

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

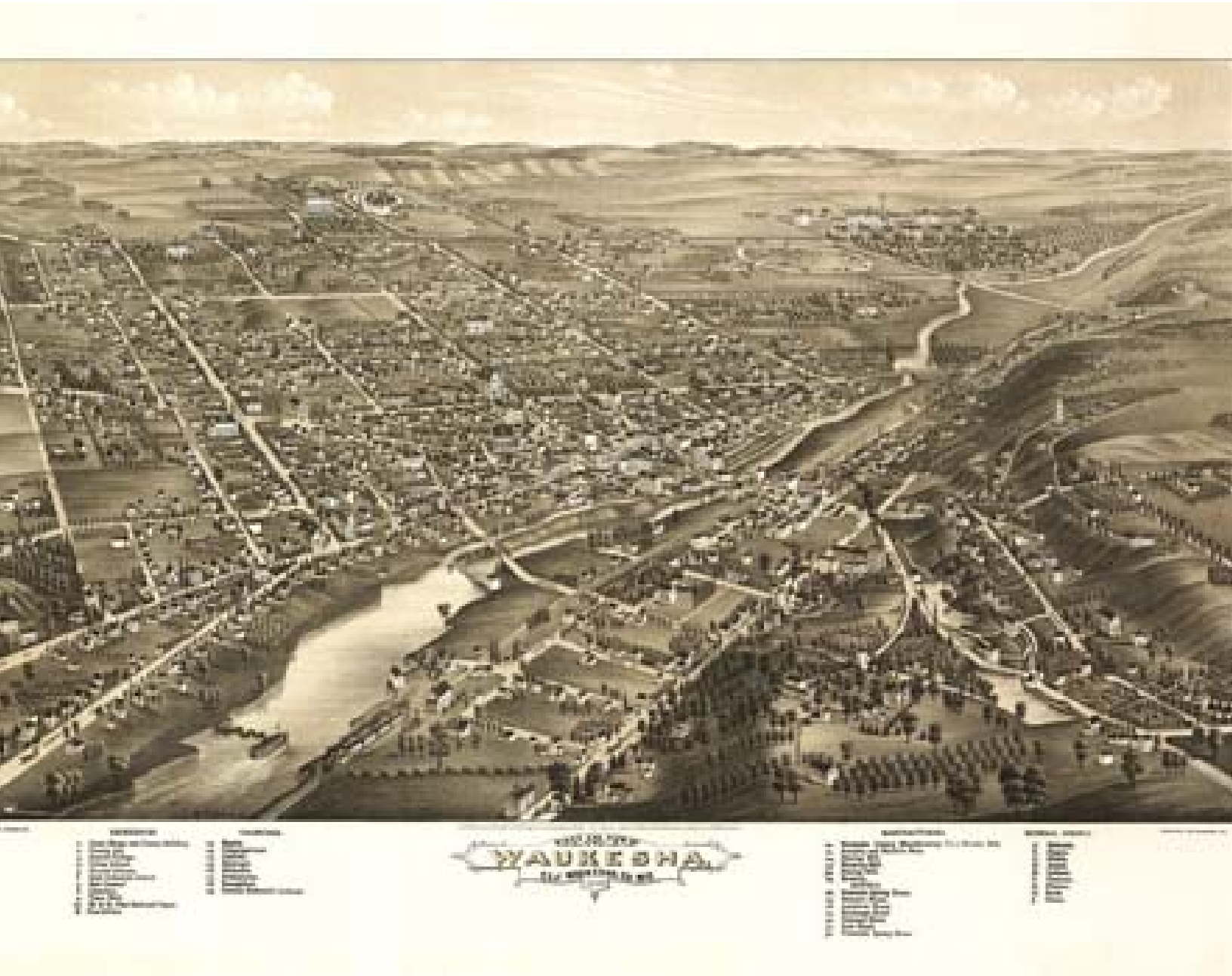
DESIGN AND CONSTRUCTION MANUAL

- Division 1 – Development Handbook
- Division 2 – Project Administration
- Division 3 – Standard Construction Specifications
- Division 4 – Standard Details
- Division 5 – Standard Bid Items

2018 Edition

*Fred V. Abadi, PhD., P.E. – Director
Department of Public Works*

DEVELOPMENT HANDBOOK



CITY OF WAUKESHA
DEPARTMENTS OF PUBLIC WORKS
AND
COMMUNITY DEVELOPMENT

2018 EDITION

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City of Waukesha
Department of Public Works

Design and Construction Manual

Division 1
Development Handbook

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**CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS**

DESIGN AND CONSTRUCTION MANUAL

**DIVISION 1
DEVELOPMENT HANDBOOK**

2018 EDITION

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0 DEVELOPMENT HANDBOOK OVERVIEW

On behalf of the City of Waukesha, we would like to take this opportunity to thank you for your investment in the City of Waukesha with your proposed development. Our goal is to provide you with clear and understandable resources to get you going with your project as soon as possible.

The Engineering Division and Planning Department have created the ***Application for Development Review (D100)*** (found in the Attachments) to guide you through the Planning and Engineering review process for the City of Waukesha. This application serves as the application for all Plan Commission projects. All Private Development submittals are reviewed by multiple departments including: Planning and Community Development, the Engineering Division of the Department of Public Works, Fire Department, and Water Utility.

The Development Handbook consists of 6 Sections relating to Private Development. The goal of the Department is to provide clear and understandable resources to get you going with your project as soon as possible.

For complex development projects, we require you to schedule a review meeting with a conceptual plan with both the Community Development Department and the Engineering Division prior to submission of a full Plan Commission application. This meeting will be coordinated by the Planning Department. The comments you will receive from the concept review meeting will aid you in preparing your full plan set in a more efficient manner. A list of contacts for each City Department is included in this document as ***Attachment K***. While you may contact individual departments for guidance when preparing your plans, the formal drawings and application forms shall be submitted to the Planning Department for review and placement on a Plan Commission Agenda. A primary contact will be assigned to coordinate review between Community Development and the Engineering Division.

The City of Waukesha website at www.waukesha-wi.gov is also a resource for additional information from each City Department. The most recent version of the City of Waukesha Code Book and Standard Construction Specifications can be found on the City's website.

1 DEVELOPMENT REQUIREMENTS AND INFORMATION

Section 1 – Development Requirements and Information outlines the start of the application process of a Private Development. This Section addresses the Development Agreement, required Financial Guarantees and Plan Sheet Standards.

The [Application for Development Review \(D100\)](#) shall be completed and included with all plan submittals. Submittals that do not include the completed Application and

appropriate Forms and Attachments will be deemed incomplete and will not be reviewed. The Applicant will be notified if the Application is found to be incomplete.

Contacts:

Dave Buechl, Dbuechl@Waukesha-wi.gov 262-524-3600

See **Attachment N** for additional contact information.

The [Private Development Process Flowchart \(Chart A\)](#) illustrates the general process for Private Development, review and approval.

2 SANITARY SYSTEM

Section 2 – Sanitary System contains information for submittal and review of developments that require Sanitary Sewer connections or installations.

3 STORM SYSTEM

Section 3 Storm System contains information for submittal and review of developments that require Storm Sewer, stormwater collection or Stormwater Management systems or BMPs.

4 ROAD SYSTEM

Section 4 – Road System contains information for submittal and review of developments that have roadways that will be dedicated public rights-of-way or connect to a public right-of-way. Plan submittals from Developers shall follow AASHTO guidelines unless otherwise noted. Street designs shall be consistent with the City's adopted Comprehensive Plan and Ordinances. Private roads shall be designed in accordance with public road standards, even in PUD's. This Section explains when a TIA must be submitted, and explains the requirements.

5 STREET LIGHTING

Section 5 – Street Lighting contains information on when developments are required by the City to provide a continuation of an existing street light system or provide a new street lighting system within the right of way of public streets of a development. When this determination has been made, the Developer will follow this guide for the specifications, design, materials, construction, testing, and acceptance to the City of Waukesha. At no time may street lights be placed within the right of way of public streets in a development without written approval from the Engineering Division.

There are instances when a Developer will need to make modifications to an existing street light system. The Developer shall follow this Section only after modifications are approved by the Engineering Division.

6 PROJECT CLOSEOUT DOCUMENTS

Section 6 – Project Closeout Documents outlines post-construction or Project Close-out requirements and documentation. This includes a Construction Binder containing all construction-related information from the CSR and Contractor performing the work, Lien Waivers, Record Drawings, Easement documents if applicable, and public sewer and roadway acceptance forms.

7 CONSTRUCTION MANAGEMENT AND REVIEW

Section 7 – Construction Management and Review outlines the requirements for Construction Management Developer Deposit, Construction Site Representatives' requirements and their general responsibilities and duties for utility and roadway construction.

8 APPENDIX A – APPLICATION FORMS AND ATTACHMENTS

D100 – Application for Development Review
Chart A – Private Development Process Flowchart
Attachment A – Development Review Checklist
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1 DEVELOPMENT REQUIREMENTS & INFORMATION

1.1 DEVELOPMENT AGREEMENT

Projects that include public infrastructure shall be required to enter into a Development Agreement.

Development agreements are intended to provide the City with the public infrastructure and amenities necessary to serve the proposed land use (development) and that they will be provided for according to an agreed-upon schedule and at a level of quality consistent with current City standards adopted by the Board of Public Works. Public benefits arising from a development agreement may include, but are not limited to, provision of public facilities such as streets, sewerage, parks/open space, transportation, schools, drainage, stormwater facilities, and utility facilities.

1.1.1 Chart A – Private Development Process Flowchart

1.2 FINANCIAL GUARANTEES

Projects that include public infrastructure and storm water facilities shall be required to guarantee the construction of the improvements through financial securities. Developer shall submit appropriate Bonding, Cash Deposit or a Letter of Credit, for review and approval to Engineering to cover the construction costs and administrative review. The Financial Guarantee shall cover the following, but not limited to, items: record drawings, televising pipes, landscaping, all public infrastructure, storm water facilities, subdivision lot grading, street grading, asphalt surface course, sanitary sewer, storm sewer, concrete curb and gutter, concrete sidewalks and ramps, driveway approaches, street construction, signage, street lighting, traffic signals, pavement markings, transformer, pump station, etc.

Chapter 236 of the Wisconsin Statute will apply and will be released 14 months after all public improvements have been completed, satisfied and accepted by the City.

1.3 ENGINEER REVIEW AND PLAN STANDARDS

1.3.1 PLAN SUBMITTAL & GENERAL PROCEDURES

1.3.1.1 Plans shall be submitted electronically in Adobe PDF format. Hard copies may be requested on occasion by the Engineering Division.

1.3.1.2 The [Application for Development Review \(D100\)](#) and associated submittal forms and Attachment(s), shall be completed and included with all plan submittals. Submissions which do not include the completed Application (D100) and appropriate Form(s) and Attachment(s) will be deemed incomplete.

- 1.3.1.3 Once a submittal is received, the Engineering Division will conduct an initial review of the application to check for completeness and accuracy.
- 1.3.1.4 If the submittal is found to be incomplete, a letter of incompleteness will be sent to the applicant indicating additional items which need to be submitted prior to a plan review being initiated. If the additional items are not submitted within 30 calendar days from the date of the letter of incompleteness, the submittal will be considered null and void and discarded. A complete separate submittal will then need to be made by the applicant upon readiness.
- 1.3.1.5 If the submittal is found to be complete, the Engineering Division will conduct a review of the plans, specifications, and submitted materials and provide review comments or approval.
- 1.3.1.6 Review comments shall be addressed by the Engineer of Record for the project or Developer as applicable. Plans may be resubmitted only after all review comments have been addressed. Resubmittals shall include a cover letter addressing each review comment, item by item, and revised plans and requested material(s) or the resubmittal will be considered incomplete and a review will not be initiated.
- 1.3.1.7 Once a plan review has been initiated, the applicant will receive correspondence within 2-4 work weeks.

1.3.2 SUBMITTAL FORMAT AND GENERAL PLAN STANDARDS

- 1.3.2.1 Plans shall include the seal and signature of the Wisconsin licensed professional engineer responsible for the preparation of the construction plans on the cover sheet or on each sheet.
- 1.3.2.2 Storm water management plan(s) and construction specifications manual(s) shall be comb bound and include the seal and signature of the Wisconsin licensed professional engineer responsible for the preparation. Other reports shall include the seal and signature of the Wisconsin licensed professional responsible for the preparation.
- 1.3.2.3 Plans shall be prepared on sheets preferably measuring 11" high by 17" wide but may be as large as 24" high by 36" wide.
- 1.3.2.4 A complete set of plans and profile construction drawings shall be submitted and approved prior to the start of construction including sanitary sewer, watermain, storm sewer, site grading, erosion control, paving, landscaping improvements, details, and cross sections. Sanitary sewer and watermain may be shown together on the same plan. Grading and Erosion Control shall be on separate sheets. Other sheets as necessary shall be included such as signage, street lighting, traffic control and detours, and property or ALTA surveys.

- 1.3.2.5 Sanitary Sewer, watermain and storm sewer system plans for the entire development shall be included.
- 1.3.2.6 A profile view shall be located below the plan view on plan and profile sheets and both views shall be aligned by stationing whenever possible. In general, stationing shall be from left to right.
- 1.3.2.7 Plan and profile sheets shall start and terminate at match lines with minimum 25 feet overlap.
- 1.3.2.8 Upon approval of construction plans, provide complete PDF and CAD files on electronic media (no Blu-Ray discs), or via acceptable electronic document transfer methods, with CAD drawings in an AutoCAD format that is compatible with the version used by the City. One set of the PDF files shall be formatted so that the plan sheets fit on an 11" x 17" sheet.

1.3.3 ALL PLAN SHEETS

- 1.3.3.1 Plan views shall show the following:
- The assumed bearing base, control monuments and stationing reference line(s)
 - Right-of-way limits and easement limits
 - Flange, face and back of curb (urban section) or edge of pavement and gravel (rural section)
 - Name of each existing, proposed, and future roadway and any intersecting roadways
 - Lot lines, lot and block numbers and found lot corners
 - Addresses for existing parcels
 - All obstructions located within the project limits including, but not limited to: trees, signs, utilities, fences, light poles, structures, etc.
 - Legend (relevant to each sheet) showing all special symbols, linetypes and hatch used
 - A note warning that underground utilities must be located by "Diggers Hotline" prior to start of construction.
- 1.3.3.2 The title block shall include at a minimum, the following information:
- Name and address of engineering (design) firm and owner/developer
 - Date of the drawing and last revision
 - Scale
 - Plan sheet number (# of #)
 - Name and location description of development
- 1.3.3.3 North shall be to the top or right of the sheet and shall be shown by a north arrow, clearly shown without intrusion.

- 1.3.3.4 The scale of the plans shall be 1" = 40' horizontally and 1" = 8' vertically for 11" by 17" plan sheets and 1" = 20' horizontally and 1" = 4' vertically for 22" by 34" sheets. Partial site plans shall have a scale of 1" = 20' or larger. Overview sheets may have an alternate scale as appropriate to the information being displayed. The scale of details shall be such that the detail is clearly shown. The scale shall be shown with a line scale and text.
- 1.3.3.5 Existing surface improvements shall be indicated with screened lines and clearly labeled.

1.3.4 COVER SHEET

- 1.3.4.1 The cover sheet shall contain the following:
- Project title
 - Location map (proximity to two main streets minimum)
 - An index of all plan sheets
 - For subdivisions, large, or phased developments, a key map showing layout and phases.
 - Reference to a minimum of two (2) current SEWRPC reference benchmarks shall be required. Survey documentation of tie to NAD 1927 State Plane Wisconsin South coordinate system (horizontal) and City of Waukesha datum (vertical) shall be provided. Elevations shown shall be based on City of Waukesha datum which may be obtained by subtracting the conversion factor of 780.558 from National Geodetic Vertical Datum (NGVD) 1929 datum. Project or plan datum is not acceptable.
 - All permanent benchmarks
 - A description of the locations of the benchmarks; and the basis or origin of the vertical control network
 - Date of preparation and applicable revision date(s)
 - The following statement: "*All site improvements and construction shown on the plans shall conform to the current City of Waukesha Design and Construction Manual. Where the plans do not comply, it shall be the sole responsibility and expense of the Developer to make revisions to the plans and/or constructed infrastructure to comply.*"

1.3.5 SITE/GRADING AND SURVEYS FOR BUILDING PERMITS

- 1.3.5.1 The plan shall show existing tree lines and any obstructions (fences, structures, power poles, etc.) within the project limits.
- 1.3.5.2 The site/grading plan and surveys for building surveys shall show:
- All proposed lot lines and lot numbers or addresses
 - Lot line dimensions and found or set lot corners
 - Outline of buildable areas for each lot

- Typical setbacks of buildable area to front, side and back lot lines. Verify side setbacks for driveways.
- All existing and proposed roads with names
- All existing buildings, structures and foundations
- All existing drainage channels and watercourses
- Emergency overflow routes
- Drainage clarified by flow arrows, high points, sags, ridges, and valley gutters
- Proposed retaining wall locations with top and bottom of wall elevations at key locations
- 100-year flood plain limit (both pre-project and post-project) and source information
- 100-year storm water surface elevation
- Wetlands with name of delineator, and date
- All environmental corridors, & or environmentally sensitive areas
- All existing and proposed easements
- Show proposed yard grade elevations, exposed rear and/or side yard elevations,.

1.3.5.3 Add the following notes to Surveys for Building Permits:

1.3.5.3.1 Builder shall provide positive gravity sanitary sewer lateral flow to main.

1.3.5.3.2 Builder shall verify basement floor elevation is at least 1 foot above the highest seasonal high-water table elevation.

1.3.5.3.3 Builder shall follow approved grading plan. A grading certification is required.

1.3.5.3.4 Builder shall verify driveway slope does not exceed 10%.

1.3.5.4 Wetland limits shall be labeled with bearings and distances and be dimensioned to lot lines. Bearings and distances may be shown in tabulated format.

1.3.5.5 Existing topography of the site and all areas within 100 feet of the site shall be shown at a one foot contour interval using City of Waukesha datum. Existing contours shall be shown as thin, dashed screened or grey lines with a readily discernable heavier line used for the 5-foot contour intervals.

1.3.5.6 Proposed grading shall be shown at a contour interval of 1 foot using City of Waukesha datum. Proposed contour lines shall be shown as solid medium lines, with a discernible heavier line use for the 5-foot contour intervals.

1.3.5.7 The yard grade and first floor elevation of any existing buildings located within 100 feet of the subdivision boundary shall be shown.

- 1.3.5.8 Show proposed road(s), curb and gutter, all storm sewer grates and storm sewer manholes (or cross-culverts for open ditches). Show any off-road storm inlets and discharge locations with surface entry elevations.
- 1.3.5.9 Spot grades shall be shown as necessary to ensure proper drainage and compliant ADA slopes and routing where applicable.
- 1.3.5.10 At front setback line show a typical house shell on each lot and the proposed yard grade to the nearest tenth of a foot (assumed to be 0.7' below the top of block) for each building. Show proposed finished elevations to the nearest tenth of a foot at all lot corners and at side lot lines adjacent to the front and back corners of the typical house. Show proposed finished elevations to the nearest tenth of a foot at high and low points along any side or back lot lines, and at high and low points if roads to demonstrate proposed drainage.
- 1.3.5.11 The grading plan for any house that will require special design due to topography, shall clearly show separate grades for the garage and yard grade if extra steps are needed. Separate spot finish elevations shall be shown for rear or side exposure or walkout.
- 1.3.5.12 Verify basement floor elevation is at least 1 foot above the highest seasonal high-water table elevation. Grading Plan shall indicate seasonal high-water table elevation.
- 1.3.5.13 Indicate minimum finished floor elevations adjacent to floodplains, ponds, creeks/channels, etc.
- 1.3.5.14 The plan shall indicate if cuts and fills will be balanced on site.
- 1.3.5.15 Proposed storm inlets shall be shown on each grading plan. Each plan shall also include specific details on all applicable retention/detention basins, ponds, overflows, etc. Separate sheets or notes may be required.
- 1.3.5.16 Follow requirements in City Storm Water Management Ordinance.
- 1.3.5.17 The plan shall show any applicable Shoreland jurisdictional lines, boundaries, WDNR Chapter 30 lines or any other environmental determinations or restrictions.
- 1.3.5.18 Depending on the development phasing, interim and final master grading plans may be required by the Engineering Division.

1.3.6 EROSION CONTROL

- 1.3.6.1 On a separate plan sheet, show erosion and sediment control measures and details including:
- Existing topography of the site and all areas within 100 feet of the site shall be shown at a one foot contour interval using City of Waukesha datum.

Existing contours shall be shown as thin, dashed screened or grey lines with a readily discernable heavier line used for the 5-foot contour intervals.

- Proposed grading shall be shown at a contour interval of 1 foot using City of Waukesha datum. Proposed contour lines shall be shown as solid medium lines, with a discernible heavier line use for the 5-foot contour intervals.
- List the total disturbed acreage including offsite areas
- Proposed limits of disturbance including proposed tree cutting areas
- Location and dimensions of all temporary topsoil and dirt stockpiles
- Location and dimensions of all appropriate best management practices (BMP)
- Phasing of BMP's with the construction activities listed / described
- Construction sequence including schedule of anticipated starting and completion date of each land disturbing and land developing activity, including the installation of the BMP measures that are needed
- Location of all channels, pipes, basins or other conveyances proposed to carry runoff to the nearest adequate outlet, including applicable design assumptions and computations
- Areas to be sodded or seeded and mulched or otherwise stabilized with vegetation, describing the type of final vegetative cover
- Areas of permanent erosion control (other than vegetation)

1.3.6.2 Follow requirements in City Storm Water Management Ordinance.

1.3.7 SANITARY SYSTEM

1.3.7.1 Proposed sewer shall be designed and located in accordance with City's Design and Construction Manual.

1.3.7.2 The plan view shall show the following:

- Screen existing utilities and lateral locations. Pipe size of existing utilities shall be labeled.
- Proposed sewer and laterals with length, size, and material type clearly labeled
- Material and size of the existing sanitary sewer being connected to
- Stub-outs labeled with length, size, slope, and invert elevations (if not profiled)
- Dimensions showing offset from right-of-way to the sewer and separation distance between other utilities
- Type and size of encasement where needed
- Flow directions of all proposed mains
- Length of each sewer lateral and height of any lateral risers. Label proposed invert elevations at right-of-way lines.
- Distance from downstream manhole to each upstream sewer lateral

- Proposed manholes and cleanouts labeled with a design plan number. Existing manholes to be labeled with numbers obtained from City records.
- Rim and invert elevations at each manhole, based on City of Waukesha datum (for private sewer if not profiled)
- Show and label all easements

1.3.7.3 The profile view shall show the following:

- Stationing
- Existing and proposed surface profiles and elevations over the sewer
- All utility crossings. Label elevations if known.
- Pipe material / class, size, length, and percent grade to two (2) decimal places
- Material and size of the existing sanitary sewer being connected to
- Material, length, type and size of encasement as needed
- Proposed manholes. Indicate type and diameter.
- Label station, rim, and invert elevations, based on City of Waukesha datum, and design plan number for each manhole and cleanout. Existing manholes to be labeled with numbers obtained from City records.
- Limits of gravel, spoil and/or slurry backfill

1.3.8 STORM SYSTEM

1.3.8.1 Proposed storm sewer shall be designed and located in accordance with City's Design and Construction Manual.

1.3.8.2 The plan view shall show the following:

- Screen existing utilities and lateral locations. Pipe size of existing utilities shall be labeled.
- Proposed sewer and laterals with length, size, and material type clearly labeled
- Material and size of the existing storm sewer being connected to
- Stub-outs labeled with length, size, slope, and invert elevations (if not profiled)
- Dimensions showing offset from right-of-way to the sewer and separation distance between other utilities
- Type and size of encasement where needed
- Length of any sewer lateral. Label proposed invert elevations at right-of-way lines.
- Proposed inlets, manholes, and other drainage structures
- Proposed drainage structures labeled with a design plan number. Existing drainage structures to be labeled with numbers obtained from City records.
- Details of outfall or ditch inlet protection requirements such as rip-rap, end sections or headwalls as needed

- Details of detention facilities outfall, overflow and control structures as needed

1.3.8.3 The profile view shall show the following:

- Stationing
- Existing and proposed surface profiles and elevations over the sewer
- All utility crossings. Label elevations if known.
- Pipe material / class, size, length, and percent grade to two (2) decimal places
- Material and size of the existing storm sewer being connected to
- Material, length, type and size of encasement as needed
- Proposed inlets manholes, and other drainage structures. Label type and size.
- Label station, rim, and invert elevations, based on City of Waukesha datum, at each manhole, inlet, and detention control structure
- Proposed drainage structures labeled with a design plan number. Existing drainage structures to be labeled with numbers obtained from City records.
- Cross-section of open channels and detention facilities, including outfall, overflow, and control structures.
- Limits of gravel, spoil, and/or slurry backfill

1.3.9 ROADWAY

1.3.9.1 For all new streets, a site-specific geotechnical evaluation and pavement design shall be submitted with the plans.

1.3.9.2 A separate detail sheet shall be required for the roadway plans. This detail sheet shall show typical cross-sections for a roadway and cul-de-sac if applicable.

1.3.9.3 Elevations shall be based on City of Waukesha datum.

1.3.9.4 The plan set of drawings shall include:

- Plan and profile views
- Intersection details
- Cross-sections at 50-ft intervals and at driveways shown on the plan

1.3.9.5 Each roadway plan sheet shall show the following:

- The assumed bearing base, control monuments and stationing reference line along the centerline of the roadway, including cul-de-sacs.
- Width of pavement and median.
- Final grade elevations at 25' intervals at the right-of-way including at the edge of pavement for rural sections or at the top of curb for urban sections.
- Final grade elevations for cul-de-sacs at 25' intervals at the right-of-way including at the edge of pavement for rural sections or at the top of curb for urban sections.

- **Label** all PVC's, PVT's, and PC's, PT's for vertical and horizontal curves
- Potential driveway locations and/or driveway restrictions for all lots adjacent to storm inlets and intersections
- Sidewalks labeled and dimensioned.
- Existing, proposed, future streets and drives labeled and dimensioned
- All roadside ditch locations, flowline elevations (based on City of Waukesha datum) at 100' intervals of the ditches.
- Slope intercepts.
- Limits of any areas which need special stabilization techniques
- Specific details of all existing connected roadways. Pavement, shoulders, ditches, curb alignment, and grades shall be shown as needed to adequately make the transition.

1.3.9.6 The profile view shall show the following:

- Stationing and final centerline grades at all 50' and 100' stations and at grade breaks
- Existing and proposed roadway profiles along centerline of roadway and cul-de-sacs.
- Invert profile for 200' downstream for any existing ditches receiving flow from a proposed road or street.
- Final grade elevations at 50' intervals for pavement centerline including at edge of pavement for rural sections and at the flange for urban sections.
- Final grade elevations for cul-de-sacs at 50' intervals, including high points, edge of pavement for rural sections and at the flange for urban sections.
- Vertical curve stationing and final centerline grades at PVC's, PVI's, PVT's, POC's at PVI's, crest/sag location and elevation, curve length and K values.
- Slope of the roadway between each grade break.
- Street grades to nearest 0.01'. Maximum and minimum grades per Section 4 of the Development Handbook.
- Sizes and inverts for all existing and/or proposed culverts.
- Limits of any areas that need special stabilization techniques.

1.3.9.7 Intersection details shall show the following:

- Radii of all intersections (edge of pavement or back of curb, with note indicating which is referenced)
- Sidewalks and accessible ramps labeled and dimensioned
- Right of way corner clips and sight visibility easements
- Spot grades as necessary to ensure proper drainage and compliant ADA slopes
- Spot grades shall be shown at end of radius for all curb and gutter and the end radius for all back of sidewalk
- Drainage clarified by flow arrows, high points, sags, ridges, etc.

- Spot grades across entire intersection and sidewalks at the following including, but not limited to locations: centerline, flange, top of curb, face of sidewalk, back of sidewalk, radii, nearest street cross-section from drawings.
- Right of way lines and easements
- Existing and proposed Lot corners

1.3.9.8 Road cross sections shall show the following:

- Right of way limits
- Slope intercepts clearly labeled
- Elevations to the nearest 0.01'
- Offset distance (left or right) from the reference line
- Final grade elevations at back of walk, face of walk, top of curb, flange elevation (edge of pavement for rural section), and the centerline of the street or roadway
- Cross slope of sidewalk, terrace area, and roadway
- Invert elevation of ditches (for rural section)

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2 SANITARY SYSTEM

All labor and material shall be governed by the latest edition and all amendments thereto of the Standard Specifications for Sewer and Water Construction in Wisconsin (SWS), and Wisconsin Department of Natural Resources (WDNR) Regulations, unless otherwise specified in these Specifications, whichever is more restrictive.

When starting an installation, the farthest downstream location of the new sanitary sewer system shall have a plug installed and maintained by the utility Contractor. That plug shall not be removed until the infrastructure field verification process and a walkthrough has been completed and the City is ready to accept the system.

2.1 STANDARDS

2.1.1 SANITARY SEWER MAIN

2.1.1.1 MATERIALS

2.1.1.1.1 All pipe used for sanitary and private main interceptor sewers shall be:

- *PVC (solid wall) SWS Section 8.10.0, ASTM D-3034, SDR-35 where cover over the pipe is 15 feet or less*
- *PVC (solid wall) SWS Section 8.10.0, ASTM D-3034, SDR- 26 where cover over the pipe exceeds 15 feet*
- *PVC (solid wall, green in color for in-ground identification) SWS Section 8.20.0, AWWA C-900*

2.1.1.2 DESIGN

2.1.1.2.1 Design flow as determined by the City Engineer, subject to the following:

2.1.1.2.1.1 *Residential/Multi-Family: gpcd = gallons per capita per day*

<i>Base Sanitary Flow</i>	<i>100 gpcd</i>
<i>Peaking Factor</i>	<i>2.5 – 4.0</i>
<i>Residential population equivalent:</i>	
<i>Efficiency or Studio Apartment: 1</i>	
<i>1 Bedroom Apartment:</i>	<i>1.5</i>
<i>2 Bedroom Apartment:</i>	<i>3</i>
<i>3 Bedroom Apartment:</i>	<i>3</i>
<i>Single Family Home:</i>	<i>3.5</i>
<i>Mobile Home:</i>	<i>2.25</i>

2.1.1.2.1.2 *Commercial, Industrial & Institutional Areas:*

- If actual water use records exist from a similar development already operating in the City of Waukesha, the past water usages for the previous four quarters or more can be obtained from the Waukesha Water Utility (WWU). The four quarters of water usage or more can be added to determine the total annual water usage and averaged with previous annual water usages to obtain an annual average water usage for the development. Another option is to provide equivalent water usage records

as previously described above from an equivalent development in another municipality for review.

- If actual water usages do not exist, then acceptable engineering references can be used to estimate annual water usages for a particular type of property. Acceptable water usage references include, but are not limited to:
 - a) Estimated Indoor Use, Table 510-1 and 510-2; Utah Water Usage Reference
 - b) U.S. Department of Energy Federal Water Use Indices; 11-08-2005;
 - c) C-2.5 Equivalent Dwelling Unit Schedule, Prince William County, VA.; 08/23/84
 - d) Section 370 Appendix B, Table 2-Commonly Used Quantities of Sewage Flows from Miscellaneous Type Facilities-Environmental Protection Agency 06/05
 - e) Water Usage Estimating Charts for Culligan Water Conditioning Equipment
 - f) Table 1-Average Flow Rate on Specific Developments; City of Oakland, CA; Sanitary sewer design guidelines; Rev. 08-18-05

2.1.1.2.2 Design flows and peaking factors are as determined by the Engineering Division. Design objectives shall result in elimination, to the greatest extent possible, of all infiltration and inflow.

2.1.1.2.3 Minimum Main sizes:

<i>Residential:</i>	<i>8"</i>
<i>Industrial / Commercial / Multi-Family & PUD:</i>	<i>8"</i>
<i>Shall accommodate future tributary areas as directed by the City Engineer.</i>	

2.1.1.2.4 Minimum slopes.

2.1.1.2.4.1 *Pipes slopes shall achieve self-cleansing velocities for peak design flows as directed by the City Engineer. Generally, minimum velocity of 2.0 fps shall be met at half-full conditions.*

<i>Pipe Size</i>	<i>Minimum Slope</i>
<i>8"</i>	<i>0.45 % (Dead end reach 0.70%)</i>
<i>10"</i>	<i>0.28 %</i>
<i>12"</i>	<i>0.22 %</i>
<i>15"</i>	<i>0.15 %</i>
<i>18"</i>	<i>0.12 %</i>
<i>21"</i>	<i>0.10 %</i>
<i>Other sizes</i>	<i>Per Engineering Division.</i>

2.1.1.2.5 Complete sewer design calculations and sewer system plans are required with construction plan submittals.

2.1.1.2.6 Conceptual sewer system plans are required for proposed developments located within the Ultimate Service Area even if sanitary sewer currently is not available. A determination is needed at the conceptual stage that future gravity sewer systems will work when needed.

2.1.1.2.7 Center of manhole shall coincide with street centerline where possible and shall be located outside of the wheel path of vehicles.

2.1.1.2.8 Invert shall not be less than:

<i>Distance below the centerline grade of the street</i>	<i>Road ROW Width</i>
<i>11.0 feet</i>	<i>60/66-ft</i>
<i>12.0 feet</i>	<i>80-ft</i>
<i>13.0 feet</i>	<i>>80-ft and cul-de-sacs</i>

2.1.1.2.9 Minimum sewer depth shall be 8 feet from finished grade to top of pipe under exceptional circumstances and shall require approval of the City.

2.1.2 SANITARY SEWER LATERALS (From main to lot line)

2.1.2.1 MATERIALS

2.1.2.1.1 All pipe used for sanitary laterals shall be:

- *PVC (solid wall) SWS 8.10.0, ASTM D-3034, SDR-35 or 26. Laterals shall have the same dimensional ratio as the sewer main.*
- *PVC (solid wall) SWS, Section 8.20.0, AWWA C-900*
- *HDPE (iron pipe sizing) SWS, Section 8.51.3, ASTM F-714, DR 17 for laterals installed by pipe bursting.*

2.1.2.1.2 Risers shall be as required by the plans in accordance with these standards or as pre-approved by the City Engineer.

2.1.2.1.3 Risers: Minimum depth below road centerline shall be per Section 2.1.1.2.8, or 5 feet below basement, whichever is greater. Sewer depth to be greater than 14 feet for riser. (Per SWS File Nos: 10A, 10B, 10C, 10D, & 10E).

2.1.2.2 DESIGN

2.1.2.2.1 Sites are allowed one (1) sanitary lateral connection. In special circumstances, additional laterals may be allowed with the written permission of the City Engineer.

2.1.2.2.2 Minimum size shall be 4" diameter.

2.1.2.2.3 Slope at 2.00%. Under exceptional conditions, the City Engineer may permit minimum slope = 1.00% in ROW/easement.

2.1.2.2.4 All connections to mains and manholes shall be in accordance with Section 2.1.3.

2.1.2.2.5 Existing laterals not used in a development shall be abandoned at the main when a development, land division or building razing occurs. See Section 2.2.

2.1.2.2.6 Each habitable building shall have a separate lateral connection to the sewer main.

2.1.2.3 REUSE OF EXISTING LATERALS

2.1.2.3.1 For all development projects requiring either Plan Commission approval and/or a Building Permit, the Developer shall provide a video of the sewer lateral to the Engineering Division for review and approval prior to the reuse of an existing lateral. Video format shall be determined by the Engineering Division.

2.1.2.3.2 In special circumstances, the City may permit the Developer to provide a \$5,000 letter of credit, cash escrow or Bond in lieu of submitting a sewer lateral video prior to issuance of a Building Permit. Once the video is received and accepted, the letter of credit, cash or Bond may be released.

2.1.3 LATERAL CONNECTIONS

2.1.3.1 Connection of new laterals to new sanitary main shall be constructed using a wye fitting.

2.1.3.2 Existing lateral reconnections to new sanitary main shall be constructed using a wye fitting.

2.1.3.3 Connection of New Sanitary Laterals to Existing Sanitary Mains shall be as follows based on existing main material:

2.1.3.3.1 ABS - Truss Pipe

- *Location - not closer than 36" to an existing joint or fitting or closer than 48" to an existing lateral.*
- *Hole - Core drill or saw-cut with appropriate cutting tools.*
- *Connection Device – Inserta Tee.*

2.1.3.3.2 Concrete Pipe

- *Location - not closer than 24" to an existing joint or fitting or closer than 48" to an existing lateral.*
- *Hole - Core with appropriate cutting tools.*
- *Connection Device – Inserta Tee.*

2.1.3.3.3 PVC Pipe

- *Location - Not closer than 36" to an existing joint or fitting or closer than 48" to an existing lateral.*
- *Hole - Core drill or saw-cut with appropriate cutting tools.*
- *Connection Device – Inserta Tee.*

2.1.3.3.4 Vitrified Clay Pipe

- *Location - not closer than 24” to an existing joint or fitting or closer than 48” to an existing lateral.*
- *Hole - Core with appropriate cutting tools.*
- *Connection Device – Inserta Tee.*

2.1.3.4 Connection of Sanitary Laterals to Sanitary Manholes will only be allowed on a case-by-case basis and when pre-approved by the City.

2.1.4 SANITARY FORCE MAIN

2.1.4.1 MATERIALS

2.1.4.1.1 All pipe used for sanitary force (pressure) mains shall be:

- *PVC (solid wall) SWS 8.51.2, AWWA C-900*
- *HDPE Force Main Pipe SWS 8.51.3, ASTM F-714*

2.1.4.1.2 All pipe shall conform to Ductile Iron Pipe OD.

2.1.4.1.3 Consult with Engineering Division for valve requirements.

2.1.4.2 DESIGN

2.1.4.2.1 Consult with Engineering Division for valve spacing.

2.1.4.2.2 Minimum design depth shall have 8 feet of cover.

2.1.4.2.3 Buried tracer location wire is required above the force main.

2.1.4.2.4 Velocity/Size:

- *Hazen-Williams formula “C” value of 120.*
- *Velocity 2.0 – 6.0 fps for lowest energy pumping cost, as approved by the City Engineer.*

2.1.4.2.5 High/Low Points:

- *Air relief valve sizing calculations shall be submitted with Plans.*
- *4-ft. minimum diameter manhole enclosures shall be installed.*

2.1.5 SANITARY MANHOLES

2.1.5.1 MATERIALS

See City of Waukesha Design and Construction Manual – Division 3 - Standard Construction Specifications – latest Edition for additional information.

2.1.5.1.1 All sanitary manholes shall be pre-cast concrete with integral base, with cone top section, Comply with ASTM C-478; 4,000 psi concrete.

2.1.5.1.1.1 Reinforced concrete flat slab as optional, with pre-approval required by the City and as shown on the Plans.

2.1.5.1.2 The manholes shall be sized as follows:

<u>Downstream Pipe Size</u>	<u>Minimum Manhole I.D.</u>
24" or less	48"
> 27"	Special Design requiring City Engineer Approval
Sampling Manhole	48"

2.1.5.1.3 All sanitary manhole cone sections shall have a minimum 3" internal vertical surface at the bottom and 2" outside vertical surface at the top.

2.1.5.1.4 All pre-cast manhole barrel joints shall be sealed with preformed butyl rubber gasket material (e.g. 'EZ-Stik' or equal).

2.1.5.1.5 All barrel & cone section lifting holes which penetrate through the structure shall be sealed with a cementitious grout with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout® by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or "plastic" consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively.

2.1.5.1.6 A frame/chimney internal rubber seal shall be installed in all manholes that conforms to SWS 8.42.0 and the following:

- *Cretex 26" LSS 0-6 Internal Chimney Seal*

2.1.5.1.7 An external sealing wrap shall be placed at all joints between pre-cast manhole sections. The external sealing wrap shall meet, or exceed, the requirements of ASTM C-877, Type II. External joint seals shall be Cretex Wrap External Manhole Joint Seals, as manufactured by Cretex Specialties Products, or pre-approved equal.

2.1.5.1.8 Internal back-plastering of the cone will not be permitted.

2.1.5.1.9 All manhole steps shall comply with SWS, Section 8.40.0 A.

2.1.5.1.10 All sanitary manhole lids (except for monitoring manholes) shall be solid, gasketed lids (self sealing) with "T" gasket, Neenah R-1660 type C platen. Frame shall be Neenah R-1661.

2.1.5.1.11 All new and rehabilitated manholes located in floodplains shall have Neenah R-1915-S1 water tight frames, gasket, and bolt down covers.

2.1.5.1.12 All manhole lids installed on manholes in public sanitary systems shall have the words "City of Waukesha" "D.P.W." in 1-inch letters stamped on the top surface. Reference Neenah 1660 – 5262. Frame shall be Neenah R-1661.

2.1.5.1.12.1 The maximum number of “City of Waukesha” stamped lids that can be ordered through the Engineering Division is five (5) STORM / SANITARY EACH. Manhole lid price is subject to change, contact the Engineering Division for pricing. The costs of the lids to be paid to the Engineering Division. Contractor shall pick up the lids from the City Garage with a 24-hour advanced notice. Payment is due before the lids can be picked up.

2.1.5.1.12.2 Monitoring manholes are described in Section 2.1.6.

2.1.5.2 DESIGN

2.1.5.2.1 Maximum distance between manholes, per Administrative Code NR-110.

2.1.5.2.2 Slope through manhole:

Angle (degrees)	Drop (feet)
0 to 10	0.10-ft. drop
>10 and <30	0.15-ft. drop
≥30 degrees	0.25-ft. drop

2.1.5.2.3 Finished frame grade:

- Floodplain areas: 2.0 feet above the 100-yr flood elevation. When practicable, grade earth at 5H:1V slope around manhole.
- Turf & easement areas: 1/4” to 1/2” below finished grade
- Pavement areas: See City of Waukesha Design and Construction Manual – Division 3 - Standard Construction Specifications.

2.1.5.2.4 Frame/Lid: All sanitary manholes shall have a heavy-duty frame with solid, gasketed self-sealing lid (T-Gasket) with concealed pick holes. Sealed bolted-down lids/frames shall be required in areas in floodplains.

2.1.5.2.5 Frame/Chimney Seals: Internal rubber seal to be installed in new manholes and when rehabilitating existing manholes.

2.1.5.2.6 Manhole chimney height: 4” minimum and 8” maximum for manholes.

2.1.5.2.7 Monitoring manholes and exterior grease tanks shall be required as directed by City. See the Monitoring Manholes section of these specifications.

2.1.5.2.8 All pre-cast manhole barrel sections shall be rotated to align all manhole steps vertically in the manhole.

2.1.5.2.9 Outside drop connections shall be provided in accordance with SWS. Inside drop connections for mains or laterals will not be permitted unless approved by the City.

2.1.5.2.10 As subsequent improvements are made to any existing manhole, chimney heights shall be reconstructed to meet the requirements of this section.

2.1.6 MONITORING MANHOLES

Users shall submit to the Department plans and specifications for the construction or modification of monitoring manholes at least 30 days before the proposed commencement of construction or modification.

2.1.6.1 MATERIALS

- 2.1.6.1.1 Manholes shall be 60" I.D. pre-cast concrete with integral base, with cone top section as standard and reinforced concrete flat slab as optional, with pre-approval required by the City.
- 2.1.6.1.2 Manholes shall be equipped with Neenah R-1661 frame and lids and internal chimney seal.
- 2.1.6.1.3 An external sealing wrap shall be placed at all joints between pre-cast manhole sections. The external sealing wrap shall meet, or exceed, the requirements of ASTM C-877, Type II. External joint seals shall be Cretex Wrap External Manhole Joint Seals, as manufactured by Cretex Specialties Products, or pre-approved equal.

2.1.6.2 DESIGN

- 2.1.6.2.1 The approach section of pipe approaching the primary gauging device must be straight for a distance of at least 20 pipe diameters with no connections, drops, or bends.
- 2.1.6.2.2 The slope of the approach distance shall be no more than 1%.
- 2.1.6.2.3 When installing a primary gauging device, the slope of the downstream outlet pipe should not be less than the upstream pipe slope. Free fall conditions should exist.
- 2.1.6.2.4 There should be no grade changes, angle points, or connections at the structure.
- 2.1.6.2.5 The sides of the channel must be plumb and straight throughout the manhole.
- 2.1.6.2.6 All manhole steps shall comply with SWS, Section 8.40.0 A. The top step shall be set at a height the does not interfere with passage of sampling equipment in or out of the manhole.

2.1.7 ADJUSTMENT RINGS

2.1.7.1 MATERIALS

- 2.1.7.1.1 All frame/casting adjusting rings shall be manufactured from ARPRO® Expanded Polypropylene (EPP), black 5000 series meeting ASTM D3575 and ASTM D4819-13; B6D7G4L3M24S2T17W7 having a 27" I.D. The rings shall be manufactured using a high compression molding process to produce a finished density of 120 g/l ((7.5 pcf). Material shall be Pro-Ring as manufactured by Cretex Specialty Products. Paving rings are not permitted.

- 2.1.7.1.1.1 “Grade” adjustment rings may contain either an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside with a flat top.
- 2.1.7.1.1.2 “Finish” or “Flat” rings may either have a keyway (groove) on the underside for vertical alignment and/or an adhesive trench with a flat upper surface. These rings shall be available in heights (thicknesses) which will allow final adjustment of the frame and cover or grate to within $\frac{1}{4}$ ” (one quarter inch) to $\frac{1}{2}$ ” (one half inch) of the specified final elevation. “Finish” rings may also have a keyway on the upper surface of the inner diameter to facilitate installation of an “Angle” ring.
- 2.1.7.1.1.3 “Angle” rings may either have an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside. When required, the “Angle” ring or rings shall allow final adjustment of the frame and cover or grate to within $\frac{1}{4}$ ” (one quarter inch) to $\frac{1}{2}$ ” (one half inch) of the specified final elevation.
- 2.1.7.1.1.4 For new manholes, the minimum height of adjusting rings for a chimney section above the cone as measured from the top of the cone or slab top shall be 4” with the maximum height of 8”. If more than 8” of adjusting rings are needed to set the casting to finished grade, then an additional barrel section shall be installed on the manhole.
- 2.1.7.1.2 Any adhesive or sealant used for watertight installation of the grade adjustment rings shall be M-1 Structural Adhesive/Sealant or equal meeting the following specifications:
- ASTM C-920, Type S, Grade NS, Class 25, Uses NT, T, M, G, A and O
 - Federal Specification TT-S-00230-C Type II, Class A.
 - Corps of Engineers CRD-C-541, Type II, Class A
- 2.1.7.1.3 Repair mortar shall be a one component, quick set, high strength, non-shrink; polymer modified cementitious patching mortar, which has been formulated for vertical or overhead use meeting the requirements of ASTM C-109 for Compressive Strength, C-348 and C-78 for Flexural Strength and C-882 for Slant Shear Bond Strength. Repair mortar shall not contain any chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming agents nor shall it promote the corrosion of any steel that it may come in contact with. Material shall be Octocrete as manufactured by IPA Systems, Inc. or approved equivalent.
- 2.1.7.1.4 Cementitious grout shall be a premixed, non-metallic, high strength, non-shrink grout which meets the requirements of ASTM C-191 and C-827 as well as CRD-C-588 and C-621. When mixed to a mortar or "plastic" consistency, it shall have minimum one day and 28-day compressive strength of 6,000 and 9,000 psi, respectively. Material shall be Ipatop-Penngrout as manufactured by IPA Systems, Inc. or approved equal.

2.1.8 GREASE INTERCEPTORS

All buildings with food service preparation on-site (now or at any future time) shall be required to install, maintain and operate an exterior or interior grease interceptor tank sized in accordance with the Department of Safety and Professional Services (DSPS). State plumbing reviews by the DSPS must be completed before a plumbing permit will be issued. Construction of the Grease Interceptor shall, in addition to requirements of the Plumbing Code, conform to the following standards. These standards are intended to minimize the potential for groundwater infiltration and inflow or rainwater from entering the sanitary sewer system via this system component.

2.1.8.1 MATERIALS

2.1.8.1.1 INTERIOR GREASE INTERCEPTOR

2.1.8.1.1.1 Interior grease interceptors shall be constructed in a watertight manner of one of the following materials

- Precast reinforced concrete
- Reinforced monolithic concrete
- Cast iron
- Coated 12-gauge steel
- Vitrified Clay
- Fiberglass
- Plastic
- Other approved materials

2.1.8.1.2 EXTERIOR GREASE INTERCEPTOR

2.1.8.1.2.1 Exterior grease interceptors shall be pre-cast concrete with integral base when required by the City Engineer and shown on the Plans.

2.1.8.1.2.2 Exterior grease interceptors shall be equipped with water-tight locking frame and lids.

2.1.8.1.2.3 All barrel joints shall have a mastic or gasket type joint seal. The exterior shall be wrapped with an additional joint seal that meets requirements of ASTM C-877, Type II, such as Cretex Wrap External Manhole Joint Seals, as manufactured by Cretex Specialties Products, or pre-approved equal.

2.1.8.1.2.4 The access or inspection chimney(s) shall have an internal chimney seal installed after construction is inspected. The internal chimney seal shall be Cretex or approved equal.

2.1.8.2 DESIGN

2.1.8.2.1 The approach section of pipe approaching the tank must be straight for a distance of at least 20 pipe diameters with no connections, drops, or bends.

2.1.8.2.2 There should be no grade changes, angle points, or connections at the structure.

- 2.1.8.2.3 In Flood Plain Areas: Tank access or inspection chimneys shall be 2.0 feet above 100-yr Flood elevations as determined via FEMA Mapping.
- 2.1.8.2.4 When practicable, grade earth at 5H:1V slope around manhole openings. In paved areas, slope drainage away from the manhole openings.
- 2.1.8.2.5 Because inlet and outlet pipe slopes are critical, the location of the exterior grease trap tank shall require prior approval of the City Engineer for location and grades. For projects requiring prior Site Plan Approval requirements, this site element shall be included on the Site Plan Submittal(s).

2.1.9 LIFT STATIONS

Consult with Engineering Division for design requirements.

2.1.10 TRACER WIRE

2.1.10.1 MATERIALS

- 2.1.10.1.1 Solid copper #10 AWG, with solid PVC insulation, SWS Section 2.11.0

2.1.10.2 DESIGN

- 2.1.10.2.1 Tracer wire on sanitary sewer shall be installed as required by the Engineering Division.
- 2.1.10.2.2 Tracer wire shall be required on all force mains. Tracer wire shall be brought to the surface in a section of PVC conduit placed vertically above the force main. A valve box top section level with the surface shall be used for access to the tracer wire. The 5¼" lid shall be of a stay-put design and embossed with the word "SEWER". A minimum of 18" of excess wire shall be brought into each valve box. Contact the Engineering Division for box location requirements.

2.1.11 BEDDING/COVER/BACKFILL

2.1.11.1 MATERIALS

- 2.1.11.1.1 Pipe Bedding and Cover Materials: Materials as required in Chapter 3.2.0 of the SWS for the application, unless otherwise permitted by the City.
- 2.1.11.1.2 Trench Backfill:
 - 2.1.11.1.2.1 Under existing or proposed pavement: Granular Backfill meeting the requirements of SWS, Section 8.43.7, Table 39. No excavated material will be allowed for reuse as trench backfill, unless otherwise permitted by the City.
 - 2.1.11.1.2.2 In non-pavement areas: Previously excavated materials meeting the requirements of SWS, Section 8.43.5 unless otherwise permitted by the City.
- 2.1.11.1.3 Slurry Backfill: Aggregate slurry in accordance with SWS, Section 8.43.8 and requirements of City, or in accordance with Excavation within the Public Right-of-Way permit, when issued.

2.1.12 CASING PIPE

Consult with Engineering Division for design requirements.

2.1.13 INSULATION

2.1.13.1 MATERIALS

2.1.13.1.1 Polystyrene board, SWS 8.50.2

2.1.13.2 DESIGN

2.1.13.2.1 All sanitary sewer pipes (mains, force mains & laterals), having less than 5.0 ft. of cover material, shall be insulated.

2.2 CONSTRUCTION

Follow construction requirements in Division 3, Standard Construction Specifications.

2.3 ABANDONMENT

2.3.1 GENERAL

2.3.1.1 All existing sanitary sewer mains and service lines, that will not be used in new or re-used in reconstruction of existing building sites, shall be abandoned at the main.

2.3.1.2 Abandonment shall be witnessed by a Construction Site Representative (CSR), a City Engineering Project Manager or the City Engineering Tech Supervisor.

2.3.1.3 Main and/or service abandonment at the street main shall be a condition of any site demolition permit(s) issued or in the case of duplication, service lines that will remain unused on new construction.

2.3.1.4 All excavations within the public rights-of-way shall require a City Excavation within the Public Right-of-Way (P103) permit.

2.3.2 SANITARY SEWER

2.3.2.1 All sanitary lines shall be abandoned at the street main fitting by:

- Excavation of the roadway and capping at the main
- Grouting the lateral at the main

2.3.2.2 Sanitary or other special manholes or structures that are part of an abandoned system shall also be abandoned in accordance with SWS Section 3.2.24 except manholes shall be removed to a depth of 3-feet below the surface or to the bottom of the cone, whichever is deeper. Structures and sewers 15 inches and larger shall be completely filled with controlled lower-strength material (CLSM / flowable fill).

2.3.2.2.1 SUBMITTALS AND SAMPLES

2.3.2.2.2 All materials of each type or use shall be from a single manufacturer. Contractor shall submit for approval six (6) sets of material specifications, certification and testing results by manufacturer on EACH material item required on the Project. Coordinate with submittals requirements in City specifications.

2.3.3 ACCEPTANCE TESTING

2.3.3.1 General

2.3.3.1.1 Deflection and Low Pressure air tests in accordance with SWS and under supervision of the Construction Site Representative or Engineering Tech Supervisor. All sewer pipes shall be laid uniformly to line and grade. Noticeable variation from true alignment and grade will be considered to be sufficient cause for rejection of the work by the City. Care should be taken to ensure that the entering pipe is forced tightly against the last pipe laid.

2.3.3.1.2 Sanitary main and lateral alignment shall be uniform in line and grade as measured from the inlet to the outlet of the pipe section. Vertical misalignment of greater than $\frac{3}{4}$ " in a single pipe section or a sag in the pipe grade extending for more (longer) than one-and-one-half (1.5) sections of pipe shall be cause for rejection. Any correction by the Contractor shall be at no cost to the City. Three (3) business days notice is required to be given to the City's Construction Site Representative to schedule testing.

2.3.3.2 Tests

2.3.3.2.1 Deflection testing for flexible mains shall be at the 95% of specified minimum I.D.

2.3.3.2.2 Sanitary Manholes shall be vacuum tested for leakage in accordance with standard test methods outlined in ASTM C-1244-93 or current edition, and minimum test time periods of:

42" & 48" dia. manholes	60 sec.
60" dia. manholes	75 sec.
72" dia. & greater manholes	90 sec.

2.3.3.2.3 The property owner shall be responsible for proper disposal of all manhole components removed. All waste materials shall be removed from pipelines and structures before abandonment. Interior manhole walls to be vacuum tested shall be dry. Sanitary manholes shall be vacuum tested from the lid down to the invert. If a vacuum test fails, all remedial sealing is to be done on the exterior of the manhole prior to re-testing following proper curing time. Manholes receiving repairs shall be vacuum tested again after repairs are completed.

2.3.3.2.4 Reports summarizing the vacuum testing shall be submitted to the City. Testing of internal seals must be with a gallon of dyed water behind the seal for a period of 1 minute without any leakage through the bottom clamp.

- 2.3.3.2.5 Prior to pre-punch list work, tracer wires shall be tested by Contractor prior to City accepting the work. The Utilities Department has the option to spot check the continuity of the tracer wires.
- 2.3.3.2.6 As part of the pre-punch list work, Contractor shall be required to clean newly installed sewer mains and have a closed-circuit television (CCTV) inspection of all sanitary sewer mains at no cost to the City. Contractor shall also clean sewer mains and have a closed circuit television (CCTV) inspection of any sewer main at new lateral connections or abandonment.

2.3.4 CLEANING

2.3.4.1 Cleaning Precautions:

- During the cleaning process, all efforts shall be made to keep foreign materials and water from adjoining sewer systems.
- Contractor shall clean all sanitary sewer line sections between manholes using high-velocity jet, or mechanically powered equipment. All dirt, sand, rocks, and other solid or semi-solid material resulting from the construction of the system shall be removed before acceptance.

2.3.4.2 Contractor shall repair all visible damage and leaks in the mains.

- 2.3.4.2.1 This procedure is in addition to any testing required by SWS Acceptance of sewer line cleaning and construction will be made upon the successful completion of the CCTV inspection and to the satisfaction of the Utility Department. If the CCTV inspection shows the cleaning to be unsatisfactory, the Contractor shall be required to re-clean and re-inspect the sewer line until the cleaning is shown to be satisfactory.

2.3.4.3 During Manhole Rehabilitation Projects:

Verify the cleanliness of all manholes that were adjusted as part of the Contract including cleaning of the steps. Advise the contracted inspector of any questionable manholes where cleanliness may be in question. Contractor shall be responsible for bringing this information to the attention of the Utilities Department contact identified at the Pre-Construction Meeting.

- 2.3.4.3.1 All sanitary sewers shall be left in a completely cleaned condition after manhole rehabilitation has been completed. All mortar, construction debris and asphalt shall be removed from lid slots, between the manhole lid and frame, as well as on the manhole walls and bench to the sewer flow line. All flow lines must be cleaned, allowing flow without obstructions. If Utilities Department personnel have to remove any debris that is left in structures and/or sewer lines after the manhole adjustments have been completed, time and equipment costs will be billed to the Prime Contractor.

2.3.5 TELEVISIONING

2.3.5.1.1 Follow televising requirements in City specifications.

END OF SECTION

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3 STORM SYSTEM

3.1 STANDARDS

All labor and material provided under this contract shall be governed by the latest edition and all amendments thereto of the Standard Specifications for Sewer and Water Construction in Wisconsin (SWS) and State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, unless otherwise specified in these standards, whichever is more restrictive. THESE STANDARDS SHALL APPLY TO ALL PUBLIC STORM SEWERS. Any and all modifications to these standards shall be approved by the City Engineer.

3.1.1 STORM SEWER PIPE

3.1.1.1 MATERIALS

3.1.1.1.1 Storm sewers shall be constructed with reinforced concrete pipe per SWS, Section 8.6.0.

- *Class V for 12-inch diameter pipe*
- *Class IV for 15-inch diameter pipe*
- *Class III for 18-inch diameter pipe and larger*
- *Reinforced Concrete Pipe – ASTM C76*
- *Horizontal Elliptical Reinforced Concrete Pipe – ASTM C507.*
- *Joints for concrete storm sewer pipe shall have rubber gaskets conforming to SWS, Section 8.41.2*
- *ADS N-12 or PVC pipe shall not be used without prior approval by the City.*

3.1.1.1.2 Where permitted by the City, PVC storm sewer shall be PVC (solid wall) SWS Section 8.10.0, ASTM D-3034, SDR-35.

3.1.1.2 DESIGN

3.1.1.2.1 Minimum size: 12-inch diameter.

3.1.1.2.2 Pipe cover:

- *3 feet minimum from finish design grade to outside top of storm sewer, or as approved by the City.*

3.1.1.2.3 Reinforced concrete flared end sections shall be used at the outfall of the storm sewer. Storm sewers with diameters 24" or greater equivalent, daylighting in ditches, shall have safety grates meeting design standards installed at the upstream and downstream ends.

3.1.1.2.4 Mainline and conveyance storm sewer design storm: Minimum 10-yr. storm event; Storm sewers may not be surcharged in a 10-yr. or less design storm condition. Surcharge condition is defined as to the crown of pipe (full pipe flow - no pressure).

3.1.1.2.5 Minimum slope shall be that which achieves a minimum velocity of 2.0 feet per second when pipe is flowing full. City may limit maximum velocities.

3.1.1.2.6 Complete sewer design calculations are required with submittals, including drainage area maps and time of concentration calculations. Use Rational Method or TR-55 Method. Site specific conditions may necessitate the need to calculate the hydraulic grade line. Headwater or tailwater conditions may affect the storm water computations and shall be considered as warranted.

3.1.1.2.7 Existing field tiles shall be connected to a storm sewer or have a positive outfall provided.

3.1.2 STORM LATERALS (From main to lot line)

3.1.2.1 MATERIALS

3.1.2.1.1 Unless otherwise specified, all pipe used for storm laterals shall be:

- *Class III concrete sewer pipe; or*
- *PVC (solid wall) SWS Section 8.10.0, ASTM D-3034, SDR-35.*
- *ADS N-12 pipe shall not be used without prior approval by the City.*

3.1.2.2 DESIGN

3.1.2.2.1 Minimum size in ROW / Easement areas shall be 6" diameter.

3.1.2.2.2 The minimum slope on laterals shall be 1.00%.

3.1.2.2.3 The maximum slope on laterals shall be 4.00%.

3.1.2.2.4 Minimum cover for storm sewer laterals in paved areas shall be 12" as measured from the top of the pipe to the top of the subgrade.

3.1.2.2.5 Connection of laterals to storm sewer shall be subject to following:

- *Hole - Core drill only.*
- *Connection Device - Kor-N-Seal boot, or pre-approved equal with stainless steel snap-in ring.*
- *Any lateral that is connected into a manhole shall have a smooth concrete bench/channel placed to convey lateral flow into the storm sewer.*

3.1.2.2.6 Storm sewer lateral lines should be designed to receive the storm water runoff from window wells, footing drains and sump pumps.

3.1.2.2.7 In areas with storm sewer where high ground water is known to exist, the City may require a storm sewer lateral be provided for each lot or building.

3.1.2.2.8 Covers installed on lateral cleanouts shall not be bolted to the cleanout pipe.

3.1.2.2.9 A temporary 2" x 6" stake shall be placed at the end of each storm lateral.

3.1.3 CULVERTS

3.1.3.1 MATERIALS

3.1.3.1.1 Culverts shall be manufactured and installed in accordance with the requirements of the WisDOT Standard Specifications.

3.1.3.1.2 Damaged or rusted culvert pipes shall not be reused.

3.1.3.2 DESIGN

3.1.3.2.1 Culverts located in a minor storm water management system shall be designed to safely convey surface water runoff from a 25-year storm event. Culverts may not be surcharged in a 25-year or less design storm condition. Surcharge condition is defined as to the crown of pipe (full pipe flow – no pressure). In some cases, culverts may need to be designed for a 100-year storm event.

3.1.3.2.2 Minimum size shall be 12" diameter for driveways and 15" for roadway cross culverts.

3.1.3.2.3 All crossroad culverts shall be designed to provide a minimum of 18" of cover to the top of the pipe at the edge of the finished pavement of the road.

3.1.4 FLARED END SECTIONS

3.1.4.1 MATERIALS

3.1.4.1.1 The end sections shall be in accordance with the requirements of the WisDOT Standard Specifications.

3.1.4.2 DESIGN

3.1.4.2.1 In areas with greater than 35 miles per hour, flared end sections shall be required to be installed on the ends of any driveway culvert.

3.1.5 DITCHES

3.1.5.1 DESIGN

3.1.5.1.1 Slopes.

- *1½% minimum*
- *4% maximum*

Alternative methods upon approval of the City.

3.1.5.1.2 Foreslope: 4H:1V maximum.

3.1.5.1.3 Backslope: 4H:1V preferred, 3H:1V maximum.

3.1.5.1.4 The minimum ditch depth shall be 12" below the shoulder point at roadway high points. Other ditch locations shall have a minimum depth of 20" below the shoulder point and be graded to accommodate a properly sized driveway culvert.

- 3.1.5.1.5 Adopt and administer the WDNR Technical Standards 1053, 1058, and 1059 for erosion control. All roadside ditches shall be covered with a minimum of 4" of topsoil, and either seeded, fertilized and matted or sodded. Sod placement shall be required on longitudinal slopes greater than 4%.
- 3.1.5.1.6 If the back slope of a ditch extends beyond the right-of-way, drainage easements shall be required adjacent to the street right-of-way at a uniform distance from the road centerline, as approved by the City Engineer.
- 3.1.5.1.7 Turf reinforcement may be used as in ditches with slopes between 4% - 5%. City shall pre-approve turf reinforcement type.

3.1.6 STORM MANHOLE

3.1.6.1 MATERIALS

- 3.1.6.1.1 All storm manholes shall be pre-cast concrete with integral base and offset cone.
- 3.1.6.1.2 The manholes shall be sized as follows:

<u>Downstream Pipe O.D.*</u>	<u>Minimum Manhole I.D.</u>
30" or less	48"
31" – 36"	60"
37" – 42"	72"
> 42"	Special Design Requiring Engineer Approval
*O.D. is the largest horizontal outside pipe dimension	

- 3.1.6.1.3 Confirm design manhole sizing with Cretex Manhole Calculator or similar.
- 3.1.6.1.4 Where field conditions do not permit an offset cone, the manhole shall be constructed with a flattop (slab or deck) with an opening for the casting.
- 3.1.6.1.5 All lifting holes which penetrate through the structure shall be sealed with a cementitious grout with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout® by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or "plastic" consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively. Dry stacking of flat decks shall not be permitted.
- 3.1.6.1.6 Steps shall not be installed in manholes.

3.1.7 INLETS

3.1.7.1 MATERIALS

- 3.1.7.1.1 Shall consist of pre-cast concrete. All inlets shall be designed and constructed to allow easy access for maintenance and cleaning.

3.1.7.1.2 Size (minimum).

- *Rectangular 24" x 36" (Internal Dimensions).*
- *Round 48" ID*

3.1.7.1.3 All inlets shall have a 2-foot deep sump below the outlet pipe invert elevation.

3.1.7.1.4 Steps shall not be installed in inlets.

3.1.7.1.5 Where directed by the City, a continuous 4" diameter perforated, corrugated polyethylene drain pipe shall be installed under the curb and gutters and extend 50 feet in either direction from storm water inlets located at low points. For inlets in other locations, the 50-ft length of drainage pipe shall be connected only to the upstream side.

3.1.7.1.6 Where underdrain pipe is specified, a 4" diameter hole shall be cored in opposite sides of each inlet located at low points to allow the connection of 4" diameter perforated, corrugated polyethylene underdrain pipe. Inlets located in other locations shall have a 4" diameter hole cored in the upstream side to allow the connection of 4" diameter underdrain pipe. The holes shall be cored at an elevation that is below the subgrade elevation to allow for positive drainage and proper placement of the underdrain. See 3.1.9.2 for underdrain Materials requirements.

3.1.7.1.7 All lifting holes which penetrate through the structure shall be sealed with a cementitious grout bed with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout® by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or "plastic" consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively.

3.1.7.2 DESIGN

3.1.7.2.1 Inlet capacity design storm: Minimum 10-yr. storm event. In a 100-yr. storm event, the maximum spread of ponded storm water shall be 10 feet as measured from the face of curb on a residential street and 3 feet as measured from the face of curb on a major street.

3.1.7.2.2 Inlet capacity design storm: 100-yr. storm event for areas with no overland flow relief.

3.1.7.2.3 Where only front yard drainage flows to the curb, maximum separation or run to an inlet is 300 feet unless, in the opinion of the City, a lesser distance is required. Where the collective drainage from more than one lot discharges over the curb at a single point, an inlet shall be required at the lot line extended.

3.1.8 FIELD INLETS

3.1.8.1 MATERIALS

- 3.1.8.1.1 Shall consist of pre-cast concrete construction.
- 3.1.8.1.2 Inlets shall be designed and constructed to allow easy access for maintenance and cleaning.
- 3.1.8.1.3 All lifting holes which penetrate through the structure shall be sealed with a cementitious grout bed with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout® by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or “plastic” consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively.

3.1.8.2 DESIGN

- 3.1.8.2.1 Inlet capacity design storm: In a 100-yr. storm event, the maximum spread of ponded storm water shall be 10 feet.
- 3.1.8.2.2 Inlet capacity design storm: 100-yr. storm event for areas with no overland flow relief.

3.1.9 ROAD UNDERDRAINS

3.1.9.1 GENERAL

- 3.1.9.1.1 Underdrain systems shall be installed under curb and gutters to collect water and convey it to inlets. The required site specific geotechnical evaluation and pavement design report submitted by the Developer shall address any recommendation to install underdrains. The City will make the final determination if road underdrains are to be included in the design including extents and locations.

3.1.9.2 MATERIALS

- 3.1.9.2.1 The underdrain system shall be constructed with:
- *4” diameter perforated, corrugated polyethylene drainage pipe meeting the requirements of AASHTO Designation: M-252.*
 - *Pipe perforations may be holes or slots and may be in 3 or 4 lines spaced around the circumference of the pipe at 120° or 90° respectively.*
- 3.1.9.2.2 The trench shall be backfilled with open graded ¾” crushed stone.

- 3.1.9.2.3 Geotextile fabric, as specified in Section 612.2.8 of the WisDOT Standard Specifications, shall be used to line the underdrain trench before the drainage pipe is installed and backfilled. Enough fabric shall be provided as to cover the sides and bottom of the trench and overlap across the top of the trench by a minimum of 4 inches.

3.1.9.3 DESIGN

- 3.1.9.3.1 The 4" drainage pipe shall be laid in an 8" deep by 8" wide trench with flat bottom with square sides. The trench, constructed at an elevation lower than the base course, shall extend 50 feet in either direction from a storm water inlet located at the low point of the road, aligned with the proposed centerline of the flange of the curb and gutter. For inlets in other locations, the 50' drainage pipe shall be connected only to the upstream side.
- 3.1.9.3.2 The drainage pipe shall be connected to inlets in cored holes and grouted in-place in the cored holes. The end of drainage pipe opposite the inlet shall be capped with a cap suitable for installing on the drainage pipe.

3.1.10 BEHIND CURB COLLECTORS

3.1.10.1 MATERIALS

- 3.1.10.1.1 Where required by the City, all behind the curb collector systems shall be constructed with minimum 6" diameter PVC (SDR 35) pipe.

3.1.10.2 DESIGN

- 3.1.10.2.1 Connected to sump pump drainage lines in lieu of storm sewer.
- *36" from flow line to surface.*
 - *1 % minimum grade.*
 - *300-ft. maximum run to outlet.*
 - *Maximum run of 250 feet in curvilinear street.*
 - *Maximum of 4 lots contributing area.*
- 3.1.10.2.2 Behind the curb collector systems shall be installed 2' behind the curb at cul-de-sacs and hill crests where storm sewers are not located.
- 3.1.10.2.3 The collector pipe shall be connected to the nearest inlet.
- 3.1.10.2.4 A clean out shall be installed at the upstream end of the collector system.
- 3.1.10.2.5 Sump lines for lots not served by the storm sewer shall be connected to the PVC collector pipe by a wye or tee fitting.
- 3.1.10.2.6 Tracer wire installation is required on all behind the curb collector pipe.

3.1.11 FRAMES, GRATES AND LIDS

3.1.11.1 MATERIALS

- 3.1.11.1.1 Vertical curb inlet frames and grates shall be Neenah R-3290.
- 3.1.11.1.2 Depressed curb inlet frames and grates shall be Neenah R-3290-A for driveway curb head reductions.
- 3.1.11.1.3 Field inlet beehive grates shall be Neenah R-2560-E.
- 3.1.11.1.4 Manhole frames and grates in inlet applications shall be Neenah R-2467.
- 3.1.11.1.5 Manhole frames and lids in non-inlet applications shall be Neenah R-1661. Covers shall have machined bearing surface and shall have eight (8) vent holes.
- 3.1.11.1.6 Manhole lids installed on manholes in public storm systems shall have the words “City of Waukesha” “D.P.W.” in 1-inch letters stamped on the top surface. Reference Neenah 1660 – 5262. Frame shall be Neenah R-1661.
 - 3.1.11.1.6.1.1 *The maximum number of “City of Waukesha” stamped lids that can be ordered through the Engineering Division is five (5) STORM / SANITARY EACH. Manhole lid price is subject to change, contact the Engineering Division for pricing. The costs of the lids to be paid to the Engineering Division. Contractor shall pick up the lids from the City Garage with a 24-hour advanced notice. Payment is due before the lids can be picked up.*
- 3.1.11.1.7 A pipe grate shall be installed on all flared end sections with sewer diameters 24” or greater equivalent.

3.1.12 ADJUSTMENT RINGS

3.1.12.1 MATERIALS

- 3.1.12.1.1 All frame/casting adjusting rings shall be manufactured from ARPRO® Expanded Polypropylene (EPP), black 5000 series meeting ASTM D3575 and ASTM D4819-13; B6D7G4L3M24S2T17W7. The rings shall be manufactured using a high compression molding process to produce a finished density of 120 g/l ((7.5 pcf). Material shall be Pro-Ring as manufactured by Cretex Specialty Products.
 - 3.1.12.1.1.1 Paving rings are not permitted.
 - 3.1.12.1.1.2 “Grade” adjustment rings may contain either an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside with a flat top.

- 3.1.12.1.1.3 “Finish” or “Flat” rings may either have a keyway (groove) on the underside for vertical alignment and/or an adhesive trench with a flat upper surface. These rings shall be available in heights (thicknesses) which will allow final adjustment of the frame and cover or grate to within $\frac{1}{4}$ ” (one quarter inch) to $\frac{1}{2}$ ” (one half inch) of the specified final elevation. “Finish” rings may also have a keyway on the upper surface of the inner diameter to facilitate installation of an “Angle” ring.
- 3.1.12.1.1.4 “Angle” rings may either have an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside. When required, the “Angle” ring or rings shall allow final adjustment of the frame and cover or grate to within $\frac{1}{4}$ ” (one quarter inch) to $\frac{1}{2}$ ” (one half inch) of the specified final elevation.
- 3.1.12.1.1.5 For new manholes, the minimum height of adjusting rings for a chimney section above the cone as measured from the top of the cone or slab top shall be 4” with the maximum height of 8”. If more than 8” of adjusting rings are needed to set the casting to finished grade, then an additional barrel section shall be installed on the manhole.
- 3.1.12.1.2 Any adhesive or sealant used for watertight installation of the manhole grade adjustment rings shall be M-1 Structural Adhesive/Sealant or equal meeting the following specifications:
- *ASTM C-920, Type S, Grade NS, Class 25, Uses NT, T, M, G, A and O*
 - *Federal Specification TT-S-00230-C Type II, Class A.*
 - *Corps of Engineers CRD-C-541, Type II, Class A*
- 3.1.12.1.3 Repair mortar shall be a one component, quick set, high strength, non-shrink; polymer modified cementitious patching mortar, which has been formulated for vertical or overhead use meeting the requirements of ASTM C-109 for Compressive Strength, C-348 and C-78 for Flexural Strength and C-882 for Slant Shear Bond Strength. Repair mortar shall not contain any chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming agents nor shall it promote the corrosion of any steel that it may come in contact with. Material shall be Octocrete as manufactured by IPA Systems, Inc. or approved equivalent.
- 3.1.12.1.4 Cementitious grout shall be a premixed, non-metallic, high strength, non-shrink grout which meets the requirements of ASTM C-191 and C-827 as well as CRD-C-588 and C-621. When mixed to a mortar or “plastic” consistency, it shall have minimum one day and 28-day compressive strength of 6,000 and 9,000 psi, respectively. Material shall be Ipatop-Penngrout as manufactured by IPA Systems, Inc. or approved equal.

3.1.13 SUMP PUMPS, DOWN SPOUTS, AND ROOF DRAINS

3.1.13.1 DESIGN

- 3.1.13.1.1 The City may require sump pumps to be connected to a storm sewer system if one exists adjacent to the lot.
- 3.1.13.1.2 Down spouts and roof drains may be connected to the storm sewer or behind the curb collector pipe. Connections shall be in accordance with the applicable building code.
- 3.1.13.1.3 When sump pumps, down spouts and roof drains discharge on the ground, they shall do so in such a manner that:
- *Adjoining properties are not adversely affected.*
 - *If no drainage easement exists along a side or rear lot line, the discharge point within the site, shall be at least 10' from the lot line.*
 - *If a public open drainage easement exists adjacent to any lot, the discharge point for down spouts and/or roof drains may be discharged directly into the easement.*

3.1.14 BEDDING/COVER/BACKFILL

3.1.14.1 MATERIALS

3.1.14.1.1 Pipe Bedding and Cover Materials: Materials as required in Chapter 3.2.0 of the SWS for the application, unless otherwise permitted by the City.

3.1.14.1.2 Trench Backfill:

3.1.14.1.2.1 *Under existing or proposed pavement: Granular Backfill meeting the requirements of SWS, Section 8.43.7, Table 39. No excavated material will be allowed for reuse as trench backfill, unless otherwise permitted by the City.*

3.1.14.1.2.2 *In non-pavement areas: Previously excavated materials meeting the requirements of SWS, Section 8.43.5 unless otherwise permitted by the City.*

3.1.14.1.3 Slurry Backfill: Aggregate slurry in accordance with SWS, Section 8.43.8 and requirements of City, or in accordance with Excavation within the Public Right-of-Way permit, when issued.

3.2 CONSTRUCTION

3.2.1 GENERAL

3.2.1.1 Construction shall be in accordance with the City of Waukesha's Design and Construction Manual, Division 3 - Standard Construction Specifications, latest Edition.

3.2.2 SUBMITTALS AND SAMPLES

3.2.2.1 All submittals shall be in accordance with the City of Waukesha's Design and Construction Manual, Division 3 - Standard Construction Specifications, latest Edition, Section 5.1.3.

3.2.3 ACCEPTANCE TESTING

3.2.3.1 General

- 3.2.3.1.1 All sewers, leads, and laterals shall be televised within the project and/or disturbed area limits by an independent television inspection service. Televising shall be in accordance with the City of Waukesha's Design and Construction Manual, Division 3 - Standard Construction Specifications, latest Edition, Section 5.3.10.

END OF SECTION

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4 ROAD SYSTEM

Follow AASHTO guidelines unless otherwise noted. Street designs shall be consistent with the City's adopted Comprehensive Plan. Private roads shall be designed in accordance with public road standards, even in PUD's.

4.1 GEOMETRICS

4.1.1 RIGHT-OF-WAY WIDTHS

4.1.1.1 Right-of-way widths shall be in accordance with Municipal Code § 23.06(3).

4.1.2 PAVEMENT WIDTHS

4.1.2.1 Pavement widths shall be in accordance with Municipal Code § 23.06(4).

4.1.3 CUL-DE-SACS

4.1.3.1 The use of cul-de-sacs is discouraged. Cul-de-sacs may only be implemented with approval of the City Engineer.

4.1.4 STREET GRADES

4.1.4.1 Street grades shall be in accordance with Municipal Code § 23.06(5)

4.1.5 CROSS SLOPE

4.1.5.1 All typical roadway sections shall have a crown, with a cross slope of 2% from the pavement centerline to the edge of pavement (flange of the curb and gutter).

4.1.6 HORIZONTAL CURVES

4.1.6.1 Horizontal curve requirements shall be in accordance with Municipal Code § 23.06(5).

4.1.7 VERTICAL CURVES

4.1.7.1.1 Minimum horizontal curve requirements shall be in accordance with Municipal Code § 23.06(5).

4.1.7.1.2 Maintain "K" Values per AASHTO Geometric Design of Highways and Streets, Current Edition including all updates.

4.1.8 SIGHT DISTANCE

4.1.8.1 For minimum sight distance requirements at intersections and driveways, refer to AASHTO Geometric Design of Highways and Streets, Current Edition including all updates.

4.1.9 CORNER RADII

4.1.9.1 Radii shall be in accordance with Municipal Code § 23.06(6).

- 4.1.9.2 Corner radii at intersections to external roadways, shall be as approved by the City Engineer.

4.1.10 ACCELERATION / DECELERATION / BYPASS LANES

- 4.1.10.1 Any roadway intersecting with a collector or arterial street projected to have more than 100 ADT shall require Acceleration/Decelerations/Bypass Lanes per WisDOT SDD 9A1.

4.1.11 TRANSITIONS

- 4.1.11.1 Transitions areas, such as lane additions, bypass lanes, traffic shifting lanes, and areas between existing pavement and new pavement sections with varying widths, shall be transitioned at a ratio of 15:1 (widen 1 foot in 15 feet).

4.2 STANDARDS

These standards shall apply to all public and private roadways. All modifications shall be approved by the City Engineering Division.

4.2.1 SUBGRADE

4.2.1.1 DESIGN

- 4.2.1.1.1 Soil borings to a minimum depth of 10 feet below finish grade shall be taken every 500 feet along the proposed centerline of the roadway, or as required by City Engineering. A site map showing the location of the borings along with laboratory soils classifications for each boring shall be submitted to the City.

4.2.2 GEOTEXTILE FABRIC

4.2.2.1 MATERIALS

- 4.2.2.1.1 Material shall be in accordance with the City of Waukesha's Design and Construction Manual, Division 3 - Standard Construction Specifications, latest Edition, Section 4.

4.2.3 BASE COURSE

4.2.3.1 MATERIALS

- 4.2.3.1.1 The crushed aggregate base course for the roadway shall consist of dense graded base conforming to Wisconsin Department of Transportation (WisDOT) Standard Specification Section 305. See also Design and Construction Manual, Division 3, Standard Construction Specifications, Section 4.

4.2.3.2 DESIGN

4.2.3.2.1 The base course thickness shall be a minimum of:

	Asphalt Pavement	Concrete Pavement
Residential streets	12"	8"
Commercial and industrial	14.5"	10"

4.2.4 SHOULDERS

4.2.4.1 MATERIALS

4.2.4.1.1 The aggregate for shoulder shall consist of crushed stone conforming to WisDOT Standard Specification Section 305 for 3/4-inch dense graded base. See also Design and Construction Manual, Division 3, Standard Construction Specifications, Section 4.

4.2.4.1.2 Recycled asphalt is not an acceptable material.

4.2.5 ASPHALT PAVEMENT

4.2.5.1 MATERIALS

4.2.5.1.1 Asphalt pavement materials shall be in accordance with the requirements of the Standard Construction Specifications.

4.2.5.1.2 The Contractor shall submit the mix design and receive the approval of the City two weeks prior the preconstruction conference. The following applies:

	Binder		Surface	
	Mix Design	Min. Thickness	Mix Design	Min. Thickness
Residential streets	Type 3 LT 58-28 H	3" (one lift)	Type 5 LT 58-28 H	2"
Commercial and industrial	Type 4 LT* 58-28 H	2" (Upper)	Type 5 LT* 58-28 H	1.5"
	Type 3 LT* 58-28 H	2.5" (Lower)		

**MT mix may be required as directed by the City Engineering Division.*

4.2.5.1.2.1 *Mix designs for all other classifications shall be as approved by the City Engineering Division.*

4.2.6 CONCRETE PAVEMENT

4.2.6.1 MATERIALS

4.2.6.1.1 Portland Cement used in all concrete mixes shall be in accordance with the Standard Construction Specifications.

4.2.6.2 DESIGN

Residential streets	Non-Reinforced	8"
Commercial and industrial	Doweled	9"

4.2.6.2.1.1 *Alternative designs shall be as approved by the City Engineering Division.*

4.2.7 CURB AND GUTTER

4.2.7.1 MATERIALS

4.2.7.1.1 Portland Cement used shall be in accordance with the Standard Construction Specifications.

4.2.7.1.2 Concrete Curb and Gutter shall be a standard 6" vertical face curb and gutter type that is 30" wide (6" top curb and 24" flange). See the City of Waukesha Design and Construction Manual, Division 4 - Standard Details.

4.2.7.2 DESIGN

4.2.7.2.1 Minimum curb grade: 0.5 % (along the gutter flow line).

4.2.8 ROAD UNDERDRAIN PIPE

4.2.8.1 MATERIALS

4.2.8.1.1 See Section 3.1.9.

4.2.9 DRIVEWAYS

4.2.9.1 DESIGN

4.2.9.1.1 Driveway approaches are to be constructed by removing existing curb and gutter and installing poured in-place concrete. This activity requires a Construction Permit issued by the City.

4.2.9.1.2 Driveway slopes shall not exceed 10%.

4.2.9.1.3 For commercial, industrial and multi-family buildings, if the initial 25 feet of driveway is deemed to be an accessible passenger loading zone, the American Disabilities Act (ADA) requires accessibility routes with longitudinal slopes of not greater than 5% and cross slopes of 2% to be connected to the loading zone and the accessible building entrance.

4.2.9.1.4 AASHTO Sight Distance requirements shall be required at all driveway locations.

4.2.9.1.5 Driveways shall be in accordance with Municipal Code § 6.13

4.2.9.2 RESIDENTIAL DRIVEWAYS

4.2.9.2.1 Only one driveway is allowed per parcel for residential developments.

4.2.9.2.2 For multi-family developments, the Plan Commission may grant one or more additional access points, based on the size of the development.

4.2.9.3 **COMMERCIAL DRIVEWAYS**

4.2.9.3.1 The number of commercial driveways shall be the minimum necessary to provide reasonable access for regular traffic and emergency vehicles, while preserving operations and safety along the public roadway. Unless a Traffic Impact Analysis (TIA) shows that a single driveway cannot provide this, only one driveway access will be permitted unless one or more of the following conditions are met.

- *The continuous frontage of the parcel is over 300 feet long, in which case an additional driveway per each 300 feet or frontage may be granted by the Plan Commission.*
- *Two one-way driveways may be permitted along frontage of at least 150 feet provided the driveways do not interfere with operations at other driveways or along the street.*
- *The Plan Commission may determine additional driveways are justified due to the amount of traffic generated by the use without compromising traffic operations along the public street.*
- *All commercial driveways along roadways with vertical face curb and gutter shall be constructed with a minimum of a driveway apron. Certain locations with heavy amounts of traffic will need to use a street type entrance as directed by the City.*

4.2.10 **PARKING LOTS**

4.2.10.1 Off street parking lots shall be designed to accommodate traffic volumes and pedestrian circulation based on the land use served.

4.2.10.2 The internal circulation pattern shall be designed with 24-ft. wide driving aisles (measured from edge of pavement marking to edge of pavement marking) for two-way traffic to allow users to maneuver in an efficient & safe manner.

4.2.10.3 The use of landscaped islands & medians shall be used to provide positive guidance to motorist and establish proper driving patterns.

4.2.10.4 Sidewalks adjacent to parking stalls shall be 8 feet wide. Smaller sidewalks may be allowed with prior City approval. Appeals may be made to the Plan Commission.

4.2.10.5 Turning radii for a single unit truck (SU Design Vehicle) shall be provided as a minimum to all portions of the lot.

4.2.10.6 Pavement:

- *General parking areas are recommended to have at least a minimum of 8-inches of crushed aggregate base course and 4-inches of LT Asphaltic Concrete.*
- *Areas of heavy traffic, such as loading docks, shall have at least a minimum of 10-inches of crushed aggregate base course and 6-inches of LT Asphaltic Concrete.*

4.2.10.7 Refer to Municipal Code § 22.53 for additional Parking Lot Standards.

4.2.11 SIDEWALK

4.2.11.1 MATERIALS

4.2.11.1.1 Sidewalk materials shall be in accordance with the Standard Construction Specifications and Municipal Code § 6.08.

4.2.11.2 DESIGN

4.2.11.2.1 Sidewalk is to be constructed of a minimum thickness of 4-inches of concrete over a 4-inch crushed aggregate base course.

4.2.11.2.2 Residential driveway crossings shall be 6-inches of concrete over a 4-inch crushed aggregate base course.

4.2.11.2.3 Commercial driveway crossings shall be 7-inches of concrete over a 4-inch crushed aggregate base course.

4.2.11.2.4 Sidewalk shall be placed with a slope perpendicular and toward the centerline of the road of 1.5%.

4.2.11.2.5 The maximum allowed longitudinal grade shall be 5%. This grade shall not be exceeded unless the road grade is of a steeper grade, in which case the longitudinal sidewalk grade shall not exceed the road grade.

4.2.11.2.6 The outside edge of sidewalks shall be located 6-inches from the right-of-way line or as directed by the City except at intersection crossings. At intersection crossing, the proper placement shall be determined by the location of the crosswalk and or as directed by the City.

4.2.11.2.7 Sidewalk are typically installed fronting on all City properties. If sidewalks are not installed as part of the project, the terrace area should be graded for future sidewalk installation.

4.3 CONSTRUCTION

4.3.1 GENERAL

4.3.1.1 Construction shall be in accordance with the Standard Construction Specifications.

4.4 TRAFFIC IMPACT ANALYSIS

These guidelines were developed to assist City staff and prospective developers in determining whether a traffic impact analysis (TIA) should be required of a Developer. These guidelines follow the practice recommended by the Institute of Transportation Engineers (ITE) and expanded on by WisDOT.

4.4.1 WHEN A TRAFFIC IMPACT ANALYSIS IS REQUIRED

4.4.1.1 A TIA is required if the development meets or exceeds any of the following requirements:

- *All big box retail (any single user exceeding 50,000 SF), gas station, grocery store, drive-thru pharmacy and fast food restaurant developments;*
- *Sit-down Restaurant development: 8,000-square feet;*
- *Commercial/retail development: 15,000-square feet;*
- *Residential development: 100 houses, 125 apartment units or condominiums/town houses;*
- *Warehouse development: 210,000-square feet;*
- *Industrial development: 55,000-square feet;*
- *Office development: 40,000-square feet;*
- *Dental/medical office development: 20,000-square feet;*
- *Hotels: 100 rooms.*

4.4.1.2 In some cases, as determined by the City, an abbreviated traffic study may be required instead of a full TIA. An abbreviated TIA can be a technical memorandum which could include following:

- *Site layout / proposed access*
- *Adjacent roadways and intersections*
- *trip generation*
- *trip assignment*
- *opening day capacity analysis*

4.4.1.3 The city reserves the right to require a TIA if the development does not fall within one of the listed criteria, or due to existing known traffic and/or safety issues, or if it was determined by the City that the proposed development may create unsafe conditions or traffic congestion.

4.4.1.4 The City may waive the TIA requirement altogether depending on the type of development and expected traffic impacts.

4.4.2 TIA PREPARATION

4.4.2.1 Preparing a TIA and all costs associated with it will be the responsibility of the developer.

- 4.4.2.2 All TIAs shall include an existing conditions analysis, initial build conditions analysis, and total build conditions analysis (for multi-phase developments). It is the City's discretion whether a +10-year future analysis should be included in the TIA (depending on development location and level of intensity of the development). Typically, a +10-year future analysis will be required if the development is expected to generate 500 or more peak hour trips.
- 4.4.2.3 Analysis Peak Periods to be studied (additional analysis hours may be added depending on development location and details of development or at the discretion of the city traffic engineer):
- *Big Box Retail – weekday AM (6-9), weekday PM (3-6) & SAT (10-2)*
 - *Restaurants – weekday midday (11-1) & weekday PM (3-6) (if fast food, also include weekday AM (6-9))*
 - *Commercial/Mixed Use Commercial/Grocery – weekday PM (3-6) & SAT (10-2)*
 - *Residential - weekday AM (6-9) & weekday PM (3-6)*
 - *Warehouse – weekday AM (6-9) & weekday PM (3-6)*
 - *Industrial, Office - weekday AM (6-9) & weekday PM (3-6)*
 - *Dental/Medical Office – weekday PM (3-6) and possibility weekday AM (6-9) depending on hours of operation and location.*
 - *Hotel – weekday AM (6-9) & weekday PM (3-6) & potentially Friday night or Saturday night if the Hotel includes banquet rooms/conference center.*
 - *Institutional (School, hospitals, gov't) – weekday AM (6-9) & weekday PM (2-6, depending on dismissal hours)*
- 4.4.2.4 If a TIA is deemed to be required, the TIA shall be prepared per the general requirements of the most recent WisDOT TIA guidelines. Specifically, the following shall be included in the submittal:

- *Development Description and Site Location*
- *Proposed Site Plan, Land Use & Intensity*
- *Development Phasing & Timing*
- *Proposed access locations*
- *Potential Off-site development (as identified by the City)*
- *Study Area, including description of existing transportation system*
- *Traffic Volumes (turning movement counts required within past 3 years)*
- *Trip Generation, Trip Distribution & Trip Assignment*
- *Capacity/Level of Service & Queuing Analysis*
- *Recommendations to achieve LOS C or D*
- *Traffic Signal Warrants and Sight Distance Analysis may also be required depending on the specific situation*
- *A signal progression analysis may be required if traffic signal timing/phasing is proposed to be modified and the subject intersection is part of a signal system.*
- *The capacity analysis software used for the analysis shall follow HCS (Highway Capacity Analysis) standards. Consult with the City traffic engineer on acceptable programs.*
- *The appendix of the report shall include all traffic count data and traffic analysis computer outputs and other calculations utilized to develop recommendations.*

4.4.2.5 When a TIA is completed and accepted by the City, it will be valid for that development only and has a sunset period of 5 years from acceptance. If the development is phased for a period of years, the City may require an updated TIA past the 5-year period.

4.4.3 OTHER CONSIDERATIONS

4.4.3.1 For any developments that are directly adjacent to, or impacting a state trunk highway by means of a new access point, or impacting an intersection with a state trunk highway, the developer shall prepare the TIA in accordance with and under the direction of WisDOT.

4.4.3.2 For any developments that are directly adjacent to, or impacting a county trunk highway by means of a new access point, or impacting an intersection with a county trunk highway, the developer shall prepare the TIA in accordance with and under the direction of Waukesha County.

4.4.3.3 If the TIA is prepared for WisDOT or Waukesha County, the developer shall submit the TIA to these agencies for review and send a copy of the same TIA for the City to review at the same time. Required development improvements for state or county highways will be directed by the state or county and the City will determine the level improvement for City streets.

- 4.4.3.4 Other considerations may be included in the TIA as required by the City. Such considerations may include:
- *Crash Rates: Locations identified by the City or Police Department as being high crash rate intersections.*
 - *Neighborhood traffic impacts: Areas where the potential exists to increase average daily traffic volumes on city streets that may cause hardship to existing residents on those streets. Mitigation efforts may be required.*
 - *Congestion: Areas of high traffic congestion that may be worsened by the development.*
 - *Multimodal assessment and accommodations (pedestrians, transit, bikes)*

4.4.4 REVIEW OF TIA

- 4.4.4.1 The review of TIAs submitted to the City will be performed under the supervision of the Director of Public Works. Facts, comments, and recommendations will be discussed with the Planning Department in preparation for reporting to the City Plan Commission. The City and Developer will work together to review and agree upon any infrastructure improvements needed to facilitate the development and to fully mitigate all traffic impacts.

END OF SECTION

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5 STREET LIGHTING

5.1 SCOPE

There are instances when developments are required by the City to provide a continuation of an existing street light system or provide a new street lighting system within the right of way of public streets of a development. When this determination has been made, the Developer will follow this guide for the specifications, design, materials, construction, testing, and acceptance by the City. At no time may street lights be placed within the right of way of public streets in a development without written approval from the City Engineering Division.

There are instances when a Developer will need to make modifications to an existing street light system. The Developer shall follow this guide only after modifications are approved by the Engineering Division.

5.2 STANDARDS

All street light systems shall be designed to meet the requirements of the current edition of the American Standard Practice for Roadway Lighting, unless otherwise specified in the Standard Construction Specifications or by the Engineering Division. All street light systems shall be constructed to meet the requirements of the State of Wisconsin Department of Transportation Standard Specifications, unless otherwise specified in the City of Waukesha's Design and Construction Manual, Division 3 - Standard Construction Specifications, latest Edition.

Specified City requirements may be found within this document and within the Standard Construction Specifications.

5.2.1 DESIGN

5.2.1.1 All street lighting systems are designed for the purpose of keeping the public safe.

This includes but is not limited to:

- Signalized intersections
- Non-signalized intersections
- Pedestrian crossings
- Roads with dangerous hills and curves
- Major roadways
- Collector roadways

Intersection "Beacon" lighting may be required for intersections of Local, Collector, and Major streets. Contact the Engineering Division for proper determination.

5.2.2 MATERIALS

5.2.2.1 Conduit shall be Schedule 40, HDPE, Black or Black with a Red stripe.

5.2.2.2 Conduit couplings shall be Shure-Lok 2. No other substitutions will be allowed.

5.2.2.3 Pull box shall be round, PVC, 15-Inch diameter, with a cast steel, heavy duty frame and lid.

- 5.2.2.4 Wire shall be #4, XLP, USE, for ungrounded and grounded conductors, and a #6, XLP, USE, green for grounding conductors.
- 5.2.2.5 Type 5 poles will be Flagpoles Inc. #FPSLS84530B-1-8 for single arm poles and Flagpoles Inc. #FPSLS84530B-2-8 for twin arm poles. Contact the Engineering Division for proper color and finish. Equals are allowed when approved by the Engineering Division.
- 5.2.2.6 Post Top decorative poles shall be HADCO -P1791-11'-8"-A. Pole shall be black in color. No equals will be allowed.
- 5.2.2.7 Cobra head fixtures shall be Cooper/Lumarc #LDRC-T3-E03-E-AP. Light fixture shall match pole in color. No equals will be allowed.
- 5.2.2.8 Post Top fixtures shall be Philips Hadco #TX0364BA2A3NWANS – MOD. Light fixture shall match the pole. No equals will be allowed.

5.2.3 CONSTRUCTION

- 5.2.3.1 Construction shall be in accordance with the Standard Construction Specifications.

5.2.4 INSPECTION AND PERMITS

- 5.2.4.1 All materials, installation, and testing of systems, are subject to inspection from the proper Authority Having Jurisdiction. For electrical service inspections, contact the Building Department, Electrical Inspector. For all other inspections within the right of way, contact the Engineering Division.
- 5.2.4.2 All necessary permits shall be applied for, paid for, and managed by the Developer.
- 5.2.4.3 Three business day notice is required for any inspections from the Engineering Division.
- 5.2.4.4 All submittals of materials and installation practices shall be submitted to the Engineering Division for review prior to construction. The Engineering Division reserves the right to reject any submittals that do not meet the standards as specified in this document.

5.2.5 ENERGY PROVIDER POWER AND LIGHTING

- 5.2.5.1 When required to provide Energy Provider street lighting, submit type of pole, type of fixture, design location and height to the Engineering Division for approval.
- 5.2.5.2 The Developer shall be responsible for all installation costs of Energy Provider lighting.
- 5.2.5.3 The Developer shall be responsible for all coordination and cost of a new or relocated electrical service for a street lighting cabinet or Energy Provider street lighting equipment.

5.2.6 PRIVATE ROADS

- 5.2.6.1 At no time, without proper authorization of the governing boards and/or City Council, shall public street lighting be installed on private roadways. This includes where a private roadway intersects with a public roadway. Private roadways may be lit with street lighting, but will be privately paid for within the development.

5.2.7 CITY PARTICIPATION

- 5.2.7.1 The City may make the determination to opt into participation of a new development for the purpose of constructing street lighting. This is at the sole discretion of the City and will only be done with proper authorization. The Engineering Division will contact the Developer for coordination if determination has been made and funds are allocated.

END OF SECTION

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6 PROJECT CLOSE-OUT DOCUMENTS

6.1 CONSTRUCTION BINDER

6.1.1.1 Construction Site Representative (CSR) (see Section 7 of Division 1 - Development Handbook) shall provide the City with a Construction Binder including the following documents:

- Material submittals
- Daily reports and photographs
- Test results/reports
- Marked up field set of construction plans

6.2 LIEN WAIVERS

Developer shall provide the City with all lien waivers pertaining to the Public Infrastructure prior to final acceptance by the City.

6.3 RECORD DRAWINGS

6.3.1 GENERAL

6.3.1.1 Plans shall include the seal and signature of the Wisconsin licensed professional engineer responsible for the preparation of the record drawings on the cover sheet or on each sheet.

6.3.1.2 Plans shall be prepared on sheets measuring 11" high by 17" wide.

6.3.1.3 A profile view shall be located below the plan view on plan and profile sheets and both views shall be aligned by stationing whenever possible. In general, stationing shall be from left to right.

6.3.1.4 Plan and profile sheets shall start and terminate at match lines with minimum 25 feet overlap.

6.3.1.5 Plan views shall show the following:

- All right-of-way, easement, lot, and property lines
- Edge of pavement or face and back of curb
- Address, lot and block numbers, and subdivision or development name. Unplatted lands and the address of any home on such lands shall be so indicated.
- All street names

6.3.1.6 The title block shall include at a minimum, the following information:

- Name and address of engineering (design) firm and owner/developer
- Name of Contractor
- Date of the drawing and last revision
- Date of construction
- Scale

- Plan sheet number (# of #)
 - Name and location description of development
- 6.3.1.7 North shall be to the top or right of the sheet and shall be shown by a north arrow, clearly shown without intrusion.
- 6.3.1.8 The scale of the record drawings shall be 1"=40'. This shall be shown with a line scale and text.
- 6.3.1.9 Screen any existing surface improvements.
- 6.3.1.10 Two SEWRPC reference benchmarks shall be shown on each sheet.
- 6.3.1.11 Elevations shown shall be based on City of Waukesha datum which may be obtained by subtracting the conversion factor of **780.558** from National Geodetic Vertical Datum (NGVD) 1929 datum. Project or plan datum is not acceptable.
- 6.3.1.12 Screen existing sanitary sewer, storm sewer and watermain and service locations.
- 6.3.1.13 Concurrent with the hard copy submittal:
- 6.3.1.13.1 Provide complete set of drawings in PDF format.
 - 6.3.1.13.2 Provide complete set of drawings in AutoCAD (.DWG) format on electronic media tied to the NAD 1927 State Plane Wisconsin South coordinate system. Elevations shown shall be based on City of Waukesha datum which may be obtained by subtracting the conversion factor of 780.558 from National Geodetic Vertical Datum (NGVD) 1929 datum.
 - 6.3.1.13.3 Provide digital files in Shapefile or Geodatabase format including the above coordinate system. This will facilitate direct insertion of the subject into the City's Geographic Information System (GIS).
 - 6.3.1.13.4 Provide separate Excel or CSV (Comma Separated Values) format file for sanitary manholes indicating survey coordinates showing northing, easting, and elevation of the center of the manhole cover. Coordinate system shall be NAD 1927 State Plane Wisconsin South. Elevations shown shall be City of Waukesha datum. Each type of manhole information shall be in a separate column.
 - 6.3.1.13.5 Provide separate Excel or CSV (Comma Separated Values) format file for all storm manholes, inlets, and flared end sections indicating survey coordinates showing northing, easting, and elevation. Coordinate system shall be NAD 1927 State Plane Wisconsin South. Elevations shown shall be City of Waukesha datum. Each type of information shall be in a separate column.
- 6.3.1.14 The cost of archiving the Record Drawings and insertion of the data into the City's GIS System shall be the sole responsibility of the Developer. Cooperation and submission of the aforementioned data will keep costs to a minimum.

6.3.2 SANITARY SYSTEM

- 6.3.2.1 Each sheet shall show all sewer and laterals with length, size, class, and material type clearly labeled.
- 6.3.2.2 The percent grade to two (2) decimal places and direction of flow of sanitary sewer.
- 6.3.2.3 Length of each sewer lateral and height of any lateral risers. Label invert elevations at right-of-way or easement lines. The ends of the laterals shall be marked with a mapleheart board and field located using survey methods.
- 6.3.2.4 Distance from downstream manhole to each upstream sewer lateral.
- 6.3.2.5 Type and size of encasement if used.
- 6.3.2.6 Manholes and cleanouts to be labeled with a design plan number and Waukesha system number. Obtain Waukesha system numbers to use from Engineering Division.
- 6.3.2.7 The following information shall be shown for each manhole:
 - Elevation of the center of the manhole cover
 - Invert elevation of each sewer
 - Pipe size of each sewer
 - Type of frame to chimney seal
- 6.3.2.8 Label backfill types and locations.

6.3.3 STORM SYSTEM

- 6.3.3.1 Each sheet shall show all sewer and any laterals with length, size, class, and material type clearly labeled.
- 6.3.3.2 The percent grade to two (2) decimal places and direction of flow of storm sewer.
- 6.3.3.3 Length of any sewer lateral. Label invert elevations at right-of-way or easement lines. The ends of laterals shall be marked with a mapleheart board and field located using survey methods.
- 6.3.3.4 Distance from downstream manhole to any upstream sewer lateral.
- 6.3.3.5 Type and size of encasement if used.
- 6.3.3.6 Drainage structures (e.g. manholes, inlets, flared end sections, etc.) to be labeled with a design plan number and Waukesha system number. Obtain Waukesha system numbers from Engineering Division.
- 6.3.3.7 Elevations of all manholes, inlets, and flared end sections shall be given. Elevations shall be to the center of the cover for manholes and the grate at the flowline for curb inlets. Invert elevations and pipe sizes shall be given for inlets and manholes.

6.3.3.8 Label backfill types and locations.

6.3.4 GRADING CERTIFICATION PLAN

6.3.4.1 In preparing a Certification Plan, the Developer's Grading Plan shall be shown as screened background.

6.3.4.2 Record grades shown on lot lines shall be no less than 0.30 ft. lower than final grades shown on approved grading plan or higher than 0.10 ft. above the final grades shown on approved grading plan. The Developer shall establish final grades within 5 feet of side lot lines, rear lot lines and the front right-of-way area between the front lot line and the back of curb. These areas shall be described as a "no-touch zone". All grades within the "no-touch zones" shall be certified by Developer's Engineer. Developer shall typically show spot grades along the side lot line, at front curb, front property corners, front setback, back of house extended, any high points, and rear property corners.

6.3.4.3 Grades along the side lot lines are required even in wooded, ungraded areas.

6.3.4.4 Existing house pad grade (elevation taken at the center and each corner of a typical house, except for lots designed for rear exposure house show existing grade at front and back of typical house). House pads are to be left 1.75' below finish yard grade with a +/- 0.25' tolerance.

6.3.4.5 Elevations every 50 feet along Developer graded swales and ditches.

6.3.4.6 Elevations every 100-ft station along the road alignment. Locations shall include:

- Pavement centerline
- Edge of pavement for rural sections and at the flange for urban sections
- Right-of-way
- Ditch flowline for rural sections
- Top of embankment on the backslope of the ditches for rural sections

6.3.4.7 Elevations around curb and gutter radii at intersections. At sidewalk ramps, include shots at the following minimum locations: gutter, top of ramp, back of landing.

6.3.4.8 After analyzing certified grades, Developer shall identify on plan those areas not within above tolerance. Show areas to be regraded, or areas where it may be desirable to revise the proposed grades in the Grading Plan.

6.3.5 STORM WATER BMP CERTIFICATION PLAN

6.3.5.1 Elevations (minimum of every 50')

- Top of berm
- Top of slope
- Toe of slope
- Safety shelf edges
- Bottom of BMP

- Spillway-top of slope & toe of slope (detailing length, width and height)
- Critical design locations

6.3.5.2 Structure Locations and Elevations

- Outfall (invert elevation and size)
- Overflow structures (corners of opening) and piping (invert elevation and size)
- Inlet structures (center of manhole) and piping (invert elevation and size)
- Outlet structures (center of manhole) and piping (invert elevation and size)
- Weirs (invert elevation and size)
- Orifice (invert elevation and size)
- Inlet/Outlet (invert elevation and size)
- Below ground storm water quality devices

6.3.6 BUILDING AND SITE CONSTRUCTION CERTIFICATIONS

6.3.6.1 For individual lots, Builder shall verify lot grading and home construction elevations match approved master grading plan or approved individual grading plan. If the grades and elevations do not match the approved elevations, the Builder shall revise the work to match the approved drawings.

6.3.6.2 Builder shall provide a stamped topographical survey by Professional Land Surveyor showing and certifying that record spot grades match the proposed grading contours on approved grading plan prior to occupancy or shall post a \$5,000 letter of credit.

6.3.6.3 Items to show on survey include:

- First floor elevation(s)
- Top of foundation wall elevation
- Basement floor elevation
- Garage floor elevation
- Yard grade elevations
- Driveway sidewalk elevation
- Distance from driveway sidewalk to garage floor
- Driveway slope(s)
- Driveway sideyard setbacks
- Address

6.3.6.4 The Surveyor shall include the following written certification on the stamped topographical survey: The final lot elevations match the approved master grading plan within a tolerance of 0.1 feet.

6.3.6.5 Televising of installation of new sanitary sewer lateral connections to main:

6.3.6.5.1 Builder to provide a post construction sewer lateral video to City for review and approval. Video format to be determined by the Engineering Division.

- 6.3.6.5.2 In special circumstances, the City Engineering Division may permit the Builder to provide a \$5,000 letter of credit or cash escrow in lieu of submitting a sewer lateral video prior to issuance of occupancy.

6.4 EASEMENTS

6.4.1 GENERAL

- 6.4.1.1 The Developer shall prepare formal written easement documents, including graphics and written legal description attachments for each easement and record the same with the Waukesha County Register of Deeds after review and approval by the City for each utility easement shown on the subdivision plat (or CSM) as a condition of Final Plat (CSM) approval.
- 6.4.1.2 No encroachment by structures, berms, trees, shrubs, paved surfaces or changes in grade greater than 6" are allowed in easement areas without approval of the City Engineering Division.
- 6.4.1.3 30-ft. wide minimum width for a single utility. The utility shall be located in the center of the final easement. Easement width may be increased to 50 feet based on pipe size and depth.
- 6.4.1.4 Easements with multiple utilities, the minimum separation from outside of the utility to the easement line shall not be less than 15 feet subject to approval by the City Engineering Division. Add not less than 10 feet per additional utility in the easement.
- 6.4.1.5 Maximum ground slope along easements:
- transverse: 25%
 - longitudinal: 10%.

6.4.2 STORM SYSTEM

- 6.4.2.1 The City requires public storm sewer and/or drainage easements for any storm water conveyance system that drains public ROW areas or neighboring off-site areas.
- 6.4.2.2 A storm sewer running along the rear lot lines within a subdivision, specifically to drain backyards, does not warrant a public easement. The City considers this to be a private system built for the lot owners of the subdivision and owned/maintained by the property owners.

6.5 PUBLIC SANITARY SEWER ACCEPTANCE

6.5.1 INFRASTRUCTURE FIELD VERIFICATION

6.5.1.1 Once sanitary infrastructure construction has been completed, the Contractor shall contact the Engineering Division to request a field verification walkthrough. The field verification walkthrough shall be conducted with the Contractor and a City Engineering representative. Items to be verified include:

- *City standard covers installed*
- *Chimney seals installed*
- *Chimney ProRings acceptably installed*
- *Manholes free of debris*
- *No leaks in piping / structures*
- *Manhole pipe connections suitably mortared around entire pipe circumference*
- *All temporary plugs have been removed and the system is ready to accept sewage*
- *Pump station operational (if applicable)*

6.5.1.2 Following the field verification walkthrough, the contractor shall complete Sanitary Infrastructure Field Verification – Form A (C117) and forward to the City for review and signature.

6.5.2 INFRASTRUCTURE ACCEPTANCE REQUEST

6.5.2.1 Once the City has received and countersigned the Sanitary Infrastructure Field Verification – Form A (form C117), the developer shall complete and submit Sanitary Infrastructure Acceptance Request – Form B (form C118) to obtain final acceptance of the sanitary infrastructure by the City. See Division 1 – Project Administration, Section 2 – Construction Administration for Forms C117 and C118. The follow items shall be addressed prior to acceptance:

- *Sewer televising documents submitted and approved*
- *Record drawings submitted and approved*
- *All punch list items completed*
- *All temporary plugs have been removed the system is ready to accept sewage*
- *Easements or plat recorded*
- *Work is free from all liens*
- *Review and inspection fees paid to City*
- *Development agreement conditions satisfied*

END OF SECTION

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7 CONSTRUCTION MANAGEMENT AND REVIEW

7.1 CONSTRUCTION MANAGEMENT DEVELOPER DEPOSIT

Projects that include public infrastructure shall be required to provide a Construction Management Developer Deposit of 120% of the estimated costs to cover any of the following applicable public infrastructure costs: as-built and easement preparation, review services for roadway, sanitary system, storm system and all associated apparatus and appurtenances, and updates to the City Geographic Information System.

7.2 CONSTRUCTION SITE REPRESENTATIVE (CSR) REQUIREMENTS

A construction site representative (CSR) shall be required for all projects that contain public infrastructure. A CSR is required to observe that the public infrastructure is in accordance with City standards. The CSR is not responsible for supervision or directing of the work. The CSR is in addition to, and not a replacement of, construction oversight by a Developer and their contractors, and at no time replaces the Developer's or the contractor's responsibilities of construction management and oversight of their work.

For private development projects, the CSR review of public infrastructure shall be performed by a consultant selected by the Developer from a pre-approved and contracted list of consultants supplied by the City, at the sole cost of the Developer. The City will make final determination of when a CSR is required to be on-site, but shall be on-site during all Sanitary sewer and storm sewer construction, roadway undercutting (EBS), concrete curb and gutter and paving operations. Other construction review may be determined by the City.

City statues referencing City requirements are listed below as of November 29, 2017:

23.07(3)(b) Prior to starting any of the work covered by the plans approved as above, arrangements shall be made to provide for inspection of the work sufficient, in the opinion of the Director of Public Works, to insure compliance with the plans and specifications as approved, and written approval obtained from the City to start the work.

23.07(3)(c) (Cr. #36-71) Irrespective of any other provisions herein or in §§22.50 or 22.52 of this Code, the developers of P.U.D. or Community Development projects shall pay to the City for the review of sanitary sewer, as such review is furnished by the City-approved Construction Site Representatives.

7.2.1 GENERAL CONSTRUCTION MANAGEMENT

7.2.1.1 The CSR shall be responsible for observing all construction work performed on-site relative to completing the project for intended use and purpose.

7.2.1.1.1 Provide full-time on-site construction observation services for the installation of all project elements, as appropriate for the nature and type of project element being constructed.

- 7.2.1.1.1.1 The City shall provide a list of pre-approved Consultants to the Developer. Consultant shall be contracted through the City with hourly rates of CSRs made available for the Developer's information. CSRs that will be on site shall be pre-approved by the Engineering Division or the City Tech Supervisor.
- 7.2.1.1.1.2 The Developer shall coordinate and schedule with the Consultant and CSRs that will be on site. Once the Developer selects a Consultant, the Developer shall complete the project with the selected Consultant unless approved by the Director of Public Works.
- 7.2.1.1.2 Prepare daily progress reports describing work completed, trades involved, and any issues that occurred at the site.
- 7.2.1.1.3 Maintain an ongoing and current record of changes to the Plans or Specifications that occur on the project. The marked-up plan-set shall be submitted with the final record drawings.
- 7.2.1.1.4 Review all materials delivered to the site to ensure that they meet the Standard Construction Specifications.
- 7.2.1.1.5 Maintain daily logs and records, submitting an original copy to the City at no less often than weekly during the project construction period.
- 7.2.1.1.6 At the close of the project, the Consultant shall provide the City with a Construction Binder including the following documents:
- Material Submittals
 - Daily Construction Progress Reports
 - Test Results/Reports
 - Change Orders / Substitutions
 - Final Mark up or red-line set / record set of construction plans

7.2.2 GENERAL RESPONSIBILITIES

- 7.2.2.1 The CSR shall have a thorough understanding of construction and experience with the construction of sanitary systems, water systems, storm systems, roadway systems, and all associated construction requirements.
- 7.2.2.2 Review project plans, specifications and special provisions. At all times have a set of Approved Construction Documents and a copy of the City of Waukesha Design and Construction Manual available for use at the Project Site.
- 7.2.2.3 City to meet with any new CSRs prior to the start of the designated Project.
- 7.2.2.4 Notify the City of any meetings that are scheduled.
- 7.2.2.5 Attend the pre-construction meeting.

- 7.2.2.6 Complete a Daily Report that includes monitoring erosion control devices to ensure that they are functioning at the beginning and end of the workday. Note the status of erosion control.
- 7.2.2.7 Review all construction materials delivered to the project. Mark all defective material and have the Contractor remove it from the site in a prompt manner. Record manufacturer, class and type of material being used on both the Daily Report and in the CSR's set of field plans.
- 7.2.2.8 Review the project location and become familiar with marked underground utility locations. Be alert for underground utilities when the Contractor is excavating.
- 7.2.2.9 During project, and after the project is substantially complete, prepare a Punch List of corrective work and provide copies to the Contractor, City and project file. Perform follow-up to assure completion of the Punch List work items, as directed by the City.
- 7.2.2.10 During final review, determine that all areas disturbed by the Contractor have been cleaned up, graded and properly restored.
- 7.2.2.11 When corrective work has been completed, compile all tests, forms and reports and submit to the City.
- 7.2.2.12 Upon project completion, provide certification that project was completed according to approved plans and specifications.
- 7.2.2.13 Maintain one (1) record set of "as-built" drawings at the Project Site, marked up to show all field changes, locations of buried utilities around and contiguous to the building(s), and other significant items. This information shall be turned over to the City Engineer at the conclusion of the Project. Preparation of the Utility line as-builts shall be consistent with City standards.
- 7.2.2.14 If requested, review all progress and final payment requests by the Contractor(s).
- 7.2.2.15 Identify any liquidated damages that may become due, basis for the charges against the Contractor(s) and document in writing to the City. Track any possible causes that justify the granting of a time extension to the Contract. Review and recommend any requests by the Contractor for changes in compensation differing from the amount(s) bid. Document these issues on the Daily Report form.
- 7.2.2.16 Review, document and recommend payment of all Contractor proposals and requests for Change Order using appropriate forms. Document any verbal requests for Change Order work on the Daily Report. Compile all Change Order request documentation and submit to the City with recommendation.

- 7.2.2.17 The Project Designer shall be responsible for resolving any conflict between the Plans, the Specifications and the site conditions that are encountered in the Construction Phase with due notice to the City. The Designer shall be responsible for review and approval of all Shop Drawings for the Project.

7.2.3 GENERAL UTILITY CONSTRUCTION

- 7.2.3.1 As grade staking is completed for various sections of the project, verify stakes for offsets and note all locations for structures, hydrants, valves and fittings. Confirm that the line and grade of the grade stakes corresponds with the approved construction plans and survey cut sheets.
- 7.2.3.2 Verify that the surface upon which the pipe is to be laid is true to grade, firm and thoroughly compacted. Never allow pipe to be laid upon a trench bottom which is soft, yielding, mucky or under water. Any undercutting not provided for in the contract should be cleared with the City Engineer. Measure all undercutting to depth, width and location to provide proper documentation and payment.
- 7.2.3.3 Confirm that the pipe is properly bedded the entire length.
- 7.2.3.4 Verify the line and grade of the pipe as it is being set by the Contractor.
- 7.2.3.5 Verify that the pipe is clean, joint components and contact surfaces are free of defects. Make sure that the pipe is driven “home” to the full depth of the socket according to manufacturer’s requirements and instructions.
- 7.2.3.6 Obtain an accurate measurement of all piping installed and record the measurements on the Daily Report and CSR’s field plans.
- 7.2.3.7 Confirm that the Contractor is using a pipe plug or “cookie” in the last installed pipe prior to excavation of the next length of pipe to prevent debris from entering the pipe. Also insist that the Contractor installs the pipe plug in the last pipe installed each day to prevent dirt, water or animals from entering the pipe.
- Observe removal of the pipe plug or “cookie”.
- 7.2.3.8 Observe the backfilling work to assure that only proper material is placed into the trench (no clay lumps, broken concrete, frozen chunks, etc.).
- 7.2.3.9 Verify that the pipe is properly protected against subsequent damage during backfilling operations.
- 7.2.3.10 Observe that backfilling around the pipe is done to one foot above the top of pipe. Observe that subsequent backfill is completed in uniform lifts and compacted per the specifications.
- 7.2.3.11 Observe staking and record ties and invert and top of pipe elevations for all main line stubs which are installed for future connections.

- 7.2.3.12 Observe that all services, including those to vacant properties and buildings, have been properly staked by the survey crew. Verify the staked service locations and elevations against the approved construction plans.
- Record the actual location of services on the CSR's field plans.
 - Confirm that all services are marked by a wooden lateral marker.
 - Accurately record the location, size, depth (or invert elevation) and length of all sanitary services on the CSRs field plans.
- 7.2.3.13 Confirm bedding and cover stone, and backfill meets specifications. 1.5.3.15 Verify benches poured in manholes and inlet manholes. Verify "no wood shims" are used in manhole, inlet or catch basin construction. Verify chimneys are properly completed prior to internal seals being installed.

7.2.4 SANITARY SEWER CONSTRUCTION

- 7.2.4.1 All precast and cast-in-place manhole components should be checked for configuration, dimensions, thickness, damage, and defects as they are delivered or constructed.
- 7.2.4.2 When the manhole base is installed, confirm the base is level and at proper grade.
- 7.2.4.3 Prior to backfilling, verify that the manholes are completely finished. Check for plumbness, dimensions, proper inverts, proper patching and leakage. All manholes must be free of dirt and debris.
- 7.2.4.4 Prior to completion, confirm that all manhole inverts have been finished off, in accordance with the plans and specifications. Check the floor and flow line, castings, adjusting rings, and steps for compliance with Contract Documents.
- 7.2.4.5 Schedule and observe low pressure air tests, and mandrel tests. Coordinate the scheduling with the Engineering Division. Confirm that the Contractor removed all plugs in existing lines.
- 7.2.4.6 Verify that the Contractor cleaned and televised the sewer.

7.2.5 STORM SEWER CONSTRUCTION

- 7.2.5.1 Verify that inlets are set to match the proposed curb and gutter for both line and grade.
- 7.2.5.2 When the Contractor is installing storm sewer directly below curb and gutter, check the elevation difference between the top of storm sewer and the bottom of the curb and gutter. Proactively check that manholes, catch basins, and inlets will be buildable as construction progresses.

- 7.2.5.3 If a storm sewer line is laid close to a watermain, determine the separation distance between the storm sewer and watermain, and consult with Tech Supervisor about the need for insulation. Wisconsin DNR requirements shall be followed.
- 7.2.5.4 Verify that all manholes and inlets are completely finished. Verify that the floor and flow line are in compliance with the plans and that the casting and Pro-rings are correctly positioned in place.
- 7.2.5.5 Verify that the Contractor cleaned and televised the storm sewer.

7.2.6 ROADWAY CONSTRUCTION

- 7.2.6.1 Before the start of construction, develop an understanding of the grading requirements.
- 7.2.6.2 Observe the grading for curb to verify that the Contractor is not undercutting the grades. If undercutting occurs, require the Contractor to bring the subgrade up with suitable granular material, at the Contractor's expense. Verify that the granular material meets the compaction requirements in the Contract Documents.
- 7.2.6.3 Determine that the pavement and the curb areas of the roadway are properly proof rolled, then monitor the repair of any substandard areas.
- 7.2.6.4 Utilize forms and/or string lines to check line and grade of curb and gutter and sidewalk. The forms or string lines should be checked at every grade stake with a carpenter's level. Visually check the string line or form line to assure uniform grade.
- 7.2.6.5 Inquire which technique will be employed by the Contractor to construct curbs (forms or curb machine). If forms are used, they should be clean, sprayed with form oil, and well braced.
- 7.2.6.6 Check curb immediately after the curb machine starts, for conformance to standard details. Continue to check for proper alignment, grade and pitch while the machine is in operation.
- 7.2.6.7 Verify that the curb is backfilled prior to when paving operations begins.
- 7.2.6.8 Before paving begins, verify that the job mix formula has been received and approved. As paving is conducted, sample and test in accordance with the testing program for the project.
- 7.2.6.9 Check temperatures of the bituminous mixtures from the truck box and the paver hopper.
- 7.2.6.10 Observe the pavement mixture as it is dumped from the truck to the paver. No lumps, clumps or non-coated aggregates are allowed.
- 7.2.6.11 Determine that all joints and areas around castings or obstacles are properly raked to ensure a uniform pavement after compaction.

- 7.2.6.12 Check for uniform shaping of the boulevards and backslopes. If grading beyond the plan limits is required, through no fault of the Contractor, measure and record the additional grading in the Daily Report and Item Record Accounts.
- 7.2.6.13 Check the project to ensure that all structures are clean, plumb and functional.

7.2.7 CONSTRUCTION SITE REPRESENTATIVE REQUIREMENTS – CITY PROJECTS

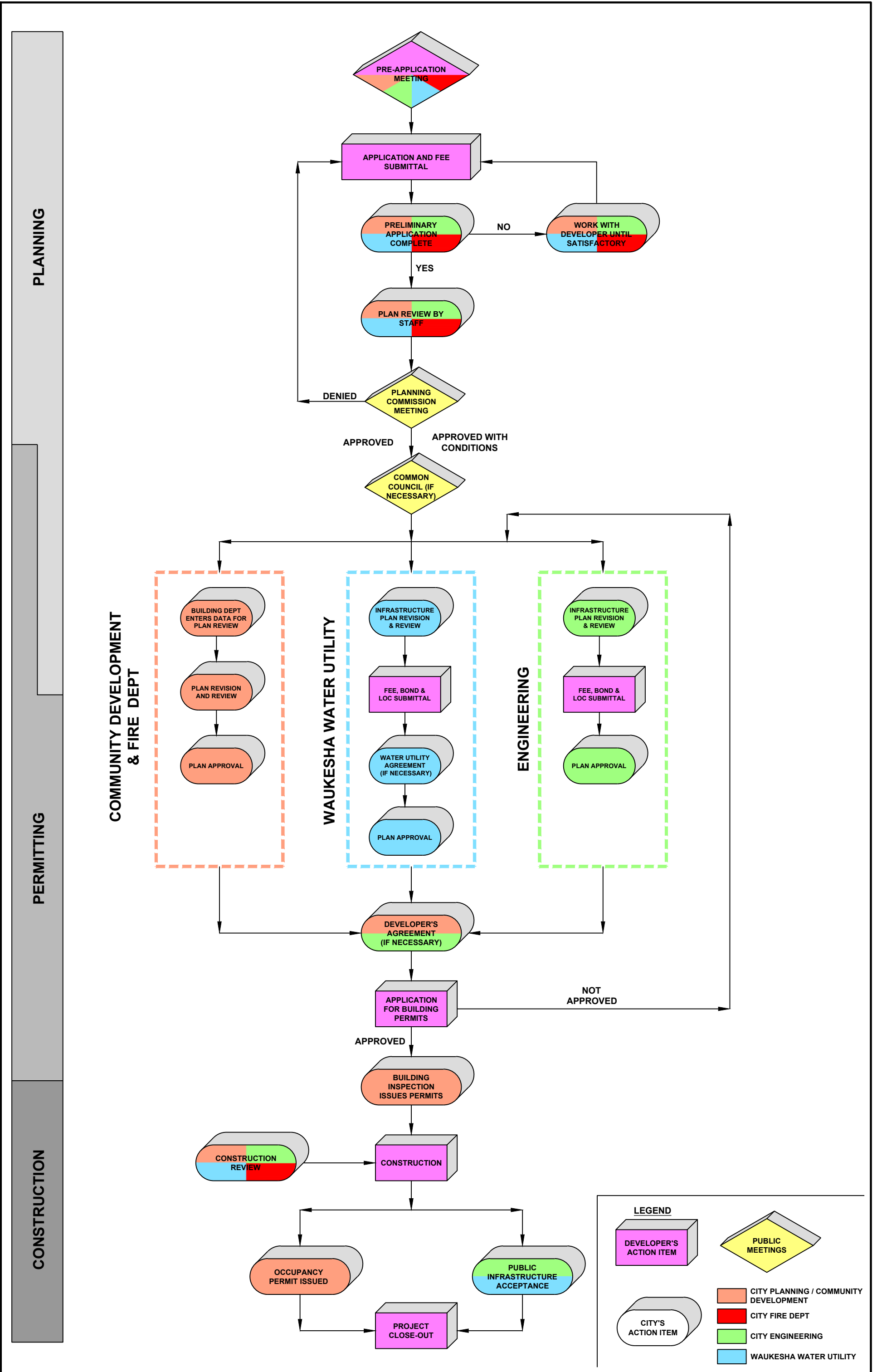
In addition to those requirements noted above, the CSR on City projects shall:

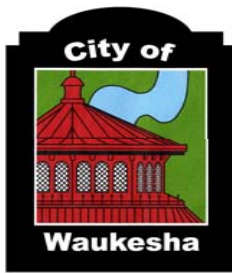
- 7.2.7.1 Monitor the schedule of individual phases of the project elements to ensure a timely completion. Verify that all necessary Permits are obtained by the Contractor(s).
- 7.2.7.2 Make recommendations for adjusting the work to accommodate changing and unforeseen conditions, as applicable and appropriate. Daily Reports when required, reflecting the effect on each Contractor or Subcontractor and the overall project schedule.
- 7.2.7.3 Receive and forward required Shop Drawings to the Designer for review. The Designer shall be responsible to distribute the reviewed Shop Drawings to the appropriate parties. Document correspondence via Memorandum or email.
- 7.2.7.4 Assist the City with such other services as may be required in execution of the Contract Documents to complete the project.
- 7.2.7.5 Assist the City in implementing the project completion consistent with the project schedule and the Contract Documents.

END OF SECTION

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Appendix A





Attachment A - Application for Development Review Checklist

Project Name: _____

Engineering Design Firm: _____

Checklist Items	CSM	Preliminary Plat	Final Plat	Property Survey for Bldg Permit	Storm Water Plan	Erosion Control Plan	Site, Grading, Drainage Plan	Street Plan	Utility Plan	Landscape Plan	Traffic Control Plan	Traffic Impact Analysis	Conditional Use or Home Indus.	PUD or Developer's Ag.	Minor site or Arch. Change	Conditional Use	Rezoning & Comp. Plan Change
Followed Construction Drawing Sheet Layout standards in Development Handbook																	
Followed Development Handbook and Storm Water Ordinance standards for Erosion control plans																	
Obtained geotechnical evaluation for storm water and pavement design																	
Followed Development Handbook standards, and Wisconsin Administrative Code for Property Survey																	
Verified proposed basement floor elevation is at least 1 foot above the highest seasonal high water table elevation																	
Followed Development Handbook standards and Ordinance for Preliminary Plat																	
Followed Site, Grading, and Drainage Plan design standards in Development Handbook and Storm Water Ordinance																	
Followed Traffic impact analysis standards in Development Handbook																	
Specifications conform to current City Standard Specifications																	
Followed Lighting Plan standards in Development Handbook																	
Development site contains Contaminated Waste																	
Followed storm water management requirements in Development Handbook, and Ordinance																	
Site contains mapped FEMA floodplain or a local 100-year storm event high water limits																	
Site contains wetlands or Natural Resource limits (ie. Primary, Secondary, Isolated , shoreland limits)																	
CSM follows standards in Development Handbook, City Ordinance, and State Statutes																	
Followed Development Handbook standards for Street plans and profiles																	
Followed Development Handbook standards for utility plans and profiles																	
Existing sanitary sewer lateral has been televised																	



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Engineering Plan Checklist

Attachment B
 (Rev 04/18)

Project Name: _____

Engineering & Design Firm: _____

General Information

Plans shall include the seal and signature of the Wisconsin licensed professional engineer responsible for the preparation of the construction plans on the cover sheet or on each sheet

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide a copy of the WisDOT permit for any work in the State of Wisconsin right of way.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide a copy of the Waukesha County Department of Public Works permit for any work in right of way of Waukesha County.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide a copy of Wisconsin Department of Natural Resources Water Resources Application for Project Permits (WRAPP) for all sites greater than one acre.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide a copy of US Army Corps of Engineers 404 permit.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide cross access agreements for use of entrances.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide off-site utility easements.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide hydraulic gradeline calculations for all storm sewer pipes signed and sealed by a professional engineer licensed in the State of Wisconsin.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide a storm water management plan and calculations signed and sealed by a professional engineer licensed in the State of Wisconsin.

All Plan Sheets

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plans prepared on sheets measuring 11" high by 17" wide or no larger than 24" high by 36" wide.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary Sewer, watermain and storm sewer system plans for the entire development are included.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A profile view is located below a plan view on plan and profile sheets and both views are aligned by stationing whenever possible. In general, stationing is from left to right.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan and profile sheets start and terminate at match lines.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The assumed bearing base, control monuments and stationing reference line(s)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Right-of-way limits and easement limits
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Edge of pavement or face and back of curb
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Name of each existing, proposed, and future roadway and any intersecting roadways
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lot lines, lot and block numbers
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Addresses for existing parcels

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All obstructions located within the project limits including, but not limited to: trees, signs, utilities, fences, light poles, structures, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A note warning that underground utilities must be located by "Diggers Hotline" prior to start of construction
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Legend (relevant to each sheet) showing all special symbols, line types and hatch used
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Title block includes at a minimum, the following information: Name and address of engineering (design) firm and owner/developer Date of the drawing and last revision Scale Plan sheet number (# of #) Name and location description of development
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	North to the top or right of the sheet and shown by a north arrow, clearly shown without intrusion.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale of the plans 1" = 40' horizontally and 1" = 8' vertically for 11" by 17" plan sheets and 1" = 20' horizontally and 1" = 4' vertically for 22" by 34" sheets. Partial site plans have a scale of 1" = 20' or larger. The scale of details is such that the detail is clearly shown. The scale is shown with a line scale and text.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing surface improvements indicated with screened lines and clearly labeled.

Cover Sheet

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Project title.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location Map (Proximity to two main streets minimum).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Index of all plan sheets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	For subdivisions, large, or phased developments, a key map of layout and phases.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A minimum of two (2) current SEWRPC reference benchmarks. Survey documentation of tie to Wisconsin State Plane Coordinate System, South Zone (horizontal) and City of Waukesha datum (vertical) provided. Elevations shown based on City of Waukesha datum.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All permanent benchmarks.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A description of the locations of the benchmarks; and the basis or origin of the vertical control network.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of preparation and applicable revision date(s)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The following statement: " <i>All site improvements and construction shown on the plans shall conform to the City of Waukesha <u>Development Handbook & Infrastructure Specifications</u>. Where the plans do not comply, it shall be the sole responsibility and expense of the Developer to make revisions to the plans and/or constructed infrastructure to comply.</i> "

Roadway

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	For all new streets, a site specific geotechnical evaluation and pavement design submitted with the plans.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A separate detail sheet showing typical cross-sections for a roadway and cul-de-sac if applicable.

Plan View

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The assumed bearing base, control monuments and stationing reference line along the centerline of the roadway, including cul-de-sacs.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	At least one clearly labeled benchmark or control point.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Width of pavement and median.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Final grade elevations at 25' intervals at the right-of-way including at the edge of pavement for rural sections or at the top of curb for urban sections.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Final grade elevations for cul-de-sacs at 25' intervals at the right-of-way including at the edge of pavement for rural sections or at the top of curb for urban sections.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Label all PVC's, PVT's, and PC's, PT's for vertical and horizontal curves Radii of all intersections (edge of pavement or back of curb, with note indicating which is referenced).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Driveways for all lots adjacent to storm inlets and intersections.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sidewalks labeled and dimensioned.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing, proposed, future streets and drives labeled and dimensioned.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All roadside ditch locations, flowline elevations (based on City of Waukesha datum) at 100' intervals of the ditches.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Slope intercepts.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Invert profile for 200' downstream for any existing ditches receiving flow from a proposed road or street.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Limits of any areas which need special stabilization techniques.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Specific details of all existing connected roadways. Pavement, shoulders, ditches, curb alignment, and grades shall be shown as needed to adequately make the transition.

Intersection Details

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Radii of all intersections (edge of pavement or back of curb, with note indicating which is referenced).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sidewalks and accessible ramps labeled and dimensioned.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Right of way corner clips and sight visibility easements.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spot grades as necessary to ensure proper drainage and compliant ADA slopes.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spot grades shall be shown at end of radius for all curb and gutter and the end radius for all back of sidewalk.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drainage clarified by flow arrows, high points, sags, ridges, etc. Slope intercepts shall be clearly labeled by station, elevation to the nearest 0.1', and offset distance (left or right) from the reference line.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Invert elevation of ditches (for rural roadway).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Final subgrade elevation at the centerline of the street or roadway.

Cross Sections

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Right of way limits.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Slope intercepts clearly labeled.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Elevations to the nearest 0.01'.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Offset distance (left or right) from the reference line.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Final grade elevations at back of walk, face of walk, top of curb, flange elevation (edge of pavement for rural section), and the centerline of the street or roadway.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cross slope of sidewalk, terrace area, and roadway.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Invert elevation of ditches (for rural section)



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Site, Grading and Drainage Plan Conditional Use Permit Checklist

Attachment C
 (Rev 04/18)

Project Name: _____

Engineering & Design Firm: _____

General Requirements

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Applicant's name
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Name and location of development
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale and north arrow
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of original and revisions noted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	License number and seal (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CAD format submission of the site layout & building plan layout
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pay impact fees

Building Plans

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Contact Community Development Department

Site Plans

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dimensions of development site
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, footprint, and outside dimensions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed pedestrian access points
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed vehicular access points
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Parking lots, driveways shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Front, side and rear yard setbacks shown and labeled
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of all existing or planned easements (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Identification of all land to be dedicated (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, elevation, and dimensions of walls and fences
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, elevation, and dimensions of outdoor lighting
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sign complies with City Code Book
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of existing and proposed signs

Site Access

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Legal description or certified survey of property
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Development compatible with its zoning district
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sidewalks to be shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site entrance drive dimensions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Individual development vehicular entrances at least 125 feet apart
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Adjacent development share driveway where possible
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	At least one vehicular and pedestrian access point to each adjoining site granted by cross easements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cross access to be provided with minimum paved width of 24 feet
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Design detail for all new public streets

Parking/Traffic

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5-foot-wide paved walkway to building entrance
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7-foot parking separation from front building
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Minimum parking spaces provided
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Service truck parking in designated service areas
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Parking spaces and layout dimensioned
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lot paved with bituminous concrete or Portland cement concrete
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Handicap parking provided
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Minimum required stacking distance
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Concrete curb and gutter around parking lot

Grading and Drainage Plans

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Show existing tree lines and any obstructions (fences, structures, power poles, etc.) within the project limits.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All proposed lot lines and lot numbers or addresses
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lot line dimensions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outline of buildable areas for each lot
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Typical setbacks of buildable area to front, side and back lot lines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All existing buildings, structures and foundations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All existing drainage channels and watercourses
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Emergency overflow routes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drainage clarified by flow arrows, high points, sags, ridges, and valley gutters
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed retaining wall locations with top and bottom of wall elevations at key locations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100-year flood plain limit (both pre-and post-project)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100-year storm water surface elevation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wetlands. Wetland limits labeled with bearings and distances and dimensioned to lot lines. Bearings and distances may be shown in tabulated format.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All environmental corridors, & or environmentally sensitive areas as required by DNR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All existing and proposed easements.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing topography of the site and all areas within 50 feet of the site shown at a one foot contour interval using City of Waukesha datum. Existing contours shown as thin, dashed screened or grey lines with a readily discernable heavier line used for the 5-foot contour intervals.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed grading shown at a contour interval of 1 foot using City of Waukesha datum. Proposed contour lines shown as solid medium lines, with a discernible heavier line use for the 5-foot contour intervals.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The yard grade and first floor elevation of proposed building and any existing buildings located within 150 feet of the parcel boundary.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed road(s), curb and gutter, all storm sewer grates and storm sewer manholes (or cross-culverts for open ditches). Show any off-road storm inlets and discharge locations with surface entry elevations.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spot grades as necessary to ensure proper drainage and compliant ADA slopes and routing where applicable.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	At front setback line show a typical house shell on each lot and the proposed yard grade to the nearest tenth of a foot (assumed to be 0.7' below the top of block) for each building. Show proposed finished elevations to the nearest tenth of a foot at all lot corners and alongside lot lines adjacent to the front and back corners of the typical house. Show proposed finished elevations to the nearest tenth of a foot at high and low points along any side or back lot lines, and at high and low points if roads to demonstrate proposed drainage.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The grading plan for any house that will require special design due to topography, clearly show separate grades for the garage and yard grade if extra steps are needed. Separate spot finish elevations shown for rear or side exposure or walkout.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Indicate minimum finished floor elevations adjacent to floodplains, ponds, creeks/channels, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed storm inlets shown on each grading plan. Each plan also includes specific details on all applicable retention/detention basins, ponds, overflows, etc. Separate sheets or notes as required.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Locations of existing and proposed streets, drives, alleys, easements, right-of-way, parking as required, vehicular and pedestrian access points, and sidewalks
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outline of any development stages
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and details on any required emergency access roads
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Soil characteristics, where applicable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed topography shown for the site and or adjacent properties
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floodplain, shore land, environmental and wetlands shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of on-site storm water drainage facilities
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and footprint of all existing buildings
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Locations and names of existing trees
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Berm detail
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lot grades and swales shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drainage calculations provided

Erosion Control

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location Map
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Soils Survey Map
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing Land Use Mapping
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Predeveloped Site Conditions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Existing contours
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Property lines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Existing flow paths and direction
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Outlet locations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Drainage basin divides and subdivides
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Existing drainage structures on and adjacent to the site
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Nearby watercourses
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Lakes, streams, wetlands, channels, ditches, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Limits of the 100-year floodplain
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Practice location/layout/cross sections
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Construction Details
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Name of receiving waters
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site description/Nature of construction activity
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sequence of construction
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Estimate of site area and disturbance area
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre- and post-developed runoff coefficients
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Description of proposed controls, including
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Interim and permanent stabilization practices
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Practices to divert flow from exposed soils
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Practices to store flows or trap sediment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Any other practices proposed to meet ordinance
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing topography of the site and all areas within 50 feet of the site shown at a one foot contour interval using City of Waukesha datum. Existing contours shown as thin, dashed screened or grey lines with a readily discernable heavier line used for the 5-foot contour intervals.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed grading shown at a contour interval of 1 foot using City of Waukesha datum. Proposed contour lines shown as solid medium lines, with a discernible heavier line use for the 5-foot contour intervals.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	List the total disturbed acreage including offsite areas.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide free survey in accordance with City Erosion Control Ordinance
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed limits of disturbance including proposed tree cutting areas.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of all temporary topsoil and dirt stockpiles.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of all appropriate best management practices (BMP).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Phasing of BMP's with the construction activities listed / described.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Schedule of anticipated starting and completion date of each land disturbing and land developing activity, including the installation of the BMP measures that are needed.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all channels, pipes, basins or other conveyances proposed to carry runoff to the nearest adequate outlet, including applicable design assumptions and computations.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Areas to be sodded or seeded and mulched or otherwise stabilized with vegetation, describing the type of final vegetative cover.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Areas of permanent erosion control (other than vegetation).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boundaries of the construction site
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drainage patterns/slopes after grading activities
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Areas of land disturbance
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Locations of structural and nonstructural controls
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drainage basin delineations and outfall locations

Optional Submittals as Determined by Review Authority

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Traffic impact analysis
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Environmental impact statement
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plot of effect of exterior illumination on site and adjacent properties
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Description of any unusual characteristics
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Street perspectives showing view corridors
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historic site
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Economic feasibility study
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Contaminated Waste Site

I hereby certify that I have reviewed the City ordinances and provided one (1) full-sized set of all required information along with all the required reduced copies of plans.

Applicant's Signature: _____



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Stormwater Management Plan

Attachment D
 (Rev 04/18)

Project Name: _____

Engineer & Design Firm: _____

STORM WATER MANAGEMENT PLAN WORKSHEET

The City of Waukesha requires a Stormwater Management Plan to be submitted with the proposed development plans for site plan review. A Stormwater Management Plan is a document describing the storm water management practices constructed and implemented within the proposed development to ensure compliance with the storm water management criteria, as set forth by the City of Waukesha. The purpose of a Stormwater Management Plan is to protect the safety and health of the public, property and aquatic environment from the threats due to storm water from land development activity. The worksheet will provide a basis to the information that shall be provided when preparing a Stormwater Management Plan for a proposed development. This Plan shall include a set of complete plans and calculations, stamped by a registered professional engineer.

Stormwater Management Plans are required as listed in City Code Book Chapter 32.06(b)

Exemptions for Design and Plan Requirements

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site is associated with agricultural or silvicultural activities

Design Requirements: Total Suspended Solids

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site is a New Development – 80% Reduction must be met
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site is an Infill Development – 80% Reduction must be met
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site is a Redevelopment – 40% Reduction must be met
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site has areas of New Development and Redevelopment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Calculations for % Reduction are included in the plan (WinSLAMM input and output)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm water Management Facilities to address TSS removal are designed according to Chapter 32 of the City Code Book and DNR Technical Standards – Check all that apply: <ul style="list-style-type: none"> <input type="checkbox"/> Wet Detention Basin <input type="checkbox"/> Bio Retention Basin <input type="checkbox"/> Swales <input type="checkbox"/> Proprietary Devices <input type="checkbox"/> Other (specify): _____

Design Requirements: Peak Discharge

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm water Management Facilities to address Peak Discharge are designed according to Chapter 32 of City Code Book and DNR Technical Standards – Check all that apply: <ul style="list-style-type: none"> <input type="checkbox"/> Wet Detention Basin <input type="checkbox"/> Bio Retention Basin <input type="checkbox"/> Swales <input type="checkbox"/> Other (specify): _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Downstream Capacity for 2-year, 10-year and 100-year, 24-hour Design Storms are met
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Calculations of available capacity, proportional share, and proposed utilized capacity under all design storms are included in plan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Calculations of Peak Discharge are included in the plan

Design Requirements: Infiltration			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydraulic Soil Type: <input type="checkbox"/> Soil Type A – Proceed <input type="checkbox"/> Soil Type B – Proceed <input type="checkbox"/> Exemption or Exclusion – Provide documentation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Low Imperviousness. Ex: low density residential parks, cemeteries Post-Development Infiltration Performance Standards: <input type="checkbox"/> Up to 40% Connected Impervious Surface <input type="checkbox"/> 90% of Pre-Development Infiltration volume met <input type="checkbox"/> 1% of site – Maximum Effective Infiltration Area
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Medium Imperviousness. Ex: Medium and high density residential, multi-family, industrial, institutional, office park. Post-Development Infiltration Performance Standards: <input type="checkbox"/> 40%-80% Connected Impervious Surface <input type="checkbox"/> 75% of Pre-Development Infiltration volume met <input type="checkbox"/> 2% of site – Maximum Effective Infiltration Area
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High Imperviousness. Ex: commercial strip malls, shopping centers, commercial downtowns Post-Development Infiltration Performance Standards: <input type="checkbox"/> Greater than 80% Connected Impervious Surface <input type="checkbox"/> 60% of Pre-Development Infiltration volume met <input type="checkbox"/> 2% of site – Maximum Effective Infiltration Area
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site has parking lots and new road construction: <input type="checkbox"/> Pretreatment included <input type="checkbox"/> 10% Infiltration of the runoff from the tow-year, 24-hour design storm with Type II Distribution
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Calculations of Infiltration Volumes are included in the plan and model input and output (WinSLAMM)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exclusions for Infiltration: <input type="checkbox"/> Tier 1 Industrial Facility <input type="checkbox"/> Storage and Loading Areas of Tier 2 Industrial Facility <input type="checkbox"/> Fueling and Vehicle Maintenance Facility <input type="checkbox"/> Areas within 1,000 feet up gradient of Karst Features <input type="checkbox"/> Areas within 100 feet downgradient of Karst Features <input type="checkbox"/> Areas with < 3 feet of separation from bottom of Infiltration System to seasonal high groundwater or top of bedrock (does not prohibit roof runoff) <input type="checkbox"/> Areas with runoff from industrial, commercial and institutional parking lots and roads with < 5 feet separation from bottom of infiltration system to elevation of seasonal high groundwater or top of bedrock <input type="checkbox"/> Areas within 400 feet of community water system well <input type="checkbox"/> Areas within 100 feet of private well <input type="checkbox"/> Areas where contaminants of concern (defined by NR720.03(2) are present in the soil through which infiltration will occur) <input type="checkbox"/> Area where soil does not meet any of the following characteristics between bottom of infiltration system and seasonal high groundwater and top of bedrock: <input type="checkbox"/> <i>At least 3-foot soil layer with 20% fines or greater</i> <input type="checkbox"/> <i>At least 5-foot soil layer with 10% fines or greater</i>

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exemptions for Infiltration: <input type="checkbox"/> Areas where infiltration rate < 0.6 inches/hour <input type="checkbox"/> Parking Areas and Access Roads less than 5,000 square feet for commercial and industrial <input type="checkbox"/> Redevelopment Post-Construction Sites <input type="checkbox"/> Infill Development < 5 acres <input type="checkbox"/> Infiltration during periods when soil on the site is frozen <input type="checkbox"/> Roads in commercial, industrial and institutional land uses <input type="checkbox"/> Arterial Roads in Residential land uses
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm water Management Facilities to address Infiltration are designed according to Chapter 32 of the City Code Book and DNR Technical Standards – Check all that apply: <input type="checkbox"/> Bio Retention Basin <input type="checkbox"/> Infiltration Basin/Rain Garden <input type="checkbox"/> Infiltration Trench <input type="checkbox"/> Other (specify): _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Soil and Site Evaluation Report per DNR Technical Standards.
Design Requirements: Protective Areas			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Impervious areas are outside protective area. If not, provide a written explanation.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Land disturbing activities are within a protective area. If Yes , check all that apply: <input type="checkbox"/> If no impervious area is within protective area, adequate sod or self-sustaining vegetative cover of 70% or greater shall be established. <input type="checkbox"/> Adequate sod or self-sustaining vegetative cover is sufficient for bank stability, maintenance of fish habitat and filtering of pollutants from upslope overland flow areas under sheet flow conditions. <input type="checkbox"/> Non-Vegetative materials are employed on the bank as necessary to prevent erosion (steep slopes, high velocity areas).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Best Management Practices are located within the protective area – Check all that apply: <input type="checkbox"/> Filter Strips <input type="checkbox"/> Swales <input type="checkbox"/> Wet Detention Basins <input type="checkbox"/> Other (specify): _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Non-Applicable Areas Apply: <input type="checkbox"/> Structures that cross or access surface water (boat landing, bridge, culvert) <input type="checkbox"/> Structures constructed in accordance with Section 59.692(1v) Wisconsin Statutes: <input type="checkbox"/> Post-Construction Runoff does not enter surface water except to the extent that vegetative groundcover necessary for bank stability
Design Requirements: Fuel and Maintenance Facilities			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are Fuel and Maintenance Facilities on the Site?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are Best Management Practices designed to reduce petroleum within runoff (no visible sheen)?

Design Requirements: Swale Treatment for Transportation Facilities			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Does the site use swales for runoff conveyance and pollutant removal for transportation facilities? If Yes, must have the following:</p> <p><i>Groundcover:</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Vegetated <input type="checkbox"/> Non-Vegetated where appropriate to prevent erosion or provide runoff treatment (riprap, check dams) <p><i>Swale Velocity Control:</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Swale is 200 feet or more in length with a velocity no greater than 1.5 feet per second for the two-year, 24-hour design storm or two-year storm with duration equal to time of concentration <input type="checkbox"/> Swale is 200 feet or more in length with velocity > 1.5 feet per second then velocity is reduced to maximum extent practicable. Written explanation stating why requirement of > 1.5 feet per second cannot be met
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Exemptions Apply:</p> <p>Average Daily Vehicles > 2,500 and initial surface water of the state that runoff directly enters is any of the following:</p> <ul style="list-style-type: none"> <input type="checkbox"/> An outstanding resource of water (ORW) <input type="checkbox"/> An exceptional resource water (ERW) <input type="checkbox"/> Water is listed in Section 303(d) of the Federal Clean Water Act and is identified as impaired in whole or in part due to non-point source impacts <input type="checkbox"/> Water where targeted performance standards are developed under NR 151.004 of the Wisconsin Administrative Code to meet water quality standards
Plan Requirements			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide permit application form, including contact information (name, address, telephone number) for the landowner, developer, land operator, certified project engineering, responsible party for installation of storm water management practices, responsible party for long-term maintenance of the storm water management practices.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Legal Description of proposed development.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Narrative describing the proposed development.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Brief summary of Design Criteria and methods used for development of Storm Water Management Practices.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm Water Management Maintenance Agreement shall be included with the Storm Water Management Plan (see Storm Water Management Maintenance Agreement template for additional information required).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Certification by a Wisconsin registered professional engineer.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Financial Guarantee.

Description and Site Characteristics for Pre/Post Development conditions shall be delineated by one (1) or more site maps at a scale of not less than one (1") inch equals two hundred (200') feet. The map(s) shall include, at minimum, the following information:

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site Location and Legal Description.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and revised topography by contours related to USGS survey datum or other datum approved by City. The topographic contours of the site shall not exceed 2 feet. The topography shall extend at minimum 100 feet outside the site boundaries to show runoff patterns onto, through and from the site.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	One hundred (100) year Floodplain boundary, shore land, environmental corridors, and wetland boundaries shall be delineated if applicable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All lakes, streams, and other water bodies illustrated on map shall be named as defined on a USGS 7.5 minute topographic map.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Predominant Soil Types and Hydraulic Soil Group Classifications.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State Plane coordinates of all manhole and inlets with reference to two nearest reference point monuments which shall be Section or ¼ Section corners.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, capacity, and dimensions/details of on-site Pre-developed and Post-developed storm water management facilities such as, but not limited to, the following: manholes, pipes, curbs, gutters, curb inlets, filter strips, swales, detention basins, curb cuts, and drainage gates.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, extent, detailed drawings, typical cross sections and slope ratios of all pre-developed and post-developed storm water retention and detention areas and drainage ways – list inlet/outlet elevations, permanent water surface elevation, high water surface elevation, and emergency spillway elevation, if applicable.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and Elevations at top and bottom of pre-developed and post-developed buildings and structures.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Locations and names of pre-developed and post-developed streets and intersections and the location of parking lots, sidewalks, bike paths and impervious surfaces (excluding single family residences). Map(s) shall clearly differentiate pre-developed and post-developed surfaces.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Delineation and dimensions of all pre-developed and post-developed property boundaries, easements, right-of-way, building setbacks, maintenance easements, and other restrictions.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and post-developed land use boundaries, including cover type and condition.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Post-developed land use cover totals for Impervious and Pervious areas as well as permanent water surface area of all storm water management facilities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Delineation of pre-developed and post-developed watershed and sub-watershed boundaries used in determination of Peak flow discharges and discharge volumes from the site. (If the watershed extends beyond the site boundaries, a separate watershed map can be supplied).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of the pre-developed and post-developed discharge points.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre/Post developed directional Flow Paths used to calculate existing/proposed time of concentrations.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of the Emergency Overland Flow.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any Regional Treatment Options (if applicable).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Identify all pre-developed land cover features, such as, natural swales, natural depressions, native soil infiltrating capacity and natural groundwater recharge areas.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any protective areas within the site.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of wells located within 1,200 feet of pre-developed and post-developed Storm Water Detention Basins, Infiltration Basins, or Infiltration Trenches.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Delineation of Wellhead protection areas defined under NR 811.16

Supportive Information and Calculation summaries shall be supplied for all storm water management requirements as dictated in the checklist under Design Requirements:

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and post-developed watershed, sub-watersheds, and land use areas (acres, watershed shall be delineated by property lines).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and post-developed impervious areas (acres).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and post-developed Runoff Curve Numbers.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and post-developed Time of Concentration.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-developed and post-developed peak flows for the 2-year, 10-year and 100-year, 24-hour storm events for each discharge point.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Total suspended solids removal computations to show compliance.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Design computations for the runoff volume of the pre-developed and post-developed conditions to show compliance with the infiltration requirements.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Design computations for all storm water drainage facilities such as, but not limited to, inflow/outflow rates, hydrographs, water surface elevations, outlet design computations, runoff discharge volume, velocities, and stage/storage data.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Design computations for the 10-year Rational Method flows for all proposed storm conveyance systems.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Computation of the available downstream capacity flowing full, overflow level of ditches and the top of the upstream end of the pipe for any culverts.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Computation of the downstream capacity using the 5-year rational storm.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tail water analysis included in storm water design for 2-year, 10-year and 100-year storm events.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Design computations to illustrate compliance with pollutant loading criteria (Storm Water Quality Management practices) with pre- and post-storm water management facilities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Narrative describing all assumptions that were deemed appropriate for design.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explanation of provisions to preserve and use natural topography and land cover features.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explanation of restrictions on Storm Water Management practices by wellhead protection plans (if applicable).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Results of investigations of soil and groundwater required for installation of Storm Water Management practices.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Impact assessment results on Wetland Functional Values (if applicable).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm Water Management practices installation schedule.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cost estimate for the construction, operation and maintenance of each Storm Water Management practice.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Any additional information that the City, or designee, may need to evaluate the impacts of the storm water discharge quality and quantity on the existing area and existing utilities.



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Certified Survey Map Checklist

Attachment E
 (Rev 04/18)

Project Name: _____

Engineer & Design Firm: _____

Surveyor: _____

Checklist to be completed and signed:			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale and north arrow
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale of plans less than or equal to 1" = 100'
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of original and revisions noted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Certification from surveyor that Plat complies with State Statute 236
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Digital PDF submitted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all existing structures and first floor elevations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of utility and drainage easements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exact length and bearing of the centerline of all streets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exact street width along the line of any obliquely intersecting street
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Railway rights-of way within and abutting the plat
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and size of all lands to be dedicated for public use (when required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comprehensive site grading drainage plan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Special restrictions relating to access control, planting strips, restrictive yard requirements, etc. (when required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Map shows entirety of all parcels in proposed certified survey map
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Major street setback or WisDOT setbacks (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floodplain limits of the 100-year recurrence interval flood
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any wetlands, shore land, or other environmental areas (if applicable)
Plans to be submitted (when applicable):			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Street plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary sewer plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm sewer plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grading and drainage plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water main plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erosion control plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Landscape plans



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Preliminary Plat Checklist

Attachment F
 (Rev 04/18)

Project Name: _____

Engineer & Design Firm: _____

Surveyor: _____

Plans to include:

- Subdivision Plat
- Legal Description
- Street Construction and Profile Plans
- Site, Grading, and Drainage Plans
- Sanitary Sewer and Water Main Plans
- Street Lighting Plans
- Landscape Plan
- Home Owner's Association (if applicable)
- The following **City** signature blocks shall be used on all subdivision plats which are regulated by Chapter 23 of the City Code Book:

I, being the duly appointed, qualified and acting treasurer of the City of Waukesha, do hereby certify that the records in my office show no unredeemed tax sales and no unpaid taxes or special assessments as of _____ affecting the lands included in the plat of _____.

CITY TREASURER: _____
 GINA KOZLIK

RESOLVED, that the plat of _____ in the City of Waukesha, _____, owners, is hereby approved by the Common Council of the City of Waukesha.

APPROVED: _____
 MAYOR SHAWN REILLY

I hereby certify that the foregoing is a copy of resolution number _____ adopted by the Common Council of the City of Waukesha.

CITY CLERK: _____
 GINA KOZLIK

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale and north arrow
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale of plans less than or equal to 1" = 100'
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of original and revisions noted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Certification from surveyor that Plat complies with Chapter 17
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reproducible paper less than 36" in width
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Title under which subdivision to be recorded

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of subdivision by government lot, ¼ section, section, township, range, county and state
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and names of any adjacent subdivisions, parks and cemeteries
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any wetlands, shore land or other environmental areas (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all existing and proposed public ways
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Right-of-way widths of proposed streets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Names of proposed streets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any easements, railways and utility rights-of-way
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of proposed subdivision in the US Public Land Survey section
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Phasing plan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Map showing entire area owned by applicant that is contiguous to proposed subdivision
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exact length and bearing of exterior boundaries
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing contours at intervals not more than 2 feet
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water elevations of adjoining lakes and streams
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floodplain limits of the 100-year recurrence interval flood
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and approximate size of any areas to be reserved or dedicated to the City
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Approximate radii of all curves
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing zoning of land within and adjacent to subdivisions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any proposed riparian lake and stream access
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed lake and stream improvements or relocations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plat shows entirety of all parcels in proposed subdivision
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Street plans and profiles (when required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Traffic impact study (when required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Type, width and elevation of any existing and proposed street pavements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Approximate dimensions of all lots
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all existing water and gas mains
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all existing property boundary lines, structures and first floor elevations thereof
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and elevations of any existing sanitary and storm sewers, culverts and drain pipes, manholes, catch basins and hydrants
<i>Plans to be submitted (when applicable):</i>			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Street plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary and sewer plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm sewer plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grading/drainage plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water main plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erosion control plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Landscape plans



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Final Plat Checklist
Attachment G
 (Rev 04/18)

Project Name: _____

Engineer & Design Firm: _____

Surveyor: _____

Plans to include:

- Subdivision Plat
- Legal Description
- Street Construction and Profile Plans
- Site, Grading, and Drainage Plans
- Sanitary Sewer and Water Main Plans
- Street Lighting Plans
- Landscape Plan
- Home Owner's Association (if applicable)
- The following **City** signature blocks shall be used on all subdivision plats which are regulated by Chapter 23 of the City Code Book:

I, being the duly appointed, qualified and acting treasurer of the City of Waukesha, do hereby certify that the records in my office show no unredeemed tax sales and no unpaid taxes or special assessments as of _____ affecting the lands included in the plat of _____.

CITY TREASURER: _____
 GINA KOZLIK

RESOLVED, that the plat of _____ in the City of Waukesha, _____, owners, is hereby approved by the Common Council of the City of Waukesha.

APPROVED: _____
 MAYOR SHAWN REILLY

I hereby certify that the foregoing is a copy of resolution number _____ adopted by the Common Council of the City of Waukesha.

CITY TREASURER: _____
 GINA KOZLIK

Checklist to be submitted:

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale and north arrow
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale of plans less than or equal to 1" = 100'
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of original and revisions noted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Certification from surveyor that Plat complies with Chapter 23
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reproducible paper less than 36" in width
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Title under which subdivision to be recorded
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comprehensive drainage
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of subdivision by government lot, ¼ section, section, township, range, county and state

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Map showing entire area owned by applicant that is contiguous to proposed subdivision
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and names of any adjacent subdivisions, parks and cemeteries
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Special restrictions relating to access control, planting strips, restrictive yard requirements, etc. (when required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plat shows entirety of all parcels in proposed subdivision
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sheet size of final plat is 22" x 30"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Railway rights-of-way within and abutting the plat
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of utility and drainage easements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Locations of all lands reserved for the common use of the property owners within plat
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Basin ownership and maintenance to be fractionally assisted to all lots and assigned to homeowner's association
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exact length and bearing of exterior boundaries
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exact length and bearing of the centerline of all streets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floodplain limits of the 100-year recurrence interval flood
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Easements and notes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of any wetlands, shore land or other environmental areas (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exact street width along the line of any obliquely intersecting street
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing zoning of land within and adjacent to subdivision
<i>Plans to be submitted (when applicable):</i>			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Street plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary sewer plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm sewer plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grading/drainage plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water main plans and profiles
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erosion control plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Landscape plans
The land division will be reviewed for compliance with Chapters 4, 23 and 32 of the City Code Book, Development Handbook, Chapter 236 of the Wisconsin State Statutes, and general development considerations.			



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Sewer Plan Review Checklist

Attachment H
 (Rev 04/18)

Project Name: _____

Engineering & Design Firm: _____

Sanitary System

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Minimum 4" sanitary sewer lateral from the main to the property line, PVC SDR 26 or 35 conforming to ASTM standards D 3034 with rubber gasket joints
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary sewer laterals shall have a green #12 locator wire installed along the entire length. Locator wire shall be brought to the surface at the edge of the building and enclosed in a curb box with "sewer" on the cover.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sampling manhole required for all food service developments (or developments with the potential to become food service) and industrial/manufacturing facilities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Industrial facilities must complete an industrial discharge form.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outside drop manhole connection required where drop is greater than 24 inches.
Sanitary Plan View			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ghost existing utilities and lateral locations in screened format. Pipe size of existing utilities labeled.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed sewer and laterals with length, size, and material type clearly labeled
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Material and size of the existing sanitary sewer being connected to.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stub-outs labeled with length, size, slope, and invert elevations (if not profiled).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dimensions showing offset from right-of-way to the sewer and separation distance between other utilities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Type and size of encasement where needed
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Flow directions of all proposed mains.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Length of each sewer lateral and height of any lateral risers. Label proposed invert elevations at right-of-way lines.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Distance from downstream manhole to each upstream sewer lateral.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed manholes and cleanouts labeled with a design plan number. Existing manholes labeled with numbers obtained from City records.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rim and invert elevations at each manhole, based on City of Waukesha datum (for private sewer if not profiled)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Show and label all easements
Sanitary Profile View			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stationing.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed surface profiles and elevations over the sewer.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All utility crossings. Label elevations if known.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pipe material / class, size, length, and percent grade to two (2) decimal places.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Material and size of the existing sanitary sewer being connected to.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Length, type, and size of encasement as needed.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed manholes. Indicate type and diameter.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Label station, rim, and invert elevations, based on City of Waukesha datum, and design plan number for each manhole and cleanout. Existing manholes to be labeled with numbers obtained from City records.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Limits of gravel and/or slurry backfill.
Sanitary for Subdivisions/Large Developments			
<i>(Complete copies of City specifications for sanitary sewer are available upon request.)</i>			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Each parcel should have a separate sanitary sewer lateral.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary sewer – 8 ft. horizontal separation from water main per DNR requirements. 8" diameter minimum size, PVC SDR 26 for depths up to 25 ft.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sanitary sewer manhole at every change of direction and a maximum distance of 400 ft.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A chimney seal shall be required on all manholes.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide copies of all approved WDNR/WDOC submittals, including sewer sizing calculation worksheet and the area served.

Storm System

Storm Plan View			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ghost existing utilities and lateral locations in screened format. Pipe size of existing utilities labeled.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed sewer and laterals with length, size, and material type clearly labeled.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Material and size of the existing storm sewer being connected to.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stub-outs labeled with length, size, slope, and invert elevations (if not profiled).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dimensions showing offset from right-of-way to the sewer and separation distance between other utilities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Type and size of encasement where needed
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Length of any sewer lateral. Label proposed invert elevations at right-of-way lines.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed inlets, manholes, and other drainage structures.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed drainage structures labeled with a design plan number. Existing drainage structures labeled with numbers obtained from City records.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Details of outfall or ditch inlet protection requirements such as rip-rap, end sections or headwalls as needed.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Details of detention facilities, outfall, overflow and control structures as needed.
Storm Profile View			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stationing.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed surface profiles and elevations over the sewer.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All utility crossings. Label elevations if known.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pipe material / class, size, length, and percent grade to two (2) decimal places.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Material and size of the existing storm sewer being connected to
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Length, type, and size of encasement as needed.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed inlets, manholes, and other drainage structures. Label type and size.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Label station, rim, and invert elevations, based on City of Waukesha datum, at each manhole, catch basin, inlet, and detention control structure.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed drainage structures labeled with a design plan number. Existing drainage structures to be labeled with numbers obtained from City records.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cross-section of open channels and detention facilities, including outfall, overflow, and control structures.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Limits of gravel and/or slurry backfill.

General System

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Show all easements, public or private.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No structures allowed within a public easement.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plantings or signs within public easements, if permitted by City, shall be at least 5 feet from the utilities.

General for Subdivisions/Large Developments

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide plans sealed by Registered Professional Engineer
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Show benchmark, north arrow and scale.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Show existing/proposed sewer and water utilities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All sewer to be installed by the developer under the terms of a Development Agreement.

Utility Plans

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all utilities: storm and sanitary sewers, water mains, fire hydrants, electrical, natural gas, and communication (cable television, telephone, etc.) lines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exterior lighting for parking and other outdoor areas, outdoor signs, and building exteriors.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of waste and trash collection, and indicate plans for snow removal.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and footprint of any and all buildings
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and names of existing and proposed streets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and size of existing and proposed storm sewer, sanitary sewer, and water utility systems shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Electric, gas, telephone, and cable lines shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All new utilities are underground
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exterior lighting detail provided
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all utility and private fire hydrants
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sampling manhole shown (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grease interceptor shown (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and size of existing and proposed water meters

Include the following notes on the Utility Plan:

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All sanitary sewer to be installed in accordance with City of Waukesha standards.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All applications and fees for sanitary sewer must be completed and paid prior to connection to sewer systems.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Any utility work in the right-of-way and all sanitary sewer connections to be inspected by City. Notify City 72 hours in advance of connecting to sewer.

The above list contains items that are commonly missed on Utility Plans. For subdivisions or other large or complex projects, a complete plan review includes many more checks too numerous to list here. Please call (262) 524-3600 for additional information. City typical sewer details can be provided upon request.

Note: For water main, contact Waukesha Water Utility at (262) 521-5272



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Landscape Plan Checklist

Attachment I
 (Rev 04/18)

Project Name: _____

Engineering & Design Firm: _____

Contact Community Development Department for Requirements

Listed below are general design considerations only:

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Show easements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and footprint of any and all buildings
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dimensions of development site along property line
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed streets
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pedestrian and vehicular access points
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of parking lots, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of all existing or planned easements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of snow removal and storage areas
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location and dimensions of outdoor lighting fixtures
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Interior parkway provided
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Parkway provided
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Buffer strip provided
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dumpster enclosure details
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Parking lot landscaping
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Utility/mechanical equipment screened
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Service area screened
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of freestanding signs
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Walls and fences shown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of utilities
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed contours and grades, including berm elevations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, name and size of proposed plant materials
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Specifications of all types of all proposed ground cover, i.e., seed, sod, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location, species, and size of existing trees
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clear identification of trees to be removed
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Square footage of parking lot area
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tree protection plan



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Property Survey for Building Permit Checklist

Attachment J
 (Rev 04/18)

Project Name: _____

Engineer & Design Firm: _____

Surveyor: _____

Plans to include:			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Survey
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Legal Description
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site, Grading and Drainage Plan
Checklist to be completed:			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale and north arrow
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scale of plans less than or equal to 1" = 100'
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of original and revisions noted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Certification from surveyor that Plat complies with Wisconsin Administrative Code A-E7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Digital PDF 8.5" x 14"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of all existing structures, fences, driveways and encroachments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Legal description of existing parcel
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Setbacks of all existing structures
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Monumentation of new lot corners in accordance with Section 236.15 Wisconsin Statutes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Major street setback or WisDOT setbacks (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Requirements in Development Handbook for Grading – Attachment D
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	In accordance with Wisconsin Administrative Code A-E 2.02(4): Each sheet of plans, drawings, documents, specifications and reports for architectural, landscape architectural, professional engineering, design or land surveying practice should be signed, sealed, and dated by the registrant or permit holder who prepared, or directed and controlled preparation of, the written material
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pay impact fees
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Landscape letter of credit
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide positive gravity sanitary sewer lateral flow to main
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verify basement floor elevation is at least 1 foot above the highest seasonal high water table elevation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The 1 st floor elevation(s), yard grade elevations, top of foundation wall elevation, basement floor elevation, garage floor elevation, driveway sidewalk elevation, distance from driveway sidewalk to garage floor, address, driveway slope(s), and driveway setbacks should be listed
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Follow applicable easement rights and conditions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Follow applicable notes on Final Plat or CSM

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Follow notes on approved subdivision construction drawings
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verify driveway side setback to be 5 feet
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Applicable Isolated Natural Resource Area restrictions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tree replanting plan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verify driveway slope does not exceed 10%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Provide gravity drainage for drain tile to rear yard
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Install roof drains to connect to private main per specifications and plan design
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Set two 4-inch diameter/6-foot-long cedar posts to mark 75-foot non-disturbance limit at east and west lot line/wetlands/and Isolated Natural Resource limits
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verify exposed basement floor elevation shall be at least 2 feet above the 100-year high water elevation of the pond
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If an existing sanitary sewer lateral is proposed to be reused, provide a pre-construction sewer lateral video to City for review and approval. Contact the City Engineering Department for the video format. If lateral maintenance is needed, then the lateral improvements may need to be included as part of this project. The lateral pipe and connection to the main may need to be lined or relayed to reduce infiltration into the City's sanitary sewer system or improve the structural integrity. In lieu of submitting the video at this time, a \$5,000 letter of credit or cash escrow can be submitted to Engineering to guarantee that the work be performed



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Reviewing Departments

Attachment K
 (Rev 01/18)

<i>Department</i>	<i>Contact Person</i>	<i>Areas of Review</i>
Community Development – Planning	Maria Pandazi, City Planner ➤ (262)-524-3530	Planning requirements
Community Development	Jennifer Andrews, Development Director ➤ (262)-524-3750	General information
Fire Department	Brian Charlesworth, Fire Marshall ➤ (262)-524-3651	Fire safety and protection
Waukesha Water Utility	Chris Walter, P.E., Technical Services Manager ➤ (262)-901-5886	Water requirements
Community Development – Building Inspections	Kristin Stone, Chief Building Inspector ➤ (262)-524-3530	Building requirements
Parks Department	Dave Rauterberg, City Forester ➤ (262)-650-2545	Tree protection and landscaping
Public Works Engineering	David Buechl. ➤ (262)-524-3600	City Engineering
Transit	Brian Engelking, Transit Manager ➤ (262)-524-3636	Public transportation

City of Waukesha
Department of Public Works

Design and Construction Manual

Division 2
Project Administration

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1 GENERAL REQUIREMENTS

1.1 CONTRACTOR'S PREQUALIFICATION APPLICATION

- 1.1.1 Bidder's Proof of Responsibility
- 1.1.2 Prequalification Statement

1.2 CONTRACTOR'S BONDING REQUIREMENTS

- 1.2.1 Concrete Contractor Application and Bond
- 1.2.2 Drainlayer's Application and Bond

1.3 CONTRACTOR'S INSURANCE COVERAGES REQUIREMENTS

- 1.3.1 Certificate of Liability Insurance

1.4 RELEASE AND HOLD HARMLESS AGREEMENT

END OF SECTION

Bidder's Proof of Responsibility

_____, 2018

To: City of Waukesha
Public Works Department
130 Delafield Street
Waukesha, WI 53188

Attn. Fred V. Abadi, Ph.D., P.E.
Director of Public Works

To the City of Waukesha:

Submitted herewith please find our statement for your consideration in determining whether our firm is qualified and capable of making a proposal to perform and furnish the necessary labor, materials and skill on the basis of our work record, experience, equipment and staff as required to enter upon and complete those various types of projects indicated below as may be awarded by the City during the current calendar year.

It is understood that:

- The determinations and decisions of the City with regard to qualifications shall be final.
- A determination of qualification for this Project applies only to this Project and does not constitute qualification for other projects.
- If the City is not satisfied with the sufficiency of the answers to the questionnaire and financial statement, it may reject the Proposal or require additional information.
- This Prequalification Statement is valid for one year following approval unless notice to the contrary is given by the City.
- If the Contractor's current Prequalification on record with the City does not pertain to the specific type of work in this specification, a new Prequalification must be filed.

All Bidder's Prequalification Statements must be completed, signed and submitted a minimum of five (5) days prior to the submittal of any project bid

Very truly yours,

[sign above]

Company Name: _____

Print name: _____

Title: _____

Authorized agent for Bidder

Date: _____

Prequalification Statement

Bidders may submit their own sworn statement in lieu of this form, provided it contains all of the information requested in this form. All Bidder's Prequalification Statements must be completed, signed and submitted a minimum of five (5) days prior to the submittal of any project bid. Statements shall have original signatures. No copies, electronic signatures, or facsimiles will be accepted. Inadequate or incomplete statements may be rejected.

Attach additional sheets as necessary to include all requested information.

1. Identification

- a. Firm Name: _____
- b. Telephone No.: _____
Fax No.: _____
E-Mail: _____
- c. Mailing Address: _____
- d. Number of years in business under present firm name: _____
- e. Specifically indicate the type of work for which your firm is seeking qualification: _____

- f. Firm is a (corporation) (limited-liability company) (partnership) (sole proprietorship). Please circle one.
- g. List principal officers, members or partners: _____

2. Experience

- A. List experience with similar projects for at least the past five (5) years in separate pages and attach to this document. Submit narrative or explanation of similar project(s) and indicate specific duties / tasks / responsibilities including the following information (attach pages):

Date: _____

City: _____

Amount of Contract: _____

Nature of Work: _____

Prime Contractor Subcontractor

- B. Experience of Principal Individuals in Organization:

Individual's Name(s): _____

Present Position or Office: _____

Years of Experience: _____

Class of Work: _____

3. Contractual Responsibility

A. Has firm ever failed in the past ten (10) years to complete on-time the work awarded to it? Use additional pages if necessary).

(1) Date _____

(2) City: _____

(3) City's mailing address: _____

(4) Describe circumstances for each instance: _____

B. Has any officer or partner of firm ever failed in the past 10 years to complete on-time a construction contract handled in his or her own name? Use additional pages if necessary.

(1) Date: _____

(2) Name of officer or partner: _____

(3) City: _____

(4) City's mailing address: _____

(5) Describe circumstances for each instance: _____

C. Has any officer or partner of firm ever been an officer or partner of some other organization during the past 10 years that failed to complete a contract on time? Use additional pages if necessary.

(1) Date: _____

(2) Name of officer or partner: _____

(3) Name and mailing address of organization: _____

(4) Describe circumstances for each instance: _____

4. Sureties

A. Name and address of bonding companies which will act as sureties for Bid, Performance, and Payment Bonds:

B. Names and addresses of all bonding companies, other than those listed in A above, which have acted as sureties for your firm during the last 5 years:

C. Has any bonding company ever taken over a contract or made any payments because of firm's failure to carry out a contract?

- (1) Date: _____
- (2) Name of bonding company: _____
- (3) Bonding company's address: _____
- (4) Describe circumstances for each instance: _____

5. Bidder's Financial Statement

- A. Attach the most-recent balance sheet and year-end profit and loss statement for the firm.
- B. Who prepared the balance sheet and profit and loss statement?
- C. Has the firm ever filed a petition in bankruptcy or filed for relief under Chapter 128?
If yes, give the case numbers for each such filing, and the identity of the courts in which they were filed.

6. Project Review

- A. Have you read each of the provisions of the Contract Documents? Yes No
- B. Have you reviewed the Project Plans and Specifications? Yes No
- C. Have you examined the Worksite? Yes No

State of _____ }
 _____ County } ss.

_____ (name), being first duly sworn, deposes and says that he or she is the _____ (title) of the firm identified in section 1, above; that the answers to the foregoing questions and all attachments produced in response to the foregoing questions are true and correct, and that any City, bonding company, or other agency herein named is hereby authorized to supply the City with any information deemed necessary to verify this statement.

Subscribed and sworn to before me this _____ day of _____, 2018.

 Notary Public, _____ County, Wisconsin
 My commission (expires _____)(is permanent)

**(PLEASE ATTACH POWER OF ATTORNEY)
(ORIGINALS ONLY – COPIES NOT ACCEPTED)**

CONCRETE CONTRACTOR APPLICATION AND BOND

To The Board of Public Works:
Waukesha, Wisconsin

Bond No. _____
Date _____, 20__

The undersigned hereby applies to be licensed as a Concrete Contractor, and hereby agrees to be governed, in all respects, by the Ordinances passed by the Common Council, and the rules, regulations and penalties which are or may be adopted by the Board of Public Works, pertaining to the Licensed Concrete Contractor of the City.

Signature

Name of firm _____

Address of business _____

Phone No. _____ Fax No. _____

KNOW ALL MEN BY THESE PRESENTS,

THAT WE, _____ as principal
and _____ As sureties, are held
and firmly bound unto the CITY OF WAUKESHA, and to any and all persons for whom
said principal may work in said City right of way during one year from date of this
Concrete Contractors license, in the penal sum of Five Thousand Dollars, lawful money
of the United States of America, to be paid to the said CITY OF WAUKESHA, its
successors and assigns, or to any persons beneficially interested herein as above set forth:
For which payment, well and truly to be made we bind ourselves, our heirs, executors and
administrators, firmly by these presents.

Sealed with our seals, and dated the _____ day of 20 _____.

WHEREAS, the above bounden _____
has made application to the Board of Public Works of the City of Waukesha for a license
to carry on business as a concrete contractor, agreeing to conform to and comply with all
regulations and directions of said Board for such work.

Now, therefore, the condition of this obligation is such, that if the said _____ licensed to carry on business as a concrete contractor, by the said Board of Public Works, shall indemnify, and save harmless the City of Waukesha and said Board of Public Works, of and from all accidents and damages consequent thereupon, for or by reason of obstructing any street, alley, or avenue or other public or private grounds, by him or by those in his employment, for the purpose of working in the City's right of way or for any other purpose or object whatever, and that he will also replace and restore the street, planking, terraced area or pavement, or the roadway, in whatever manner constructed, to as good a state and condition as he found it, and keep and maintain the permitted work in good order, to the satisfaction of the Board of Public Works of said City, for the warranty period of two years next after the date of the completion of such work and shall conform in all respects to the rules and regulations which may have been or may hereafter be established by the said Board, and shall well and truly pay or cause to be paid, all fines that may be imposed by said Board for any violation thereof, or any judgment, decree, damages, and costs thereof, that may be recovered in any court against said City of Waukesha by reasons of the negligence of the said _____ or any of his agents or employees, or in consequence of any act done by him or them by virtue of said license, then this obligation to be void and of no effect, otherwise to be in full force and virtue.

This bond is in effect from _____ to _____.

Signed, sealed and delivered
In presence of:

(Witness to Principal)

Signed: Principal

Print Name: Principal

(Witness to Surety)

By: _____ (Seal)
Signed: Surety

Print Name: Surety

**(PLEASE ATTACH POWER OF ATTORNEY)
(ORIGINALS ONLY – COPIES NOT ACCEPTED)**

DRAINLAYER'S APPLICATION AND BOND

Bond No. _____

Date _____, 20__

Phone No. _____ Fax No. _____

KNOW ALL MEN BY THESE PRESENTS, THAT WE, _____
_____, as principal of _____
_____, and _____

of _____, as sureties, are held and firmly bound unto the City of Waukesha and to any and all persons for whom said principal may install plumbing or drainage within the City of Waukesha in the penal sum of Five Thousand Dollars (\$5,000.00), lawful money of the United States of America, to be paid to said City of Waukesha, its successors or assigns, or to any persons beneficially interested herein as above set forth, for which payment well and truly to be made we bind ourselves, our heirs, executors, and administrators firmly to these presents.

Sealed with our seals and dated this _____ day of _____, 20__.

WHEREAS, the above bounden principal has made application to the BOARD OF PUBLIC WORKS to carry on the business of plumbing or drainlaying in the City of Waukesha:

NOW, THEREFORE, the condition of this obligation is such that if the said _____, licensed to engage in plumbing or drainlaying in the City of Waukesha, shall faithfully perform all such work with due care and skill and in accordance with the laws, ordinances, rules, and regulations governing the installation of plumbing and drainage in said City, and will indemnify the City of Waukesha and save it harmless against all damages, costs, expenses, outlays, and claims of every nature and kind arising out of any unskillfulness or negligence on his or their part in connection with plumbing or drainage work done until the expiration of such license, then this obligation to be void and of no effect, otherwise to be in full force and virtue.

Signed, sealed and delivered

In presence of:

(Witness to Principal)

Signed: Principal

Print Name: Principal

(Witness to Surety)

By: _____ (Seal)
Signed: Surety

Print Name: Surety

This bond expires December 31, 20_____.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
03/29/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
INSURED	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	INSURER A:	
	INSURER B: N/A	
	INSURER C: N/A	
	INSURER D: N/A	
INSURER E:		
INSURER F:		

COVERAGES CERTIFICATE NUMBER: LOS:001499308-27 REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PROJ <input type="checkbox"/> LOC		X				EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 1,000,000 PRODUCTS - COMP/OP AGG \$ 1,000,000
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
	UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$
	WORKERS COMPENSATION AND EMPLOYERS LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below						WC STATUTORY LIMITS OTHER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

City of Waukesha is an additional insured.

CERTIFICATE HOLDER

City of Waukesha
130 Delafield Street
Waukesha, WI 53188

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
of Marsh Risk & Insurance Services

COPY OF

Signature Needed

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RELEASE AND HOLD HARMLESS AGREEMENT

WHEREAS, the undersigned, owner(s) of the property located at _____, (legal description to follow) in the City of Waukesha, Wisconsin, have requested permission to install an in-ground sprinkler system/sprinkler heads/conduit in the City right-of-way, and

WHEREAS, the City of Waukesha is willing to permit said installation provided it is held harmless from all damages, and

WHEREAS, the owner(s) assumes responsibility for and agrees to pay to the City any additional or extra costs incurred by the City for public work or public utility work required because of the construction of the encroachment within the City right-of-way.

NOW, THEREFORE, in consideration for permission from the City of Waukesha to install an in-ground sprinkler system/sprinkler heads/conduit in the City right-of-way. The undersigned property owners, their heirs, legal representatives, successors and assigns, shall and hereby do indemnify and hold harmless the City of Waukesha its officers, agents and employees, from all claims, demands, actions, causes of action, and judgments whatsoever in any way resulting from, or arising out of, this placement. This Agreement shall run with the land, and shall be binding upon the owner, their heirs, executors, administrators, successors and assigns.

Dated this _____ day of _____, _____.

Legal description of property: _____

OWNERS:

Signature

(Print name)

Signature

(Print name)

STATE OF WISCONSIN)

ss

WAUKESHA COUNTY)

Personally came before me this _____ day of _____, _____, the above named _____ and _____ to me known to be the persons who executed the foregoing instrument and acknowledge the same.

Notary Public
Waukesha County, Wisconsin
My Commission Expires: _____

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Appendix A - Forms

2 CONSTRUCTION ADMINISTRATION

2.1 C100 - MUNICIPAL CONSTRUCTION ADMINISTRATION PROCESS FLOWCHART

2.2 C101 - NOTICE OF AWARD

This document from the City notifies the Contractor that the Contract has been awarded. The Contractor is to execute (sign) contracts, and provide Performance and Payment bonds, Affidavits and Powers of Attorney. Certificates of Insurance shall also be obtained by the Contractor and all documents shall be submitted to the City.

2.3 C102 - NOTICE TO PROCEED

This document from the City notifies the Contractor that commencement with the work may begin following the indicated date. The Date of Substantial Completion is indicated. Contractor shall accept the Notice and return a signed copy to the City prior to starting the work.

2.4 C103 - REQUEST FOR CONSTRUCTION STAKING

This Document serves as a request from Contractor to City for Construction Staking (Surveying), and requests specific details and information to be performed.

2.4.1 C104 - CONSTRUCTION STAKING CUT SHEET

2.5 C105 - FIELD ORDER

This Order from the City to the Contractor serves to communicate a minor design change that, in the interpretation of the Engineer, will not result in additional/reduction of costs to either party, nor in a Contract Time extension/reduction. The Project Manager may issue this Order.

2.6 C106 - WORK CHANGE DIRECTIVE

This Directive from the City to the Contractor serves to communicate a change that directs minor changes resulting in an estimated cost increase/decrease less than \$5000. Contract Bid Item per Unit prices are to be used and will not result in an adjustment to the Contract Time.

2.7 C107 - CONTRACT CHANGE ORDER

This Order from the City to the Contractor directs major changes that may result in an estimated cost increase/decrease more than \$5000. Contract Bid Item per Unit prices are to be used and may result in an adjustment to the Contract Time. If the work contains items not part of the Contract, the Contractor shall provide Unit Prices prior to issuance of the Change Order. The Director of Public Works will issue this Change Order with concurrence from the Board of Public Works.

2.8 C108 - REQUEST FOR INFORMATION

This Document serves as a request from Contractor to City for additional information to clarify the Plans, Specifications or other Contract Documents.

2.9 C109 - PAYMENT REQUEST FORM

This Document serves as a request from the Contractor to the City requesting Payment for work performed. The Contractor may not submit pay requests more frequently than 2-week intervals, or longer than 60 days. Payment may only be requested for work performed, and materials on-site that have been reviewed/accepted and with delivery documentation (tickets) provided. Contractor may use an alternate form other than that as provided. Detailed quantification shall be provided with Bid Item Unit prices, descriptions, and costs as shown for clarity. Contractor shall make request in a timely manner for review by Engineer.

2.10 C110 - SUBMITTAL REVIEW STAMP

This Cover Sheet shall accompany all responses from the City to the Contractor regarding submittals as required by the Standard Construction Specifications. This Cover Sheet only indicates that the submitted material(s) have been reviewed, or that additional information is to be provided by the Contractor and resubmitted for the Engineer to make a review for Specification compliance. This review does not constitute acceptance or approval and does not relieve the Contractor for compliance with requirements of the plans or specifications.

2.11 C111 - STATEMENT OF SUBSTANTIAL COMPLETION

This Statement from the Contractor to the City indicates that the Contractor certifies that the work under the Contract is Substantially Complete according to the terms and conditions of the Contract Documents. Substantially Complete is defined as having 95% of all (applicable) Bid Items complete and the City can occupy or utilize the designated work for which it is intended. The project is not considered Substantially Complete until the City concurs with the Statement.

2.12 C112 - PUNCHLIST

The Punchlist is a list of deficient, incomplete, damaged or unincluded items that have not been addressed and are part of the Contract Documents. The Punchlist is generated within 10 days of the City's concurrence of the Statement of Substantial Completion. The Contractor shall make all corrections of items on the Punchlist as soon as possible and practical without delay. The Contractor shall notify the City when the items have been completed for verification. Field verification by the City does not constitute acceptance of any item listed on the Punchlist.

2.13 C113 - STATEMENT OF WARRANTY COMMENCEMENT

This Statement by the City to the Contractor indicates the commencement of the Warranty Period for the work or items under the Contract. Bid Items may have different warranty periods.

2.14 C114 - STATEMENT OF FINAL COMPLETION

This Statement from the Contractor indicates that all applicable Unit Bid items are 100% completed, 100% of the Punchlist Items have been completed and the City is occupying or utilizing the designated work for which it is intended. The project is not considered Complete until the City concurs with the Statement.

2.15 C115 - NOTICE OF PENDING CONTRACT NONCOMPLIANCE

This Notice to the Contractor indicates that the project has not yet met Substantial Completion and it is anticipated that the project will not meet the Contract deadline. It is a reminder that the

City will apply Liquidated Damages as allowed under the Contract Documents, and that the City reserves the right to complete any unfinished work and back-charge the Contractor for related costs.

2.16 C116 - NOTICE OF APPLICATION OF LIQUIDATED DAMAGES

This Notice to the Contractor indicates that the project has not yet met Substantial Completion and that the City will apply Liquidated Damages as allowed under the Contract Documents, and that the City reserves the right to complete any unfinished work and back-charge the Contractor for related costs

2.17 C117 - SANITARY INFRASTRUCTURE FIELD VERIFICATION – FORM A

This form will be completed by the Contractor and City stating that the infrastructure has been installed per the Contract Documents. This is completed for all City and private projects which contain public sanitary sewer infrastructure.

2.18 C118 - SANITARY INFRASTRUCTURE ACCEPTANCE REQUEST – FORM B

This form will be completed by the Developer and Design Engineer stating that the infrastructure conforms to the Contract Documents and requests acceptance from the City. This is completed for all City and private projects which contain public sanitary sewer infrastructure.

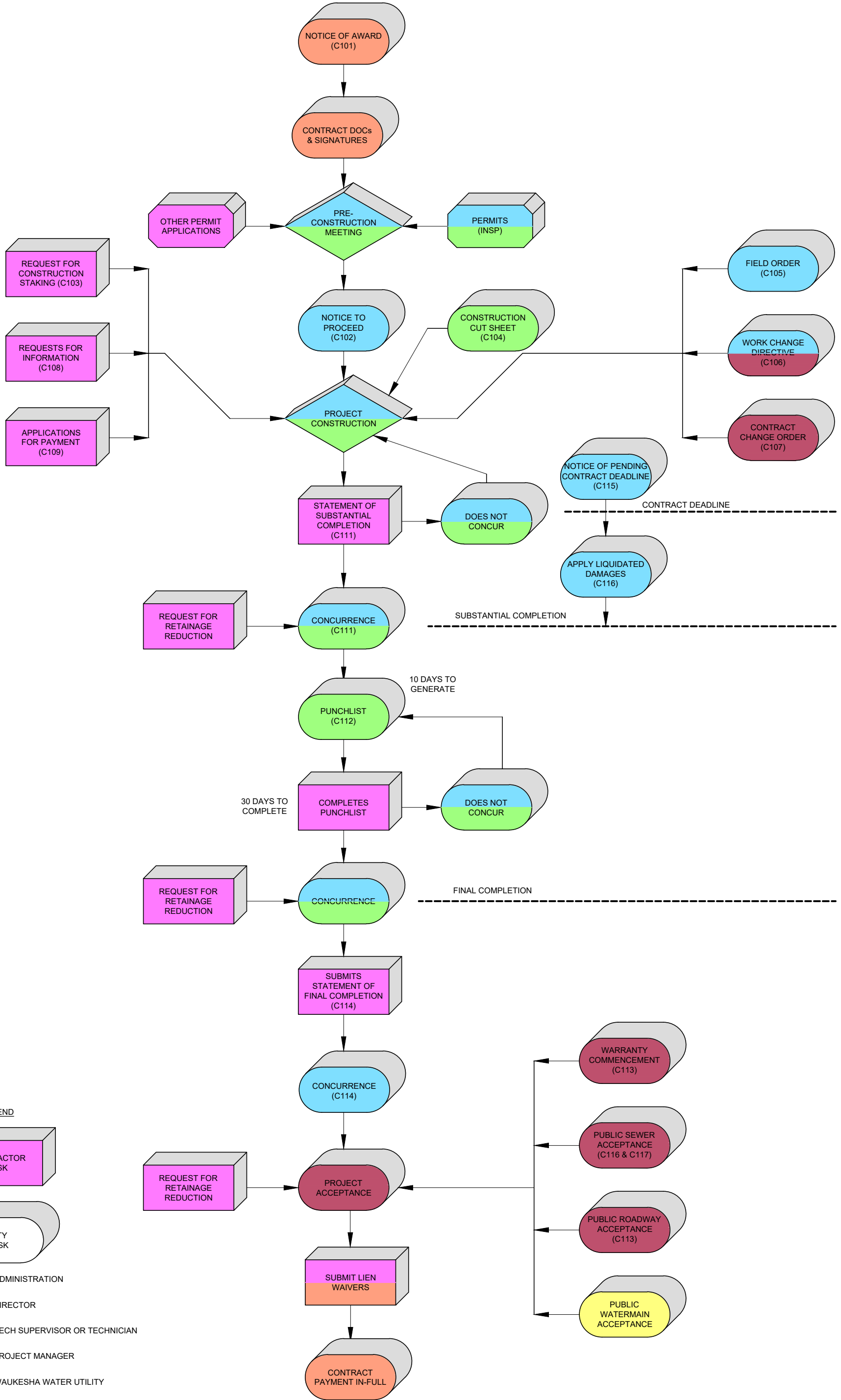
2.19 C119 – ORDER TO TEMPORARILY SUSPEND WORK

This form is to notify the Contractor that the City is temporarily suspending work operations for a period of time that the Engineer may deem necessary in the interest of public safety and convenience. Work may be suspended due to unsuitable weather conditions or other conditions considered unfavorable for prosecution of satisfactory work, or due to failure on the part of the contractor to perform provisions of the contract.

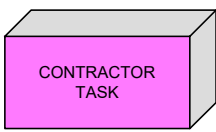
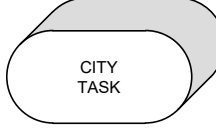




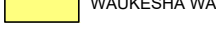
2.20 C120 – TEMPORARY CONSTRUCTION PERMIT

This permit allows the City a temporary right to occupy, install and construct improvements for as long as required for such purpose.

END OF SECTION



LEGEND

-  CONTRACTOR TASK
-  CITY TASK
-  ADMINISTRATION
-  DIRECTOR
-  TECH SUPERVISOR OR TECHNICIAN
-  PROJECT MANAGER
-  WAUKESHA WATER UTILITY

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

PROCESS FLOW CHART
MUNICIPAL CONSTRUCTION PROJECT ADMINISTRATION

APPROVED: ALEX DAMIEN DATE: 12/07/17

DRAWN BY: JAW

PLOT SCALE :

00-0001

APPROVED: DATE:

CHECKED BY:

PLOT DATE : 1/29/2018 11:12 AM

PROJECT NO: STANDARD DETAILS



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Notice of Award
Form C101
(Rev 01/18)

Click or tap to enter a date.

Click or tap here to enter text.
Click or tap here to enter text.
Click or tap here to enter text.

Dear: Click or tap here to enter text.:

Re: Click or tap here to enter text.

You are hereby notified that City of Waukesha Common Council has awarded the above referenced project to Click or tap here to enter text. at their Click or tap to enter a date. meeting. At this time, please:

- Execute both copies of the enclosed contracts.
- Obtain and return the original Performance and Payment bonds in duplicate. These Bonds must be signed by the Contractor, Surety and witnesses must sign for both signatures. The Surety must also execute the Affidavit and attach a Power of Attorney.
- Obtain a Certificate of Insurance for the project showing the City of Waukesha as an additional insured per the terms and conditions of the contract and explained in detail on page #xx of the Contract.
- Return the contract, Bonds, and Certificate of Insurance to me within 10 days.

The Contract is not binding until fully executed; you should make no expenditures in anticipation of this work except for items pertaining to the signing of the Contract and appurtenant forms, until you receive the Notice to Proceed.

Our Project Manager for this project is Click or tap here to enter text. If you have questions concerning these forms, please contact the Project Manager at 262-524-3600 or myself at 262-524-3605.

Sincerely,

Judith A. Allen
Office Manager

Enc: Agreement Forms (2 copies)
Bond Forms (1 copy)



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Notice to Proceed

Form C102
(Rev 01/18)

Click or tap to enter a date.

Click or tap here to enter text.
Click or tap here to enter text.
Click or tap here to enter text.

Re: Contract #: Click or tap here to enter text.
PO #: Click or tap here to enter text.

You are hereby notified to commence work in accordance with the Contract dated Click or tap to enter a date., on or before Click or tap to enter a date. and you are to complete the Work by Click or tap to enter a date..

By _____ By _____
Project Manager

ACCEPTANCE OF NOTICE

Receipt of this Notice to Proceed is hereby acknowledged this day, _____, 20_____.

By: _____
Contractor's Representative

Title: _____

Please sign and return the original to the attention of the Project Manager, City of Waukesha Engineering, 130 Delafield St., Waukesha, WI 53188. Retain a copy for your records.



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Request for Construction Staking
Form C103
 (Rev 01/18)

Date:
 Project:
 Contractor:

Phone: _____ Cell Office

Email: _____

Cut Sheets:

Email to above address US Mail Pick up at City Engineering Deliver to Site

Requested Completion Date (To be Staked By): _____ **Time:** _____

Provide a minimum of 3 working-days for each request to be completed.

Check if Needed	Item	Offset	Offset Side/Direction	Stakes on center
<input type="checkbox"/>	Sanitary Sewer			
<input type="checkbox"/>	Storm Sewer			
<input type="checkbox"/>	Road Centerline			
<input type="checkbox"/>	Curb *		N/A	
<input type="checkbox"/>	Sidewalk			
<input type="checkbox"/>	Other (explain)			

* - Curb is normally staked at radius centers, PTs, mid-points, PCs and Deflection Points.
 Low points and High points are normally staked.
 Curb and gutter will be staked to the **Face/Top** unless otherwise noted on Cut Sheets.
 Inlets are staked to **Center of Structure and Flowline** unless otherwise noted on Cut Sheets.
 Contractor is responsible for layout / setup of ADA ramps. City will not stake ramp elevations.

Plans provided with this request:
 Special Requests:

Submit by email to: Jweil@Waukesha-wi.gov



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Field Order
Form C105
(Rev 01/18)

To: Click or tap here to enter text.

RE Project: Click or tap here to enter text.

Contract No.:

Date: Click or tap to enter a date.

Field Order No.:

You are hereby directed to execute promptly this Field Order which interprets the Contract Documents or orders minor changes in the Work without change in Contract Price (Sum) or Contract Times.

Description:

Attachments:

By: Click or tap here to enter text.



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Work Change Directive

Form C106
(Rev 01/18)

To: Click or tap here to enter text.

RE Project: Click or tap here to enter text.

Contract No.:

Date: Click or tap to enter a date.

Work Change Directive No.:

You are hereby directed to execute promptly this Work Change Directive which interprets the Contract Documents or orders minor changes (less than \$5000) in the Work without change in Contract Price (Sum) or Contract Times. You are directed to promptly proceed with the following change:

Description:

Attachments:

Method of determining payment:

- Unit Prices
- Lump Sum
- Quantity
- Other _____

Total estimated increase/decrease.

\$ _____

By: _____
(Project Manager)

By: _____
(Contractor's Signature and Title)

By: _____

Date: _____

Date: _____



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Contract Change Order
Form C107
(Rev 01/18)

Project: Click or tap here to enter text.

Date: Click or tap to enter a date.

Contract Number: Click or tap here to enter text.

Branch: Engineering Department.

Change Order Number: Click or tap here to enter text.

Contractor: Click or tap here to enter text.

Amount of original contract \$

Amount of Contract prior this Change Order \$

Description of change:

Click or tap here to enter text.

Amount of this Change Order \$

Net Contract Amount after this Change Order \$

City of Waukesha
Director of Public Works

Date

Contractor
Click or tap here to enter text.

Date



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Request for Information

Form C108
(Rev 01/18)

Date: Click or tap to enter a date.

City of Waukesha's Project Name: Click or tap here to enter text.

To: City of Waukesha
Engineering Department
Attn: Click or tap here to enter text.
130 Delafield St.
Waukesha, WI 53188

From: Click or tap here to enter text.

Method Sent: Mail E-Mail Delivered

Description of Request:
Click or tap here to enter text.

Additional Support Documents: are / are not attached

City Response Date:

City Response From:

City Response:
Click or tap here to enter text.

Date

TO: City of Waukesha, Engineering Division

ATTN: Project Manager

PROJECT:

CONTRACT NO.

CONTRACT AMOUNT:

CONTRACTOR'S NAME:

CONTRACTOR'S ADDRESS:

PAYMENT REQUEST NO.:

Item No	Bid Quantity	Completed Quantity	Description	Cost	Per Unit	Amount
1		0.0		@	Lump Sum	\$0.00
2		0.0		@	Lump Sum	\$0.00
3		0		@	Lin. Ft.	\$0.00
4		0		@	Lin. Ft.	\$0.00
5		0		@	Each	\$0.00
6		0		@	Each	\$0.00
7		0		@	Each	\$0.00
8		0		@	Vert. Ft.	\$0.00
9		0		@	Vert. Ft.	\$0.00
10		0		@	Lin. Ft.	\$0.00

Payment request total:

\$0.00

This payment request is for work items completed per the contract and standard specifications. I understand the quantities and measurements will be verified and that a retainage will be withheld.

Contractor Signature

For City of Waukesha use only:

Account #: _____

Amount: \$0.00

Retainage: _____

Payment Amount: _____



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Submittal Review

Form C110
(Rev 01/18)

- Reviewed**
- Revise and Resubmit**

Corrections or comments made on the shop drawings during this review do not relieve contractor for compliance with requirements of the drawings and specifications. This check is only for review of the general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for: Confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.

Date: Click or tap to enter a date.

By: _Click or tap here to enter text.



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Statement of Substantial Completion

Form C111
(Rev 01/18)

Click or tap to enter a date.
City of Waukesha
Engineering Department
130 Delafield St.
Waukesha, WI 53188

Project Name: Click or tap here to enter text.

Dear **Project Manager**:

I, the Contractor for the above referenced project hereby, certifies that the Work under this Contract is Substantially Complete in accordance with the terms and conditions of the Contract Documents.

Upon City's receipt and concurrence, the City shall prepare a Punchlist of any deficiencies that prevents the Work from being accepted as complete. The City will provide the Punchlist within ten (10) days of the date the City signed below.

Upon correction of any noted deficiencies, the Contractor shall notify the City of corrective actions. The City shall re-inspect the Work and shall update the Punchlist to show completed or satisfied deficiencies. Additional deficiencies may be noted and added to the Punchlist at any time. Re-inspection and updating of the Punchlist will not constitute acceptance of noted item.

The Contractor hereby states that the work has met the definition of Substantially Complete.

Signed _____ Date: _____

The Project Manager concurs with the Contractor that the work is Substantially Complete. The City has inspected the above-referenced project and finds the Work to be 95% of all Unit Bid Items completed and the City of Waukesha can occupy or utilize the designated work for which it is intended.

Substantial Completion is given on condition that Contractor agrees to complete all of the Punchlist items within 30 days of the issuance of the Punchlist.

The City hereby concurs that the above referenced project is Substantially Complete:

Signed _____ Date: _____

Definitions:

Substantial Completion of the Work is defined as having 95% of all Unit Bid Items completed and the City of Waukesha can occupy or utilize the designated work for which it is intended.

Date of Substantial Completion is established when the Contractor provides this signed form to the City, and the City concurs with the Contractor by signing and dating this form.



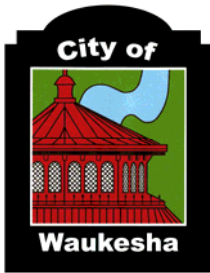
City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Punchlist
Form C112
 (Rev 01/18)

Project Name	Prepared By:	Date:
Contractor	(Initials)	1/15/2018

Item No.	Location	Description	Field Verified as Completed	Inspector's Initials
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
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37				
38				
39				
40				

• This Punchlist may not be comprehensive.
 • Once the Item has been completed, notify the City Engineer or Tech Supervisor so that a field-check of the Item can be performed to verify that it has been completed.
 • This Punchlist will be updated weekly or as necessary.
 • Field verification does not constitute acceptance of any item on this list.



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Statement of Warranty Commencement

Form C113
(Rev 01/18)

Click or tap to enter a date.

City of Waukesha
Engineering Department
130 Delafield St.
Waukesha, WI 53188

Project: Click or tap here to enter text.

The Warranty Period for the above noted Project starts Click or tap to enter a date.

All defects in workmanship and materials that occur within the Warranty Period from the date of the City's Final acceptance of the Contract work shall be corrected by the Contractor. When defects are corrected, the warranty for that portion of the work shall extend for one year from the date such correction is completed and accepted by the City.

The Contractor shall begin to correct any defects within seven (7) calendar days of its receipt of notice from the City of the defect. If the Contractor does not accomplish the corrections within a reasonable time, the City may complete the corrections and the Contractor shall pay all costs incurred by the City to accomplish the correction.

Signed



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Statement of Final Completion

Form C114
(Rev 01/18)

Click or tap to enter a date.

City of Waukesha
Engineering Department
130 Delafield St.
Waukesha, WI 53188

Regarding: Click or tap here to enter text.

I, the Contractor for the above referenced project, hereby certifies that the Work under this Contract has been reviewed and is found to be Complete in accordance with the terms and conditions of the Contract Documents.

Final Completion of the Work is defined by having 100% of all applicable Unit Bid Items completed, 100% of the Punchlist items completed and the City of Waukesha is occupying or utilizing the designated work for which it is intended.

The Date of Final Completion shall be determined when Contractor provides this signed Statement to the City, and the City concurs with the statement.

Upon receipt and concurrence, the City shall prepare Acceptance documentation of the project.

The Contractor hereby states that the work is Complete.

Signed: _____

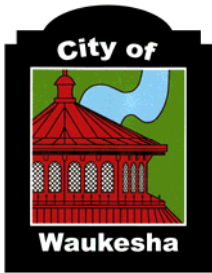
Date: _____

The City has inspected the above-referenced project and finds the Work to have 100% of all Unit Bid Items completed, 100% of the Punchlist items are completed and the City of Waukesha is occupying or utilizing the designated work for which it is intended.

The City hereby concurs that the above referenced project is Complete and the Warranty period for all applicable items commences from this date:

Signed _____

Date: _____



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

**Notice of Pending
Contract Noncompliance**
Form C115
(Rev 01/18)

Click or tap to enter a date.
Click or tap here to enter text.
Click or tap here to enter text.
Click or tap here to enter text.

Re: Click or tap here to enter text.

Dear Click or tap here to enter text.:

As of this date, the Project has not yet met Substantial Completion on every aspect, and the City is anticipating that the Project will not meet the Date of Substantial Completion without significant efforts on behalf of the Contractor.

This Notice is a reminder that the Contract for the project provides for the assessment of liquidation damages by the City in the amount of \$ Choose an item. for each day that the work is incomplete after the Substantial Completion deadline, which is Click or tap to enter a date.

As an additional reminder, if the remaining work is not completed, the City of Waukesha has the right to complete any unfinished work and back-charge the Contractor for related costs.

- 1). Submit an updated construction schedule as soon as possible showing your accelerated schedule in an attempt to complete the work.**
- 2). Indicate a date of anticipated Substantial Completion.**

Thank you.

Project Manager

City of Waukesha – Director or Public Works



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Notice of Application of Liquidated Damages

Form C116
(Rev 01/18)

Click or tap to enter a date.

Click or tap here to enter text.
Click or tap here to enter text.
Click or tap here to enter text.

Re: Click or tap here to enter text.

As of this date, the project has not met Substantial Completion.

This Notice is a reminder that the Contract for the project provides for the assessment of liquidation damages by the City in the amount of \$ Choose an item. for each day that the work is incomplete after the Substantial Completion deadline.

The City of Waukesha will be assessing liquidated damages commencing as of Click or tap to enter a date.

As an additional reminder, the City of Waukesha has the right to complete any unfinished work and back-charge the Contractor for related costs.

- 1). Submit an updated construction schedule as soon as possible showing your accelerated schedule in an attempt to complete the work.**
- 2). Indicate a date of anticipated Substantial Completion.**

Thank you.

Project Manager

Director of Public Works



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 waukesha-wi.gov

Sanitary Infrastructure Field Verification Form A (C117)

(Rev 1/18)

Project Information

Date of Field Verification

Construction Plans Title

Construction Plans Latest Revision Date

Project Description

Contractor Information

Company Name

Title

Last Name

First Name

MI

Address

City

State

ZIP Code

Phone Number (include area code)

Email Address

Infrastructure Verification

The sanitary infrastructure conforms to the following:

- | <u>True</u> | <u>False</u> | <u>N/A</u> | |
|-----------------------|-----------------------|-----------------------|--------------------------------------------------------------------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | City standard covers installed |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Chimney seals installed |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Chimney ProRings acceptably installed |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Manholes free of debris |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | No leaks in piping / structures |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Manhole pipe connections suitably mortared around entire pipe circumference |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | All temporary plugs have been removed and the system is ready to accept sewage |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Pump station operational |

I hereby certify that I have field verified the above information and that it is correct and true.

Contractor Name (print)

Signature of Contractor

Date Signed

City Representative

City Representative Name (print)

Signature of City Representative

Date Signed

SUBMITTAL INSTRUCTIONS:

1. Provide date of field verification.
2. Indicate title and latest revision date of City approved project construction plans.
3. Provide a project description and indicate type of project (e.g. sanitary sewer extension, force main, pump station, sewer replacement, etc.)
4. Provide installation contractor information.
5. All sections of the infrastructure verification checklist must be completed for every submittal. If it is felt that an item on the checklist does not apply to a particular project, indicate this with N/A.
6. The field verification shall be conducted with a City representative.
7. A completed copy of this form shall be submitted along with FORM B, Sanitary Infrastructure Acceptance Request, when requesting acceptance of installed sanitary infrastructure from the Department of Public Works.



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 waukesha-wi.gov

**Sanitary Infrastructure Acceptance Request
 Form B (C118)**
 (Rev 1/18)

Developer Information

Company Name		Title		
Last Name		First Name		MI
Address		City	State	ZIP Code
Phone Number (include area code)		Email Address		

Project Information

Attach a drawing / plan which clearly indicates the extent of the sanitary infrastructure covered by this request.

Construction Plans Title	Construction Plans Latest Revision Date
--------------------------	-----------------------------------------

Project Description

Developer's Engineer Certification

The sanitary infrastructure conforms to the following:

- | True | False | N/A | |
|-----------------------|-----------------------|-----------------------|-----------------------------------------------------------------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Installed in accordance with approved plans and specifications |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Sewer televising documents submitted. Reviewed & approved by _____ on _____ |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Record drawings submitted. Reviewed & approved by _____ on _____ |

I hereby certify that the above information is correct and true.

Engineer's Last Name	First Name	Name of Firm
Signature of Engineer	P.E. Number	Date Signed

Developer Certification

The sanitary infrastructure conforms to the following:

- | True | False | N/A | |
|-----------------------|-----------------------|-----------------------|--------------------------------------------------------------------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Sewer testing completed (mandrel, pressure, manhole vacuum). All tests passed. |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | All punch list items addressed |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | All temporary plugs have been removed and the system is ready to accept sewage |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Easement or plat recorded |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Work is free from all liens |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Review and inspection fees paid to City |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Developer's agreement conditions satisfied |

I hereby certify that the above information is correct and true.

Developer Name (print)

Signature of Developer	Date Signed
------------------------	-------------

City Acceptance

City Engineer Name (print)

Signature of City Engineer	Date Signed
----------------------------	-------------

SUBMITTAL INSTRUCTIONS:

The following is a listing of information that must be submitted when requesting acceptance of a sanitary project:

1. Provide developer information. The developer may be an individual, company, institution, or municipality.
2. Attach one (1) copy of a drawing or plan which clearly indicates the extent of the sanitary infrastructure covered by this sanitary acceptance request.
3. Indicate title and latest revision date of City approved project construction plans.
4. Provide a project description and indicate type of project (e.g. sanitary sewer extension, force main, pump station, sewer replacement, etc.)
5. All sections of the engineer and developer certification checklists must be completed for every submittal. If it is felt that an item on the checklist does not apply to a particular project, indicate this with N/A.
6. For the sewer televising documents and record drawings checklist items, indicate the City staff member from whom approval was obtained and the date of the approval.
7. Forward this request form along with an approved copy of FORM A, Sanitary Infrastructure Field Verification Form, to the Department of Public Works for processing.



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

**Order to Temporarily
Suspend Work**
Form C119
(Rev 01/18)

Date:

Project:

The Engineer has the authority to require partial or complete suspension of operations for periods of time the Engineer may deem necessary in the interest of public safety and convenience. Work may be suspended due to unsuitable weather or other conditions considered unfavorable for prosecution of satisfactory work, or due to failure on the part of the contractor to perform provisions of the contract.

This order to temporarily suspend work is/are for the following:

The suspension will start at _____ AM / PM on _____, 20__

The work will resume at _____ AM / PM on _____, 20__ provided the above noted conditions are completed, or so directed by the Engineer.

If suspension of operations and contract time is provided for in the contract, contract time charges will be suspended. If suspension of the work ordered by the Engineer is due to the contractor's failure to perform the work or failure to comply with the requirements of the contract, time charges will continue to accrue. The question of contract time is resolved at the time of completion of the work under the contract when a request for extension of contract time would be considered.

ACCEPTANCE

Receipt of this Order to Temporarily Suspend Work is hereby acknowledged this day, _____, 20__.

By: _____
Contractor's Representative

Title: _____

Please sign and return the original to the attention of the Project Manager, City of Waukesha Engineering, 130 Delafield St., Waukesha, WI 53188. Retain a copy for your records.



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

Temporary Construction Permit

Form C120
(Rev 03/18)

Tax Parcel Number:
Owner:

Address:

Purpose:	Roadway Reconstruction and Grading
----------	------------------------------------

The undersigned **Owner(s)** (GRANTOR), conveys a Temporary Construction Permit as described below to grant to the **City of Waukesha** (GRANTEE), a temporary right to occupy, install and construct improvements including, but not limited to, grading, roadway construction, utility installation, driveway improvements, restoration or other construction project-related work, at no additional cost to the Owner, for as long as required for such purpose, and to operate necessary equipment thereon, including the right to preserve, protect, remove or plant any vegetation to prevent erosion of the soil.

This Temporary Construction Permit shall terminate upon completion of the construction project for which this instrument is intended and given.

The area that is being requested is within the property boundaries of the parcel number indicated above.

(Owner Signature) (Date)

(Print Owner Name)

(Owner Signature) (Date)

(Print Owner Name)

(Date)

(Print Name and Title) (Date)

City of Waukesha
(Approved For)

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3 DPW-ISSUED PERMITS

There are 6 permits or authorizations issued by the Department of Public Works for work in the right-of-way. (Typically, the right-of-way includes everything from the back of City sidewalk across the street to the back of City sidewalk.):

- A. P102 - Construction
- B. P102a – Construction - Utility
- C. P103 - Excavation Within the Public Right-of-Way
- D. P104 - Utility (*formerly - Installation of Underground Utilities Within City Streets, Alleys, R.O.W.'S or Easements Controlled by The City of Waukesha*)
- E. P105 - Temporarily Occupy the Right-of-Way
- F. P106 - Erosion Control/Storm Water Permit
- G. P107 – Erosion Control Permit Termination
- H. P108 - Oversize Transport Authorization

Any contractor not following regulations, ordinances, specifications or directions from the City may be banned from working in the City right-of-way. After-the-fact permit applications may have double the fees applied.

The Public Works Department also issues a Release and Hold Harmless Agreement for irrigation systems or privately-owned facilities within the City right-of-way.

3.1 APPLICATION REQUIREMENTS AND INFORMATION

- A. Permit [Application \(P101\)](#) shall be completed by Applicant.
- B. Permits are issued at Engineering Office, 130 Delafield St, Waukesha, WI
- C. **Contacts:**
 - Craig Bayerl, cbayerl@waukesha-wi.gov, 262-524-3656
Permits: **Construction, Excavation within Public ROW, Utility and Temporary Occupy the ROW permits.**
 - Velvet Weier, vweier@waukesha-wi.gov, 262-524-3579
Permits: **Erosion Control / Stormwater Permit**
 - Jon Weil, PS, jweil@waukesha-wi.gov, 262-524-3599
Permits: **Oversize Transport Authorization.**
- D. Permits grant contractors permission to work in the public right-of-way at a specified location.

- E. Contractor agrees to comply with the rules and regulations as established by City Ordinances and City of Waukesha Standard Construction Specifications, latest Edition.
- F. Applicant needs an approved [Certificate of Insurance](#) on file with the City that contains the following:
 - City of Waukesha as addition insured.
 - City of Waukesha listed as a Certificate holder.
 - General Liability checked.
 - Applicant Signature.
- G. Agreements necessary to hold the City harmless from all damages, costs and charges that may accrue from such excavation within the right-of-way.
- H. Concrete work requires the contractor have a [Concrete Bond](#).
- I. Plumbing work requires the contractor have a [Drain Layer's Bond](#).

3.2 P102 - CONSTRUCTION PERMIT & UTILITY CONSTRUCTION PERMIT

A Construction Permit is required for the installation, reconstruction, or maintenance of sidewalks, driveway approaches, curb and gutter sections or other pavement.

3.2.1 REQUIREMENTS:

- A. A traffic control plan must be approved before any work begins according to the Manual of Uniform Traffic Control Devices.
- B. Proper flashing barricades must be in place before any work starts.
- C. The permit is void unless work is commenced within 30 days.
- D. Asphalt/concrete pavement must be stopped within 10 feet of the property line in all areas where there is no concrete sidewalk and grades must be obtained from the City Engineer's Office before work is started. Any asphalt used from that point to the road is considered temporary.
- E. Contractors must call for an inspection before any placement of concrete or asphalt. Any work not inspected will be rejected and have to be replaced at the contractor's expense.

3.2.2 COST

The cost for a Construction Permit is \$65.00 (late fee \$130.00).

The cost for a Utility Construction Permit is \$200.

3.3 P103 - EXCAVATION WITHIN THE ROW PERMIT

A permit is required for anyone intending to dig/saw/drill or any other excavation within the public right-of-way to complete work beyond the work permitted in the construction permit:

- A. Soil boring
- B. For Utility installation including, but not limited to: gas electric, telephone, water, sewer, fiber optic.

3.3.1 REQUIREMENTS

- A. A traffic control plan must be approved before any work begins according to the Manual of Uniform Traffic Control Devices.
- B. Proper flashing barricades must be in place before any work starts.
- C. Work must begin within 30 days of permit issue date or it will become null and void.
- D. The contractor will be responsible for temporary patching of any open excavation in hard surfaces as delineated on the permit.
- E. The contractor will be responsible for all restoration of soft surfaces, i.e., grass, to the satisfaction of the City.
- F. The City's contractor will make permanent repairs in hard surfaces after the excavation has had a chance to settle and stabilize, usually the following year.
- G. The City will bill the contractor for the permanent repair in hard surfaces. The limits for the permanent repair in hard surfaces will be determined at the City's sole discretion.
- H. No excavation or sawing any new pavement within the City right-of-way. New is defined as any pavement surface that is less than six years old.

3.3.2 COST

The cost for an Excavation within the Public ROW Permit is \$80.00 for each permit (late fee \$160.00).

3.4 P104 - UTILITY PERMIT

A Utility Permit is required for the installation of underground utilities in the public right-of-way. This includes, but is not limited to, soil boring, monitoring wells, utility poles, and cell towers.

To initiate the Utility Permit, the Utility (i.e., WE-Energies, Spectrum, AT&T) submits to the City a request to place the underground equipment within the City's right-of-way.

Please Note: An agent or contractor requesting the permit for the utility must have their own insurance to do so and assumes the liability under the permit.

3.4.1 REQUIREMENTS

The Utility Permit request shall include:

- A. Utility Name

- B. Utility Address
- C. Purpose of Work
- D. Start Date
- E. End Date
- F. Location of Installation
- G. Set of plans

3.4.2 COST

The cost for an Excavation within the Public ROW Permit is \$80.00 for each permit (late fee \$160.00).

3.5 P105 - TEMPORARILY OCCUPY THE ROW PERMIT

A permit to temporarily close the any part of the road, sidewalk, or alley, such as:

- A. Placement of a dumpster, storage unit
- B. Equipment and materials, such as, scaffolding
- C. Close a sidewalk
- D. Close a traffic lane
- E. Installation of fixed features such as awnings, stairs, etc.
- F. Placement of tables and chairs

3.5.1 REQUIREMENTS

- A. A traffic control plan must be approved before any work begins according to the Manual of Uniform Traffic Control Devices.
- B. Proper flashing barricades must be in place before any work starts.
- C. In addition to the traffic control plan, the owner of the equipment, dumpster, or POD is required to submit a statement explaining the need to occupy the right-of-way. The narrative shall include the dates in which the occupancy shall occur, a drawing showing the proposed obstruction placement, and the address of the site. This can be done via email or letter.

3.5.2 COST

The cost for a Temporarily Occupy the ROW Permit is based on the following schedule:

Placement	Fee Schedule
Dumpster/storage unit/equipment/materials	\$15.00 first day; each day thereafter \$10.00; weekly \$50.00
Tables and chairs	\$100.00 seasonal; \$15.00 single occurrence
Installation of awnings, stairs, other fixed features	\$35.00

3.6 P106 - EROSION CONTROL AND STORMWATER DISCHARGE PERMIT

An Erosion Control permit is required for any land disturbing activity that exposes soil to erosion (grading or filling) or increase storm water runoff and meets any of the following permit thresholds:

- A. All new subdivisions
- B. All new public or private road construction
- C. Maintenance of storm water retention basins
- D. 3,000 square feet of land disturbance (grading/structures)
- E. 400 cubic yards of excavation, fill or a combination of these
- F. 300 lineal feet of new utility or other open channel disturbance (unless utility is plowed-in outside of ditch line).

3.6.1 REQUIREMENTS

Subject to Chapter 32 of the City of Waukesha Municipal Code, storm water permits are subject to all of the requirements listed in detail on the application and summarized below. The City may include other permit requirements that it determines are necessary to ensure compliance with the ordinance. Violation of any permit requirement shall cause the permit holder and any other responsible party to be subject to enforcement action.

3.6.2 OTHER PERMITS

Compliance with federal, state, and local laws and regulations. The City may require other permits or plan approvals prior to issuing a storm water permit.

3.6.3 APPROVED PLAN

All best management practices shall be installed and maintained in accordance with approved plans and construction schedules.

3.6.4 PLAN MODIFICATIONS

The City shall be notified of any significant modifications proposed to be made to the approved plans.

3.6.5 NOTIFICATION

The City shall be notified at least 2 working days before commencing any work in conjunction with approved plans. The City shall also be notified of proposed plan modifications under Sub. 3 above and within 1 working day of completing construction of a storm water BMP.

3.6.6 ACCESS

The City or its designee shall be permitted access to the site for the purpose of inspecting the property for compliance with the approved plans and other permit requirements.

3.6.7 PROJECT ENGINEER/LANDSCAPE ARCHITECT

The permit holder shall provide an engineer licensed in the state of Wisconsin to be responsible for achieving compliance with approved construction plans, including the implementation of the approved inspection plans and verification of construction in accordance with the City Ordinance.

3.6.8 INSPECTION LOG

The permit holder shall provide a qualified professional to conduct inspections and maintain an inspection log for the site. All best management practices shall be inspected within 24 hours after each rain event of 0.5 inches or more that results in runoff, or at least once each week. The permit holder shall use the current WDNR Construction Site Inspection Report, form 3400-187:

<http://dnr.wi.gov/files/PDF/forms/3400/3400-187.pdf>

3.6.9 BMP MAINTENANCE:

The permit holder shall maintain and repair all best management practices within 24 hours of inspection, or upon notification by the City, unless the City approves a longer period due to weather conditions. All BMP maintenance shall be in accordance with approved plans and applicable technical standards until the site is stabilized and a permit termination letter is issued by the City. Corrective actions shall be documented using the following Construction Site Inspection Corrective Action Photos form 3400-187A:

<http://dnr.wi.gov/files/PDF/forms/3400/3400-187A.pdf>

3.6.10 OTHER REPAIRS

The permit holder shall be responsible for any damage to adjoining properties, municipal facilities or drainage ways caused by erosion, siltation, runoff, equipment tracking.

3.6.11 EMERGENCY WORK

The permit holder authorizes the City, in accordance with the enforcement procedures under Section 32.14 of the Ordinance, to perform any work or operations necessary to bring erosion control or storm water management practices into conformance with the approved plans and consents to charging such costs against the financial assurance retained or to a special assessment or charge against the property as authorized under Subch. VII of Ch. 66, Wisconsin Statutes.

3.6.12 COST

The cost of the Erosion Control/Storm Water Permit is based on the current fee Schedule:

Erosion Control / Storm Water Management Permit Fee Schedule	
Construction Project	Fee
Single-Family Residence	\$150.00
Multi-Family Residence <i>(Determined by number of units in building footprint)</i>	\$80.00/unit
Commercial Building	\$400.00 min. + \$50.00 per acre>2 ac.
Industrial Building	\$400.00 min. + \$50.00 per acre>2 ac.
Institutional Building	\$400.00 min. + \$50.00 per acre>2 ac.
Single-Family Site Development	\$400.00 + \$20.00 per lot
Multi-Family Site Development <i>(Determined by number of units in building footprint)</i>	\$400.00 + \$10.00 per unit
Minor Land Divisions	\$400.00 min. + \$50.00 per acre>2 ac.
Utilities	\$0.10 per foot

3.6.13 APPLICATION

To apply for an Erosion Control / Storm Water permit, please fill out the [Storm Water Permit Application \(PDF\)](#) (Form P106) and submit appropriate fees per [Permit Fee Schedule](#) and submit it to:

Velvet Weier
 City of Waukesha, Engineering Division
 130 Delafield Street
 Waukesha, WI 53188
vweier@waukesha-wi.gov

3.6.14 P107 - EROSION CONTROL PERMIT TERMINATION

The Permit Termination (Form P107) is issued to the original Permit Applicant at the conclusion of the project and after verification that the project has met all applicable permit conditions and has been 100% restored and stabilized.

3.7 P108 - APPLICATION TO TRANSPORT AND AUTHORIZATION

To apply for an Oversize Transport Authorization, fill out the [Application to Transport \(Form P108\)](#) and return it to:

Jon Weil, PS
City of Waukesha, Engineering Division
130 Delafield Street
Waukesha, WI 53188

3.8 APPENDIX A – PERMIT AND APPLICATION FORMS

END OF SECTION

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City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

Application for Public Works Permit

Form P101
 (Rev 01/18)

1. Applicant's Name, Address, City, State and Zip Code Email - Phone -	2. Work Start Date 3. Work Finish Date	4. Location Description where work is being done: <i>(address, 1/4 section, section, town, range. Provide location maps & plans)</i>
5. Owner's information - if different than the Applicant: <i>(Name and Owner's Address)</i>		

6. WORK TYPE: (Check the type of permit applying for and check all that apply)

A. Temporarily Occupy the Right-of-Way:

- Placement of a Dumpster / Storage Unit / Equipment / Materials
- Placement of a Tables and Chairs: Seasonal Single Occurrence
- Installation of Fixed Features (awnings, stairs, etc.)

B. Construction: For new construction, replacement, or maintenance of:

- To Place: approx. _____ sq. ft. of New Sidewalk
- To Replace: approx. _____ sq. ft. of Old Sidewalk
- To Place/Replace: approx. _____ sq. ft. of Concrete Drive Approach
- To Place/Replace: approx. _____ sq. ft. of Asphalt Drive Approach
- To Remove & Replace: approx. _____ lin. ft. of Curb and Gutter

C. Utility: For installation of new underground utilities in the public right-of-way:

- | | | |
|-------------------------------------------|-----------------------------------|--------------------------------------|
| <input type="checkbox"/> Soil Boring | <input type="checkbox"/> Gas | <input type="checkbox"/> Cable TV |
| <input type="checkbox"/> Monitoring wells | <input type="checkbox"/> Electric | <input type="checkbox"/> Telephone |
| <input type="checkbox"/> Utility poles | <input type="checkbox"/> Sewer | <input type="checkbox"/> Fiber optic |
| <input type="checkbox"/> Cell Towers | <input type="checkbox"/> Water | <input type="checkbox"/> Other _____ |

_____ Work Number

D. Excavation within the Right-of Way: For digging, sawing or drilling within the Right-of-Way:

- Soil Boring
- Utility Installation for:
 - Gas Electric Sewer Telephone Water Cable TV Other
- The Street is:
 - Dirt/Gravel Surface Treatment Brick Concrete Asphalt

E. Erosion Control/Storm Water: *(contact Engineering Dept for a separate application)*

F. Transport of Oversize or Overweight Vehicles: *(contact Engineering Dept for a separate application)*

Submit completed and signed Application to:

City of Waukesha, Engineering Department, 130 Delafield St., Waukesha, WI, 53188 or
 email: cbayerl@waukesha-wi.gov

It is understood and agreed that approval is subject to the applicant's full compliance with the pertinent Ordinances, as well as any codes, rules, regulations, and other jurisdictional agencies' permit requirements. Applicant shall comply with all permit provisions, superimposed notes, and detail drawings that the City of Waukesha may add. Any alteration of this form by the applicant is prohibited and may be cause to revoke this permit. When approved, a permit will be issued which contains any provisions required.

 Applicant or Authorized Representative Signature

 Date

 Printed Name

 Title

**CITY OF WAUKESHA
CONSTRUCTION PERMIT
PERMIT FEE \$65.00 - (LATE FEE \$130.00)**

Cash \$ _____ Check # _____ Credit Card _____

By: _____

Issue & Date Paid _____ Date this permit Expires by: _____

- 1. TO PLACE: approx. _____ sq. ft. of New Sidewalk
- 2. TO REPLACE: approx. _____ sq. ft. of Old Sidewalk
- 3. TO PLACE/REPLACE: approx. _____ sq. ft. of Concrete Drive Approach
- 4. TO PLACE/REPLACE: approx. _____ sq. ft. of Bituminous Drive Approach
- 5. REMOVE & REPLACE: approx. _____ lin. ft. of Curb and Gutter

Work being done at _____

Owned by _____
(Name) (Address, if different from above)

The undersigned hereby declares that he is authorized by the owner of the above described property to perform the above work and also hereby agrees to have a bond as required and to execute the above work in conformity with the specifications adopted by the Board of Public Works and all the rules, regulations and penalties prescribed by the Common Council and the Board of Public Works of the City of Waukesha as set forth in Chapter 6 of the Municipal Code, except as in Item 4 above, where the requirement for bonding is waived. The undersigned is also responsible for any damage to the street and it shall be his responsibility to repair according to City of Waukesha regulations. The undersigned also hereby agrees to start said work immediately and to finish the same without delay.

Proper flashing barricades must be in place before any sawing or removals take place. Contractor must schedule inspection before pouring concrete or placing asphalt and work must be inspected before pouring of concrete or placing asphalt. All inspections are for the same day and only good for that calendar day.

Hot sheet asphalt/concrete must be stopped within 10 feet of the property line in all areas where there is no concrete sidewalk and grades must be obtained from the City Engineer's office before work is started. Any asphalt used from that point to the road is considered temporary.

Company Name: _____

Address: _____

Signed: _____

Printed Name: _____

Phone: _____ Cell # _____

FRED V. ABADI, Ph.D., P.E.
DIRECTOR OF PUBLIC WORKS
Phone : (262) 524-3600
Email: fabadi@waukesha-wi.gov

**CITY OF WAUKESHA
UTILITY PERMIT
PERMIT FEE \$35.00**

NAME AND ADDRESS OF PERMITTEE

Company Name

Attn:

Street Address

City, State & Zip

PURPOSE OF PROPOSED WORK

WORK COMMENCEMENT DATE

WORK COMPLETION DATE

LOCATION: STREET

DESCRIPTION

The proposed work has been reviewed by a Representative of the City of Waukesha Engineering Department. A permit therefor is granted, subject to the following conditions and any attached hereto:

1. An Excavation Permit is to be obtained from the Department of Public Works Office before work has commenced. There will be a permit fee of \$80.00 for the permit.
2. All damages to the roadway surface and sidewalks shall be temporarily repaired, with permanent repair to be made by the City of Waukesha under the terms of the Excavation Permit. Damages to the terraced areas shall be restored to a condition acceptable to the City at the expense of the applicant.
3. The roadway and sidewalk area shall be kept open for traffic unless special permission has been granted to close off the street or sidewalk. There shall be no interference with traffic due to the placing of excavated material or machinery on the lanes kept open for traffic. City of Waukesha barricading regulations are to be in effect.
4. Applicant will not be allowed to make any excavations or cuts in permanent pavement except by special permission.
5. All trees that are within the excavation working area, in City right-of-way, must be bored in accordance with the City Forester's regulations. Pruning of trees to accommodate utility construction or over-head installation is prohibited.
Permission to open-cut or prune must be obtained, in advance, from the City Forester.
6. The City of Waukesha reserves the right to make such changes/relocations within the right-of-way at any time. These changes/relocations may include but are not limited to: for the purpose of Public safety, relocation, reconstruction, widening and maintaining of the City right-of-way and permit any necessary changes in storm sewer or sanitary sewer location or grades. Permittee must promptly and at its own expense, with due regard for seasonal working conditions, permanently remove and/or relocate its facilities in the right-of-way whenever the department requests such removals and/or relocations. If the Permittee does not comply with the City, the City will arrange to do the work and bill the permittee.
7. The Permittee agrees to indemnify, defend, save and hold harmless the City, its Officers and employees from any and all claims, liability, lawsuits, damages, and causes of action, which may arise out of the permit or the permittee's activity.
8. Erosion Control Permit Issued: N/A

OTHER CONDITIONS:

9. No pedestals or above ground structures in City right-of-way.

APPROVED: _____

**Fred V. Abadi, Ph.D., P.E.
Director of Public Works**

DATE: _____

WORK ORDER NO. _____



DEPARTMENT OF PUBLIC WORKS
TEMPORARILY OCCUPY THE RIGHT-OF-WAY

Permittee Information

Permit No. _____

Company _____
Name (Print) _____
Address: _____ City / Zip _____
Project address: (if different from above) _____
Contact Phone & E-mail: _____

Permit For: (check one)

- 1. Placement of Dumpster / Storage Unit / Equipment / Materials / Within ROW -
Provide Sketch of Location - Explain Why Items Can Not Be Placed On Private Property
Fee Schedule: First Day-\$15.00, Each Day Thereafter - \$10.00, Weekly - \$50.00

Start Date of Occupancy _____ End Date of Occupancy _____
- 2. Placement of Tables & Chairs Within ROW – Provide Sketch of Location
Fee Schedule: Seasonal - \$100.00
Single Occurrence - \$15.00
Start Date of Occupancy _____ End Date of Occupancy _____
- 3. Installation of Fixed Features (Awnings, Stairs, etc.) – Provide Sketch of Location and Details of the
Encroachment
Fee Schedule: \$35.00

Amount Due _____
Cash _____ Check # _____ Credit Card Type _____

(Date) (Signature of Applicant)

Signed Indemnification and Hold Harmless Agreement? Y / N
Provided Certificate of Insurance Naming City of Waukesha as Additionally Insured? Y / N

Conditions of Approval _____

Approved _____ Date _____

Double Fees shall be charged if work is started before permit is issued.
Violation of the conditions of the Permit may result in penalties as provided for
in Sect. 25.05 of the Municipal Code including possible revocation of the Permit.



City of Waukesha
 Department of Public Works
 130 Delafield Street
 Waukesha, WI 53188
 Waukesha-wi.gov

**Application for
 Stormwater Management
 and Erosion Control**
 Form P106
 (Rev 01/18)

Project Name: _____

Project Type (From Fee Schedule): _____

Project Location: _____

Permit Fee: _____ Permit Number: _____

Permit Issued: _____ Permit Expires: _____

The following contacts are required at the time of application: (Enter on page 2)

- **Applicant:** The person or entity holding fee title to the property or their representative. The applicant shall sign the initial permit application form in accordance with the items 1 – 5 listed below, after which the applicant may provide written authorization for others to serve as the applicant’s representative: **1)** In the case of a corporation, by a principal executive officer of at least the level of vice-president or by the officer’s authorized representative having overall responsibility for the operation of the site for which a permit is sought; **2)** In the case of a limited liability company, by a member or manager; **3)** In the case of a partnership, by the general partner; **4)** In the case of a sole proprietorship, by the proprietor, or; **5)** For a unit of government, by a principal executive officer, ranking elected official or other duly authorized representative.
- **Engineer (or Preparer):** The primary contact for the preparation of erosion control and Storm water management plans. All plan review comments will be addressed to this Contact. For all storm water plans and other engineering, this person must: **1)** be a licensed P.E. in Wisconsin; **2)** stamp P.E. number and sign all plans submitted as part of permit; and **3)** oversee and verify construction of all practices.

<u>Storm Water Management & Erosion Control Permit</u>	
Items submitted: (Office use only)	<u>Permit Approved</u>
1. Signed Application	
2. Application Fee	_____
3. Site Plan Map	By _____
4. Erosion Control Plan	
5. Storm Water Mgt. Plan (including inspection plan)	_____
6. Maintenance Agreement	
7. Financial Assurance	

Application for Storm Water Management & Erosion Control Permit (Page 2)

Applicant Contact Information: (required to process application)

Name: _____ Company: _____

Mailing Address: _____

City: _____ State: _____ Zip Code _____

Daytime Phone #: _____ Fax: _____

E-mail Address: _____

If the box is checked below, I hereby authorize the contact(s) identified to serve as my representative(s).

I understand by submitting this application, City staff may enter upon the subject site to obtain information necessary to administer the ordinance.

Signature of Applicant: _____ Date: _____

Engineer Contact Information: (required to process application)

Authorized as applicant representative

Name: _____ Company: _____

Mailing Address: _____

City: _____ State: _____ Zip Code _____

Daytime Phone #: _____ Fax: _____

E-mail Address: _____

Site Grading & Temporary Erosion Control Practices: (required to issue permit)

Name: _____ Company: _____

Mailing Address: _____

City: _____ State: _____ Zip Code _____

Daytime Phone #: _____ Fax: _____

E-mail Address: _____

Restoration & Stabilization Practices: (required to issue permit)

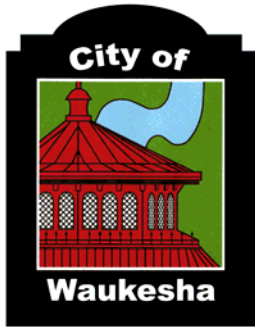
Name: _____ Company: _____

Mailing Address: _____

City: _____ State: _____ Zip Code _____

Daytime Phone #: _____ Fax: _____

E-mail Address: _____



OFFICE OF THE DEPARTMENT OF PUBLIC WORKS

EROSION CONTROL / STORM WATER PERMIT

Permit No. EC1X-000XX

Project Name:

Project Location:

Permit Issued Date:

Permit Approved By:

SAMPLE

Issuance of this permit verifies that all applicable conditions of Chapter 32 of the City of Waukesha Municipal Code as well as conditions set forth in permits administered by other state and local government agencies which pertain to the construction site have been met.

Permit Display: The permit holder shall display this permit in a manner that can be seen from the nearest public road and shall protect it from damage from weather and construction activities until permit termination.

Erosion Control / Storm Water Permit – General Requirements

Subject to Chapter 32 of the City of Waukesha Municipal Code, storm water permits are subject to all of the requirements listed below. The City may include other permit requirements that it determines are necessary to ensure compliance with the ordinance. Violation of any permit requirements shall cause the permit holder and any other responsible party (as defined) to be subject to enforcement action.

[Definition: "Responsible party" means any person or entity holding fee title to the property or acting as the owner's representative, including any person, firm, corporation or other entity performing services, contracted, subcontracted or obligated by other agreement to design, implement, inspect, verify or maintain in the BMPs and other approved elements of erosion control and storm water plans and permits under this ordinance.]

1. **Other Permits:** Compliance with a storm water permit does not relieve the permit holder or other responsible party of the responsibility to comply with other applicable federal, state and local laws and regulations. The City may require the applicant to obtain other permits or plan approvals prior to issuing an erosion control / storm water permit.
2. **Approved Plans:** All best management practices shall be installed and maintained in accordance with approved plans and construction schedules. A copy of the approved plans shall be kept at the construction site at all times during normal business hours.
3. **Plan Modifications:** The City shall be notified of any significant modifications proposed to be made to the approved plans. The City may require proposed changes to be submitted for review prior to incorporation into the approved plans or implementation. Any modifications made during plan implementation without prior approval by the project engineer under sub. 6 below and the City are subject to enforcement action.
4. **Notification:** The City shall be notified at least two working days before commencing any work in conjunction with approved plans. The City shall also be notified of proposed plan modifications under sub. 3 above and within one working day of completing construction of a storm water BMP. The City may require additional notification according to a schedule established by the City so that practice installations can be inspected during construction.
5. **Access:** The City or its designee shall be permitted access to the site for the purpose of inspecting for the property for compliance with the approved plans and other permit requirements.
6. **Project Engineer / Landscape Architect:** The permit holder shall provide an engineer licensed in the State of Wisconsin to be responsible for achieving compliance with approved construction plans, including the implementation of the approved inspection plans and verification of construction in accordance with the City ordinance. If warm season or wetland plantings (as defined) are involved, the permit holder shall also provide a landscape architect or other qualified professional to oversee and verify the planting process and its successful establishment.

[Definition: "Warm season and wetland plantings" means seed or plant stock that is native to a prairie or wetland setting. These types of plantings usually take a couple of years to get established and require diligent removal of invasive species during this time. Upon maturity, warm season plants generally have a deep root system, which enhances infiltration.]

7. **Inspection Log:** The permit holder shall provide a qualified professional to conduct inspections and maintain an inspection log for the site. All best practices shall be inspected within 24 hours after each rain event of 0.5 inch or more that results in runoff, or at least once each week. The inspection log shall include the name of the inspector, the date and time of inspection, a description of the present phase of construction, the findings of the inspection, including an assessment of the condition of erosion and sediment control measures and the installation of storm water management BMPs, and any action needed or taken to comply with this ordinance. The inspection log shall also include a record of BMP maintenance and repairs conducted under subs. 8 and 9 below. The permit holder shall maintain a copy of the inspection log at the construction site and the City may view or obtain a copy at any time during normal business hours until permit termination.
8. **BMP Maintenance:** The permit holder shall maintain and repair all best management practices within 24 hours of inspection, or upon notification by the City, unless the City approves a longer period due to weather conditions. All BMP maintenance shall be in accordance with approved plans and applicable technical standards until the site is stabilized and a permit termination letter is issued by the City. The permit holder, upon approval by the City, shall remove all temporary erosion control practices such as silt fence. The permit holder, in accordance with approved plans and applicable technical standards, shall maintain permanent storm water management practices until maintenance responsibility is transferred to another party or unit of government pursuant to the recorded maintenance agreement.
9. **Other Repairs:** The permit holder shall be responsible for any damage to adjoining properties, municipal facilities or drainage ways caused by erosion, siltation, runoff, or equipment tracking. The City may order immediate repairs or clean-up within road right-of-ways or other public lands if the City determines that such damage is caused by activities regulated by a permit under this ordinance. With the approval of the landowner, the City may also order repairs or clean-up on other affected property.
10. **Emergency Work:** The permit holder authorizes the City, in accordance with the enforcement procedures under section 32.14 of the ordinance, to perform any work or operations necessary to bring erosion control or storm water management practices into conformance with the approved plans and consents to charging such costs against the financial assurance retained or to a special assessment or charge against the property as authorized under subch. VII of ch. 66, Wisconsin Statutes.



City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188
Waukesha-wi.gov

**Erosion Control and
Stormwater Management
Permit Termination**
Form P107
(Rev 01/18)

Project Name: [Click or tap here to enter text.](#)
Stormwater Permit Holder's Name: [Click or tap here to enter text.](#)
Stormwater Permit Number: [Click or tap here to enter text.](#)

Chapter 32 of the City of Waukesha Municipal Code ("Stormwater Ordinance") requires that:

1. All newly constructed stormwater management practices be maintained by the Stormwater Permit Holder until permit termination, after which the maintenance responsibilities shall be transferred to the responsible party identified on the subdivision plat [or CSM] and referenced in the Maintenance Agreement,

Or,

2. All temporary stormwater and erosion control management (BMPs) have been removed following review of the site restoration practices and that the site has been 100% restored.

Upon execution below, this shall serve to certify that the Stormwater Permit Holder has satisfied all requirements of the Stormwater Ordinance, the requirements of the Contract Documents, the Standard Specifications and that the City of Waukesha has terminated the Stormwater Permit.

Dated: [Click or tap to enter a date.](#)

Signed: _____

**CITY OF WAUKESHA
APPLICATION TO TRANSPORT**

**TRANSPORT OF OVERSIZE OBJECTS OR OVERWEIGHT VEHICLES OVER CITY STREETS, BRIDGES,
R.O.W.'S OR EASEMENTS CONTROLLED BY THE CITY OF WAUKESHA**

I hereby make request for authorization to transport the following described oversize or overweight vehicles or other objects over the local roads or bridges indicated below. If the vehicles or other objects are to be transported over state highways or Waukesha County roads, permitting must be obtained from the appropriate authority and signed copies provided as part of this application.

NAME AND ADDRESS OF PERMITTEE

Company Name:
Attn:
Street Address:
City, State & Zip:

COMMENCEMENT DATE/TIME

COMPLETION DATE/TIME

ROUTING: STREET(S) DESCRIPTION (or enclose/attach map)

ITEM(S) TO BE MOVED: _____
TRUCK LICENSE: _____ STATE: _____
TRAILER LICENSE: _____ STATE: _____

SELF PROPELLED TRUCK CRANE SERIAL #: _____ MOBIL HOME SERIAL # _____

OVERALL SIZE REQUEST

**HEIGHT: _____ WIDTH: _____ LENGTH: _____

VEHICLE OVERHANG: (FRONT) _____ (SIDE) _____ (REAR) _____

VERTICAL CLEARANCE (Underside): _____

** City of Waukesha standard height for traffic signals is approx. 16'-0" on most streets. Applicant to verify load height vs. signal height along proposed transport route. See General Provisions of this Authorization for additional information.

WEIGHT INFORMATION

VEHICLE GROSS WIGHT/VEHICLE COMBINATION/LOAD _____ LBS

WHEEL BASE (MEASURE FRONT CENTER AXLE TO REAR CENTER AXLE) _____ FT

MINUMUM NUMBER OF AXLES ON VEHICLE OR VEHICLE COMINATION _____

AXLE WEIGHT AND SPACINGS

AXLE	1	2	3	4	5	6
WEIGHT	LBS	LBS	LBS	LBS	LBS	LBS
DISTANCE	FT/IN	FT/IN	FT/IN	FT/IN	FT/IN	FT/IN

AXLE	7	8	9	10	11	12
WEIGHT	LBS	LBS	LBS	LBS	LBS	LBS
DISTANCE	FT/IN	FT/IN	FT/IN	FT/IN	FT/IN	FT/IN

OVER WEIGHT LOADS TRAVELING OVER CITY BRIDGES:

Applicant shall, upon request by City Engineer, submit independent structural review of any existing City of Waukesha bridge(s) on proposed route. Review shall contain structural analysis indicating load ratings of bridges along proposed route(s), analysis of weights and spacing of load & transport and summary indicating assurance of structural capacity of bridge(s) within industry-standard degree of safety. Review shall be stamped by a Professional Structural Engineer licensed in the State of Wisconsin.

Structures on proposed route:

Road Name _____ Bridge No. _____

Road Name _____ Bridge No. _____

Road Name _____ Bridge No. _____

The above vehicles will not be operated on the City Roads at a speed greater than _____ miles per hour.

OTHER CONDITIONS:

APPLICANT SIGNATURE: _____

DATE: _____

APPROVED: _____

DATE: _____

CC: Waukesha Police Dept.

Submit no less than 2 weeks prior to requested date to:
City of Waukesha Engineering Dept 130 Delafield St, Waukesha, WI 53188.

GENERAL PROVISIONS

A minimum of 2 weeks will be required for application review.

The City Engineer may require the Applicant to submit an independent Engineering Analysis for loads exceeding weight limits over City of Waukesha maintained bridges. If an Engineering Analysis is required, the Applicant shall be responsible for the costs associated with the study.

(1) At no time will traffic be blocked from use of the city road unless special conditions have been described and approved. Said vehicles will be operated in such a manner as to impede traffic in the least possible manner. Watchmen will be furnished, if required, to direct traffic around vehicles or objects. Said vehicles or objects will not be left parked on the traveled portion of the roadway either night or day unless specific permission is granted by the Public Works Department.

(2) If this application to move vehicle or loads over the above city roads is granted, the applicant hereby assumes responsibility for any damage to property or persons caused directly or indirectly by the transportation of said loads under the proposed permit. The applicant further agrees to hold The City of Waukesha harmless from all suits, claims; damages or proceedings of any kind as a direct or indirect result of the transportation of said vehicles or loads.

(3) In the event that it is necessary to remove any buildings, railings or other structures from the road, or in the event that any building, traffic signal, railing or other structures are damaged on account of the transportation of said vehicles, then the cost of removal, damage and replacement of said buildings, traffic signal, railing or other structures shall be borne by the applicant to the satisfaction of the Department of Public Works.

(4) The applicant further agrees that the equipment, load or object to be transported will not be loaded or unloaded from the vehicle or vehicles within the traveled limits of the road without the specific permission from the Department of Public Works.

(5) The applicant further agrees to furnish the City of Waukesha, upon request, with an acceptable bond or other security to cover any damage that might occur to roads, bridges, or structures which might be caused by the transportation of said vehicles or objects under the proposed permit. The applicant further agrees to furnish the City of Waukesha, upon request, with a financial statement of said applicant.

(6) Special provisions: The mover and/or owner of said vehicle and/or load will be held responsible for necessary flagging of traffic. If by reason of weather conditions, narrow bridges (bridges less than 20' in width or if load protrudes over the center line of the bridge), limit of visibility or any other reason that transportation of said vehicle and/or load creates a traffic hazard, two (2) flagmen shall be required as long as said hazard exists. One flagman shall be placed not less than 500' nor more than 600' in front of said vehicle and/or load and another spaced the same distance to the rear of said vehicle and/or load being moved is more than 12' in width or 70' in length, two (2) flagmen shall be furnished at all times and spaced as indicated heretofore.

*Said vehicles will not be on City Streets during hours of darkness.

(7) Said vehicles will not be on City of Waukesha roads on Sundays or on the following legal holidays. NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY OR CHRISTMAS DAY.

(8) There shall be no movements from 12:00 noon the day before a holiday until 12:00 noon the day after a holiday (A long holiday weekend.) Other added restrictions may be imposed around any of these holidays.

(9) Said vehicle will be marked with six orange or red flags. Four of these will be placed as near to each corner of said vehicle as possible, and one on each side at mid or widest point. These flags shall be in good condition, plain color with no figures, with a minimum size of 16" square and shall be placed so that they can be clearly seen by approaching traffic. Said vehicle must be marked on front and rear of said vehicle or load with a sign reading "OVERSIZE LOAD". The sign must be at least 18" wide, at least 6' and not over 8' long.

The size of letters will be 12", red on white background.

(10) This application date does not apply to any City of Waukesha Roads or Bridges that are closed for construction purposes, or to any roads or bridges that are posted for a gross load limit less than the gross load of vehicles and load described in this application; nor to any State Highways or County Roads.

(11) Said vehicle will be driven at a slow speed as to cause the least amount of impact to the pavement.

The background features a light gray line-art illustration. On the left, a large dome with a lantern on top is shown. Below it, a series of arched windows with diamond-patterned grilles are visible. At the bottom, a fence with pointed pickets runs across the width of the page. The text is overlaid on the right side of the image.

**CITY OF WAUKESHA
DEPARTMENT OF
PUBLIC WORKS**

**DESIGN AND
CONSTRUCTION
MANUAL**

**DIVISION 3 -
STANDARD
CONSTRUCTION
SPECIFICATIONS**

2018 EDITION

STANDARD CONSTRUCTION SPECIFICATIONS

**CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS**

2018 EDITION

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1 GENERAL REQUIREMENTS

1.1 GENERAL

1.1.1 SCOPE OF WORK

- 1.1.1.1 All work included in these Specifications is subject to the provisions of the Instructions to Bidders, General Conditions, and the Contract, appropriate provisions of which shall apply equally to all subcontractors.
- 1.1.1.2 The Wisconsin Highway Specifications and the Wisconsin Sewer and Water Specifications shall govern all work except as superseded by the Plans, these Specifications, or the Special Provisions.
- 1.1.1.3 The Contractor shall furnish all labor, material, and equipment necessary to complete in all respects the work shown on the Plans or mentioned in the Specifications, or required in order to complete the work in accordance with the intent of the Plans and Specifications. Unless specifically stated to be the responsibility of another party, the requirements of these Specifications shall be the responsibility by the Contractor.
- 1.1.1.4 Payment under the various bid items is intended as full compensation for the work described as well as all labor, tools, equipment, and incidentals required to complete the work.

1.1.2 ABBREVIATIONS

- 1.1.2.1 Abbreviations and acronyms used in these Specifications include, but are not limited to:
- A. AASHTO – American Association of State Highway and Transportation Officials.
 - B. ADA – American with Disabilities Act.
 - C. Administrative Code – Rules of Wisconsin Code.
 - D. ANSI – American National Standards Institute.
 - E. AREMA – American Railway Engineering and Maintenance-of-Way Association.
 - F. ASME – American Society of Mechanical Engineers.
 - G. ASTM – ASTM International.
 - H. AWWA – American Water Works Association.
 - I. CCTV – Closed circuit television.
 - J. CIPP – Cured in place pipe.
 - K. DNR – Wisconsin Department of Natural Resources.
 - L. EBS – Excavation below subgrade.
 - M. FHWA – Federal Highway Administration.
 - N. HDPE – High density polyethylene.
 - O. HMA – Hot mix asphalt.
 - P. MUTCD – Manual on Uniform Traffic Control Devices for Streets and Highways.
 - Q. OSHA – Occupational Safety and Health Administration.
 - R. QMP – Quality Management Program.

- S. PVC – Polyvinyl chloride.
- T. SSPC – SSPC: The Society for Protective Coatings.
- U. USCOE – U. S. Army Corps of Engineers.

1.1.3 DEFINITIONS

- 1.1.3.1 General: Basic Contract definitions are included in the "General Terms and Conditions" of the Contract. The following additional terms have the meanings indicated.
- 1.1.3.2 Wisconsin Highway Specifications: The bound document entitled "State of Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction", current edition including modifications to the standard specifications (ASP-6) at the time bids are received.
- 1.1.3.3 Wisconsin Sewer and Water Specifications: The bound document entitled "Standard Specifications for Sewer and Water Construction in Wisconsin", current edition including addenda at the time bids are received.
- 1.1.3.4 Construction Site Representative: The authorized representative of the Engineer assigned to make a detailed review of any and all portions of work.
- 1.1.3.5 Substantial Completion: Substantial completion is the stage in the progress of the work when the work or designated portion thereof is sufficiently complete in accordance with the Contract Documents and has 95% of all applicable bid items complete, so that the City can, in the opinion of the Engineer, occupy or utilize the Work for its intended use.
- 1.1.3.6 Final Completion: Final completion is the point at which, in the opinion of the Engineer, the work is 100 percent complete and ready for final payment.

1.1.4 SUBMITTALS

- 1.1.4.1 Traffic Control Plan: Submit a traffic control plan and any other information on the traffic control procedures being used to the Engineer for approval three days prior to the pre-construction meeting. The plan shall detail each phase of the project. The traffic control procedures shall be approved and in place prior to the start of any work. Subsequent revisions to the traffic control plan shall be submitted to the Engineer for review at least three days prior to proposed implementation.
- 1.1.4.2 Work Schedule: Submit a schedule detailing the timeline for all phases of the project for approval by the Engineer. The work schedule shall be updated as needed (ex., when delays occur) or as requested by the Engineer. At a minimum, the work schedule shall be updated and submitted weekly.

1.1.4.3 The Engineer will not issue the Notice to Proceed until the Traffic Control Plan, Work Schedule, and permits and notices for which the Contractor is responsible have been submitted and approved. The Substantial Completion date will not be adjusted due to Contractor's failure to submit and receive approval of the Traffic Control Plan, Work Schedule, and applicable permitting requirements.

1.1.5 WARRANTIES

1.1.5.1 All work included in this Contract shall be warranted by the Contractor as specified in the "General Terms and Conditions" of the Contract. Additional special warranties may also apply as specified in the individual Specification sections or the Special Provisions.

1.1.6 MEASUREMENT AND PAYMENT

1.1.6.1 The cost of complying with these general requirements shall be included in the prices of the various bid items for the project except where a specific bid item is included in the Schedule of Prices.

1.1.6.2 Mobilization:

- A. Measurement: The City will measure Mobilization as a single lump sum acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Mobilization". The City will make incremental payments in accordance with the provisions Section 619 of the Wisconsin Highway Specifications. Payment is full compensation for furnishing and installing materials, facilities, and services, and for performing all work necessary to complete this bid item.

1.1.6.3 Traffic Control:

- A. Measurement: The City will measure Traffic Control as a single lump sum acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Traffic Control". Payment is full compensation for furnishing, installing, maintaining, and removing all barricading, signing, temporary markings, staging, and traffic control necessary throughout this Contract, except where separate bid items are included for specific work.

1.1.6.4 Detour Route:

- A. Measurement: The City will measure Detour Route as a single lump sum acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Detour Route". Payment is full compensation for furnishing, installing, maintaining, and removing all signing associated with detour route(s).

1.1.6.5 Traffic Control Sign – Portable Changeable Message:

- A. Measurement: The City will measure Traffic Control Sign – Portable Changeable Message as a single lump sum acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Traffic Control Sign – Portable Changeable Message". Payment is full compensation for furnishing, installing, operating, maintaining, relocating, and removing changeable message sign(s).

1.1.6.6 Temporary Safety Fence:

- A. Measurement: The City will measure Temporary Safety Fence by the linear foot along the base of the fence, center-to-center of posts, acceptably completed. Temporary safety fence will only be measured for payment where use of the fence is specifically called for on the Plans or in the Special Provisions.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Temporary Safety Fence". Payment is full compensation for furnishing and installing fence and posts; maintaining the fence and posts in satisfactory condition; and for removing and disposing of fence and posts at project completion.

1.2 PRODUCTS (NOT USED)

1.3 EXECUTION

1.3.1 CONSTRUCTION REQUIREMENTS

1.3.1.1 Prosecution and Progress:

- A. Unless otherwise provided in the Special Provisions, the Contractor shall not begin the work to be performed under the Contract before receiving the Notice to Proceed from the Engineer.
- B. Except as provided in the Special Provisions, all work under the Contract shall be prosecuted to completion thereof without suspension. The Contractor shall employ an ample force of workers and provide a construction plant properly adapted to the work and of sufficient capacity and efficiency to accomplish the work in a safe and workmanlike manner at the rate of progress specified. All plants shall be maintained in good working order and provision shall be made for immediate emergency repairs.

- C. When the Contract is divided into several streets or sections, work on another section shall not begin until the Notice to Proceed has been issued by the Engineer.

1.3.1.2 Plans and Specifications:

- A. The work shall be executed in strict conformity with the Plans and Specifications, and the Contractor shall do no work without proper drawings and instructions. In case of difference between the Plans and Specifications, the Specifications shall govern.

1.3.1.3 Shop Drawings and Other Submittals:

- A. The Contractor shall submit to the Engineer or Engineer's representatives all shop or setting drawings, schedules, and other submittals required for the work. Follow the submittal procedures specified in the "Submittal Procedures" article below. The Contractor shall make any corrections in the drawings or other submittals required by the Engineer or Engineer's representatives and resubmit same without delay.
- B. The Contractor shall keep at the site of the work an approved or conformed copy of the Plans and Specifications. The Engineer shall have access to these on-site Plans and Specifications at all times.

1.3.1.4 Materials and Workmanship:

- A. Unless otherwise stipulated in the Specifications, all workmanship, equipment, materials, and articles incorporated in the work covered by this Contract are to be new and of the best grade of their respective kinds for the purpose. When required by the Specifications or when called for by the Engineer, the Contractor shall furnish the Engineer for approval full information concerning the materials or articles which it contemplates incorporating in the work. Samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials, and articles installed or used without such approval shall be at the risk of subsequent rejection.
- B. If not otherwise provided, material or work called for in this Contract shall be furnished and performed in accordance with well known established practice and standards recognized by architects, engineers, and the trade.

1.3.1.5 Inspection:

- A. The Engineer and its representative shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and for inspection.

- B. The Engineer shall have the right to reject materials and workmanship which are defective or require correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the City. If the Contractor does not correct such non-conforming work and remove rejected materials within a reasonable time, fixed by written notice, the City may remove them and charge the expense to the Contractor.
- C. Should it be considered necessary or advisable by the Engineer at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any material respect due to fault of the Contractor or its subcontractors, it shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement plus fifteen percent (15%) shall be allowed the Contractor.

1.3.1.6 Engineer to Supervise Work; Changes in Plans:

- A. The work done under this Contract shall be done in accordance with the Plans and Specifications under the administration of the Engineer. Anything mentioned in the Specifications and not shown on the Plans or shown on the Plans and not mentioned in the Specifications shall be of like effect as if shown or mentioned in both. Any doubt as to the meaning of the terms of this Contract or the annexed Specifications, or any obscurity or discrepancy in the Plans shall be explained by the Engineer. The Contractor shall not adjust any apparent discrepancy without the decision of the Engineer, except at its own risk. The Engineer shall have the option of making changes in the Plans relating to positions, dimensions, or materials which become necessary to properly and safely construct the work, either before or after construction has begun.

1.3.1.7 Orders Must Be in Writing:

- A. No extras of any kind will be allowed unless ordered in writing by the Engineer. Extra work shall be performed only in the presence of an employee of the City whose account of the labor performed and materials furnished will be taken in making up the Engineer's estimate for the extra work. The unit prices to be charged for extra work based upon the cost of labor and materials shall be determined by the Engineer who, for the purpose of determining such cost, may request and shall be furnished copies of the original bills, invoices, and vouchers of the Contractor which will disclose such costs.

1.3.1.8 Verbal Orders:

- A. No verbal order or suggestion given by an employee of the City shall be construed as authorizing or laying the basis for any claim on the part of the Contractor for extra compensation either for extra work or for materials or for damages because of the Contractor's compliance the verbal orders.
- B. Such verbal orders or suggestions as to the performance of the work will be freely given but, in case they appear to the Contractor to involve extra work for which it should receive extra compensation, it shall ask for a regular written order. In case of dispute as to what does or does not constitute extra work, a decision will be made by the Engineer, and the Contractor shall act in conformity with the decision. The Contractor may request, if it desires, a written order to do the work without the designation of the work as "extra work".

1.3.1.9 Engineer's Instructions to be Obeyed:

- A. The Contractor hereby agrees to at all times follow, without unreasonable delay, all orders and instructions given in compliance with the terms of this Contract by the Engineer during the progress of the work, and to have upon the work at all times a duly qualified person to look after the work and to receive the instructions of the Engineer. The Engineer shall, under usual conditions, give its directions to the superintendent and the foreman who may have immediate charge of the workers employed in the particular work in relation to which the order be given.

1.3.1.10 Discharge of Incompetents:

- A. If at any time anyone employed or engaged upon work shall wrongfully or ignorantly perform the work assigned to him or her after proper directions have been given by the Engineer, or shall be disobedient, disrespectful, or conduct himself or herself in an improper manner, the Contractor, upon notice from the Engineer, shall immediately dismiss such person or persons from the work and shall not again employ him or her upon any part of it.

1.3.1.11 Contractor Responsible:

- A. The presence of the Engineer or its representative upon the work during its construction shall in no way relieve the Contractor of the responsibility for the work or by any excuse for it to furnish workmanship or materials not in compliance with these Specifications. The Contractor shall assume all risks and casualties of every description and shall have charge of and be responsible for the entire work until its final completion and acceptance.

1.3.1.12 Delays

- A. If the Contractor is delayed in the completion of the work by any act or neglect of the Owner or by any other Contractor employed by the Owner or by causes beyond the Contractor's control including labor strikes, lock-outs, fire or unavoidable casualties, then the Contract Time of completion or Date of Substantial Completion may be extended for such reasonable time as may be agreed upon by the Owner and Contractor after a written notice is provided detailing the cause and duration of said delay. Such Notice must be provided to the Owner within five (5) days of the beginning of such delay.

1.3.1.13 Site Cleaning

- A. The Contractor shall at all times keep the premises free from accumulations of waste materials, rubbish or garbage caused by his employees or work and at the completion of the work, shall remove all rubbish and construction materials from the site including tools, equipment, scaffolding, packing materials and surplus material, and shall leave the work clean and ready for use. In case of dispute, the Owner may remove the rubbish and surplus materials, equipment, etc., and charge the cost to the Contractor. Burning of waste materials is prohibited.

1.3.1.14 Final Estimate

- A. The Final Estimate, to which shall be attached a Certificate of Acceptance, dated and signed by the Engineer, stating that the work has been fully completed in substantial compliance with the terms of the agreement, specifications, and plans or authorized modifications of the same, and to the satisfaction, shall be filed with the Board and a copy furnished to the Contractor within thirty (30) days of the certificate and acceptance.
- B. Within fifteen (15) days thereafter, the Board shall give the Contractor an opportunity to file any objections to such Final Estimate. All such objections shall be in writing so that they may be comprehensively considered by said Board.
- C. Within thirty (30) days thereafter, the whole amount shown upon such Final Estimate as accruing the Contractor shall be due and payable to the Contractor, provided however that there shall be retained from such Final Estimate or from any payments due to the Contractor under this agreement all amounts which may be expended by the Board for work done or materials furnished in carrying out any work under this agreement which the Contractor has failed to do to the satisfaction of the Engineer, and all amounts which the Contractor has failed to pay, and all sums which the City is entitled to retain as liquidated damages in case the work is not completed within the time specified, and all other sum or sums as by the terms of this agreement or by any act of the Legislature of the State of Wisconsin now in force, it is or may be authorized to reserve or retain.

1.3.1.15 Deduction for Uncorrected Work

- A. If the Owner deems necessary or expedient to correct incomplete, defective, damaged or work not performed in accordance with the Contract Documents, the difference in value combined with a fair allowance for the costs to perform such corrective work shall be deducted from the contract.

1.3.1.16 Contractor Precluded from Suing City

- A. The acceptance of the Final Payment by the Contractor shall be and shall operate as a release to the City from all claims and liabilities to the Contractor for anything done or furnished for or relating to the work, or for any act, neglect, fault, or default of the City.
- B. Neither the Final Payment nor any provision in the Contract Documents shall relieve the Contractor of the responsibility for negligence of faulty materials or workmanship within the extent and period provided by law, and upon written notice, shall remove any defects and shall pay for any damage to other work resulting the corrective action.

1.3.2 WORK HOURS

- 1.3.2.1 Typical work hours shall be 7:00 a.m. to 7:00 p.m. Monday through Friday, with hours of 7:00 a.m. to 5:00 p.m. on Fridays of Holiday weekends.
- 1.3.2.2 If the Contractor or Subcontractors deem it necessary to work on Saturdays, Sundays, or Holidays, they shall make a request to the Engineer 48 hours in advance to obtain permission and inspection for such work. If said work is approved, the work hours shall be 8:00 a.m. to 4:00 p.m. If said work is approved and the Contractor does not work or does work which, in the opinion of the Engineer, did not require inspection, the Contractor will be charged a \$500.00 inspection and supervision fee for each occurrence.
- 1.3.2.3 If the Contractor or Subcontractors deem it necessary to work overnight or outside the regularly scheduled hours, they shall submit a request to the Engineer at least 7 days prior to such work. The Contractor shall submit a detailed schedule of the work, the reason why the work is required to be performed outside of normal hours, and shall be responsible for all additional costs of traffic control, lighting, inspection, testing, and/or monitoring during the work.

1.3.3 MEASUREMENT OF WORK

- 1.3.3.1 All quantities or verification of materials (haul or scale tickets) from the Contractor shall be submitted or claimed within 30 calendar days of delivery or placement of materials. Late tickets will not be paid.

1.3.3.2 On request, the Contractor shall submit written documentation showing how quantities on its Application / Request for Payment were measured or calculated.

1.3.3.3 Where the City has surveyed quantities of work in the field, the measurements shall be accepted as final without dispute unless the Contractor submits satisfactory documentation of differing quantities.

1.3.4 SUBMITTAL PROCEDURES

1.3.4.1 Submit items for review as indicated in the individual specification sections. Unless otherwise indicated, submit the following quantities for each type of submittal (electronic files are preferred):

A. Shop Drawings: PDF electronic file or minimum 3 paper copies (2 retained, 1 returned).

B. Product Data: PDF electronic file or minimum 3 paper copies (2 retained, 1 returned).

C. Appearance Samples: 2 samples (1 retained, 1 returned).

D. Certificates of Compliance: PDF electronic file or 2 paper copies.

E. Permits and Approvals: PDF electronic file or 1 paper copy.

F. Test Reports: PDF electronic file or 2 paper copies.

G. Operation and Maintenance (O/M) Manuals: 2 paper copies.

H. Warranties: PDF electronic file or 2 paper copies.

1.3.4.2 Shop drawing and product data submittals shall bear the stamp of approval of the Contractor as evidence of accuracy, compatibility, and conformance with contract requirements. Drawings and product data not so stamped will be returned without being examined. Where manufacturer's standard literature includes multiple products or options, identify the specific products and options as required for this project. Specific written notice shall be given of each variation that shop drawings and product data may have from requirements of the Plans or Specifications.

- 1.3.4.3 Products subject to shop drawing, product data, or sample review shall not be used in the work until submittals have been reviewed and bear the stamp and signature of the City. Submittals will only be reviewed for general conformance with the design concept of the project and general compliance with the information given in the Plans and Specifications. The Contractor shall be responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and the means and methods of construction, coordinating its work with that of all other trades, and performing all work in a safe and satisfactory manner. Corrections or comments made on submittals shall not relieve the Contractor from compliance with requirements of Plans and Specifications and shall not be considered an order for extra work.

1.3.5 TESTING PROCEDURES

- 1.3.5.1 Provide testing as indicted in the individual specification sections.
- 1.3.5.2 All required tests are to be made in conformance with the latest ASTM methods of tests or other applicable procedures.
- 1.3.5.3 Where required, test reports shall be supplied. The test reports shall provide satisfactory documentary evidence that the materials or procedures which have been incorporated into the project are acceptable for the intended use. Materials which have not met the appropriate standards shall be immediately removed from the job site and replaced with acceptable materials at the Contractor's expense.

1.3.6 PROTECTION

- 1.3.6.1 Protect improvements on site and on adjoining properties. Provide barricades, coverings, or other types of protection as necessary to prevent damage and to safeguard against injury. Restore to original condition improvements damaged by the work or improvements which required temporary removal during construction.
- 1.3.6.2 New concrete shall not be painted or marked except as shown or specified for the project. The Contractor shall remove and replace at its own expense, concrete that it has painted or marked with extraneous information.

1.3.7 LOCATING EXISTING UTILITIES

- 1.3.7.1 Location and description of underground utilities and structures shown on drawings are approximate and are based on records available to the City or surface features indicating their existence. There may be other utilities within project area that are not shown.
- 1.3.7.2 Notify all affected utility companies of construction operations at least three working days before beginning work near their facilities. Do not begin excavation work until underground utility locations have been marked. Field verify all utilities before beginning work.

- 1.3.7.3 Use caution when excavating so that exact location of underground utilities, both known and unknown, may be determined. Provide adequate protection and support for utilities during construction operations.
- 1.3.7.4 If uncharted or incorrectly charted utilities are encountered during excavation work, or if proposed construction conflicts with existing utilities, give prompt notice and submit proposed solution to the Engineer for approval. Cooperate with the City and public and private utility companies to keep their services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

1.3.8 TRAFFIC CONTROL

- 1.3.8.1 Provide traffic control in accordance with part VI of the "Manual on Uniform Traffic Control Devices", published by the Federal Highway Administration, and supply any personnel necessary to flag traffic. Supply and maintain adequate barricades and signs to properly close off the construction area.
- 1.3.8.2 As part of this Contract, provide signs, flashers, and barricades along the project in the following manner:
 - A. Type III Barricades at all construction limits.
 - B. Temporary stop signs at all intersections as needed.
 - C. Road Closed and Advance warning signs for any side streets that intersect the street under construction.
 - D. Road Work Ahead signs at any side streets that intersect the street under construction.
 - E. One flasher for each end of radius at intersections along the excavated ditch for curb and gutter.
 - F. One flasher for every two hundred feet within a block along the excavated ditch for curb and gutter.
 - G. One flasher at each end of all walk excavations, and "Walk Closed" signs as necessary.
 - H. One temporary (movable) sign board or Class III barricade on each primary approach to the project for businesses to post private signage when businesses are within the work zone or affected by the work and if requested by a business.
 - I. Other signs as directed by the Engineer if required to comply with the requirements of this Contract.
 - J. If included in the Contract, provide portable changeable message sign(s) complying with the requirements of Section 643 of the Wisconsin Highway Specifications.

- 1.3.8.3 During the work on this Contract, the following traffic control requirements shall be met:
- A. Access shall be maintained for fire trucks, ambulances, police cars, and other emergency vehicles at all times.
 - B. Safe access shall be maintained through the construction site for pedestrians at all times. The walking paths shall be a smooth, hard surface meeting ADA requirements and shall be maintained as necessary. Provide flashers and “Walk Closed” signs as necessary. Phasing of the sidewalk construction will be necessary. A walk along one side of the street through the work zone shall be open at all times, unless otherwise approved by the Engineer.
 - C. Access shall be maintained to all non-residential driveways at all times during construction unless other arrangements are made by the Contractor to coordinate the closure. Phase the construction of underground utilities, concrete pavement, curb, drive approaches, and sidewalk as necessary to maintain access to non-residential driveways.
 - D. Access to residential driveways shall be maintained until the day concrete pavement or curb and gutter is placed. Drive approaches should be poured as soon as possible after the concrete road and/or curbs are poured to minimize the time residents will not have access to their driveways. Residents shall be allowed to park in front of their residence after work hours.
 - E. As requested by the Engineer, construct temporary drive approaches with dense aggregate after removing the existing drive approaches. This temporary approach shall be constructed immediately following the removal of the existing drive approach and shall be wide enough to get traffic in or out of the existing driveway. This temporary drive approach shall be maintained until the concrete pavement or curb and gutter is placed.
 - F. On-street parking may be removed by the Contractor to facilitate construction and maintain traffic flow if approved by the Engineer. The Contractor shall obtain from the City and place "No Parking" signs for the particular street. Temporary "No-Parking" signs shall not be attached to street trees. Signs shall be returned to the City following use.

1.3.9 WORKING WITHIN CITY RIGHT-OF-WAY

1.3.9.1 Procedures for Obtaining Permission to Work in the City Right-of-Way:

- A. All Contractors or Utilities working within the street right-of-way shall apply for an Excavation Within Public Right-of-Way Permit prior to the beginning of work. This permit may be obtained from the Public Works Department.

- B. All Contractors or Utilities shall notify the City Emergency Services of any street closing prior to the beginning of work, and upon completion of the work.
- C. All Contractors and Utilities shall apply to the Public Works Department for a Street Occupancy Permit before obstructing any sidewalk or street for the purpose of storage of equipment and materials or the erection of a scaffolding.

1.3.9.2 General Provisions for Working Within Right-of-Way:

- A. No opening that will in any way obstruct a moving lane of traffic on any arterial street in the City will be permitted without 24 hours notice to the Engineering Division and Police Department.
- B. If a vehicular detour route is required, it shall be constructed, maintained, and signed by the Contractor or Utility as directed by the Police Department or the Engineering Division.
- C. If a pedestrian detour route is required, it shall be constructed, maintained, and signed by the Contractor or Utility as directed by the Police Department or the Engineering Division.
- D. When a street or intersection is closed to through traffic, the Contractor or Utility shall provide barricades and signs as specified in the "Traffic" article above.
- E. A Contractor or Utility shall not use construction equipment for the purpose of barricading its work. In addition, any equipment parked in the street right-of-way shall be appropriately barricaded so as not to create a hazard.
- F. The Contractor, Job Superintendent, or Foreman on the job at any given time shall be responsible for providing, placing, and maintaining such barricades, drums, rubber cones, signs, lights, flashers, delineators, flags, and flagmen as may be required by the Police Department and Engineering Division.
- G. Signs and flashers shall conform to Wisconsin Highway Specifications minimum standards.
- H. In areas of high volume traffic, bridging of trenches may be required. Where required, the bridging of trenches is to be accomplished with steel plates which are anchored against movement and ramped at the edges.
- I. Signs and barricades which are owned by the City of Waukesha are not available for use by Contractors or Utilities.

1.3.10 TEMPORARY SAFETY FENCE

1.3.10.1 General: Furnish and install temporary fence at the locations shown on the Plans.

1.3.10.2 Materials:

- A. General: Unless otherwise indicated in the Special Provisions, the Contractor may furnish either plastic or chain link temporary fence, at its option. Furnish new or used materials intended to last for the duration of the project construction. Salvaged and used materials may be from other project sites, the Contractor's inventory, or from rental companies provided they meet the intentions and requirements of this specification.

- B. Plastic Fence:
 - 1. Posts: Furnish notched conventional metal "T" or "U" shaped fence posts.

 - 2. Fabric: Furnish fence fabric meeting the following requirements:
 - a. Color: International orange (UV stabilized).
 - b. Roll Height: 4 feet.
 - c. Mesh Opening: 1-inch min. to 3-inch max.
 - d. Resin/Construction: High density polyethylene mesh.
 - e. Service Temperature: -60° F to 200° (ASTM D648).
 - f. Tensile Yield: Avg. 2000 lb. per 4 ft. width (ASTM D638).
 - g. Ultimate Tensile Strength: Avg. 3000 lb. per 4 ft. width (ASTM D638).
 - h. Elongation at Break (%): Greater than 100% (ASTM D638).
 - i. Chemical Resistance: Inert to most chemicals and acids.

- C. Chain Link Fence:
 - 1. Posts and Framework: Furnish posts of metal construction, in round, square, roll formed, U-channel, angle, or other common metal shapes at the Contractor's option. Furnish all braces, supports, anchors, pedestals, rails, tension wires, fasteners, and other such items needed for the fence to be self-supporting for perpendicular wind loads up to 90 mph.

 - 2. Fabric: Fabric shall be galvanized steel or aluminum with 2-inch openings. Height of fence fabric shall be 4 feet unless otherwise indicated in the Special Provisions or on the Plans.

1.3.10.3 Construction:

- A. Posts to support the fence in pavement and other hard surface areas shall be pedestal mounted and weighed down with sand bags so as not to damage the existing pavement. Posts to support the fence in soil and non-hard surface areas may be driven. Drive posts into the ground a minimum of 12 to 18 inches, or deeper if required to proper support fence. Space posts at a maximum of 8 feet on center. All posts shall be secure and reasonably vertical and uniformly spaced.

- B. Use a minimum of three wire ties to secure the fence at each post. For plastic fence, weave tension wire through the top row of strands to provide a top stringer that prevents sagging.

- C. Overlap fabric rolls at a post and secure with wire ties.
- D. Maintain fencing as required during the work. After the project is completed, remove all fencing and clean up all debris which may have accumulated at the fencing. Replace or repair as required, all surfaces and/or landscape features damaged or disturbed under this Contract.

1.3.11 DRAINAGE

- 1.3.11.1 Provide and maintain adequate drainage facilities as may be necessary to effectively protect both public and private property. The sanitary sewer system shall not be used to facilitate adequate drainage.
- 1.3.11.2 All ditches and drains shall be in such condition as to provide effective drainage. When berms of earth are placed along the shoulders, proper provision shall be made for surface drainage.

1.3.12 DUST AND NOISE CONTROL

1.3.12.1 Dust Control:

- A. Take appropriate dust control measures so as to keep the dispersion of dust to an absolute minimum.
- B. When necessary or required by the Engineer, water or calcium chloride shall be applied to the subgrade or gravel base of the project in a sufficient amount to prevent or limit the amount of dust and dirt rising from the construction area. Calcium Chloride shall be applied dry and have an Anhydrous Chloride content of not less than 77% by weight.
- C. Apply dust control measures within 24 hours of being so directed by the Engineer.
- D. The cost of applying dust control, including materials, shall be included in the prices of other items in the project. If dust control measures are not applied within 24 hours of the Engineer's direction to apply the materials, the City reserves the right to apply its own dust control measures and to back-change the Contractor for all costs.

1.3.12.2 Noise Control:

- A. Conduct operations in such a manner to cause the least amount of nuisance to residents in the vicinity of the work site.

1.3.13 WATER AND SANITARY PROVISIONS

- 1.3.13.1 City water for use on this Contract may be obtained from City fire hydrants, providing the Contractor obtains a hydrant meter from the Waukesha Water Utility. The Contractor shall pay all deposits and rental fees for the meter and shall also pay any water usage fees. The Water Utility can be contacted at 262.521.5272.
- 1.3.13.2 The Contractor shall provide and maintain in a neat and sanitary condition such sanitary accommodations for the use of its employees as may be necessary to comply with the requirements of the State Department of Health Services and the City of Waukesha.

1.3.14 RAILROAD COORDINATION

- 1.3.14.1 Comply with Section 107.17 of the Wisconsin Highway Specifications and the Special Provisions for all work affecting railroad property and any existing tracks.

1.3.15 HAZARDOUS SUBSTANCES

- 1.3.15.1 Whenever the construction operations encounter or expose an abnormal condition that may indicate the presence of a hazardous substance, immediately discontinue construction operations near the abnormal condition and notify the Engineer. Treat all abnormal conditions with extreme caution. Abnormal conditions include, but are not limited to, the following:
 - A. The presence of a tank or barrel.
 - B. An obnoxious odor.
 - C. Excessively hot earth.
 - D. Smoke.
 - E. Visible fumes.
 - F. Discolored earth or sheen on groundwater.
- 1.3.15.2 Do not resume construction operations in this area until the Engineer so directs. The Contractor may continue work in other areas of the project unless the Engineer otherwise directs.
- 1.3.15.3 Take actions to prevent the hazardous substance from spreading into an uncontaminated area.
- 1.3.15.4 Dispose of hazardous substances conforming to the requirements and regulations of the responsible state or federal agencies. If the Engineer requires the Contractor to dispose of the hazardous substance and the contract does not provide for this work, the work will be considered extra work. If the responsible state or federal agency requires special procedures for the disposal, the City will arrange with qualified persons to dispose of the substance.

1.3.16 ARCHAEOLOGICAL AND HISTORICAL FINDINGS

- 1.3.16.1 For construction operations on the project, if encountering human remains or if encountering artifacts of potential archaeological or historical significance, immediately stop operations at the encounter site and notify the Engineer. Cooperate, as necessary, by moving construction operations from the encounter site and complying with the Engineer's directions.
- 1.3.16.2 Do not resume operations at the encounter site without the Engineer's permission. The Contractor may continue work elsewhere on the project unless the Engineer directs otherwise.

1.3.17 MAINTENANCE

- 1.3.17.1 The Contractor shall be responsible for and maintain the work until final acceptance thereof, except as provided under Sections 104.6 and 105.11 of the Wisconsin Highway Specifications.
- 1.3.17.2 When the Contract provides that the road or portions thereof undergoing improvement will be closed to through traffic, the Contractor will be responsible for providing or constructing, maintaining and protecting adequate barriers, special warning signs, watchmen and/or lights at intersecting roads or streets and at other points of public access to the project.
- 1.3.17.3 When the Contract provides for maintenance of traffic over or along the road while undergoing improvement or reconstruction, the road shall be kept open to all traffic, by and at the expense of the Contractor. The Contractor shall keep the portions of the road being used by public traffic in such condition that traffic will be reasonably and adequately accommodated. It shall provide and maintain in safe and adequate condition temporary approaches, crossings, and intersections with roads and necessary driveways.
- 1.3.17.4 The Contractor shall keep clean all streets over which it hauls equipment and materials.
- 1.3.17.5 The Contractor shall bear all of the expense of maintaining traffic over the section of road undergoing improvement and the construction and maintaining of such approaches, crossings, intersections and other features as may be necessary without direct compensation except as to those features of such work which are a part of planned completed construction work.

- 1.3.17.6 Regardless of whether the Contract specifies that the road undergoing improvement is to be closed or open to through traffic, the Contractor shall at all times conduct the work in such a manner as to ensure the least possible obstruction to local service traffic to residents along the street being improved and to that end shall, at its own expense, provide and maintain in reasonable passable conditions such temporary roads or trails and temporary approaches as are deemed reasonable and practical by the Engineer. Should the Contractor fail to maintain a passable road after being notified by the Engineer to make corrections, the City shall have the right to return the road to a passable condition and the Contractor shall be responsible for the City's costs to make such corrections.
- 1.3.17.7 Upon specific approval of the Engineer prior to final inspection and acceptance, the Contractor may be relieved of maintenance of portions of the completed work when such portions of work are so situated that such parts can be opened and advantageously used for traffic and when such parts of the work can be conveniently maintained by the maintenance forces of the City.
- 1.3.17.8 The assumption of maintenance by the City, however, will not relieve the Contractor of any responsibility for defective workmanship or materials, or for damage caused by its own operations. Such action will not be construed to be final inspection or acceptance of any part of the work, nor to be waiver of any legal rights.

1.3.18 TRADE NAMES

- 1.3.18.1 Wherever a particular manufacturer's product is named, it is mentioned for descriptive purposes and to indicate the type, quality, and function of the article which will meet the intent of the Specifications.
- 1.3.18.2 Unless otherwise indicated, equivalent products of other manufacturers may be used only if approved by the Engineer in writing.

1.3.19 LINES AND GRADES

- 1.3.19.1 Give the Engineer at least 72 hours notice of the need to lay out any portion of the work. Clearly state in such notice the exact location where stakes are needed. Make staking requests using the City's Construction Staking Request Form.
- 1.3.19.2 Before commencing work, the Contractor shall review the stakes and marks for completeness and correctness. No claim will be considered by the City because any alleged inaccuracies or for alterations subsequently necessary because such alleged inaccuracies, unless the Contractor notifies the Engineer of the inaccuracies in writing before commencing work. The Contractor is responsible for preserving of all stakes and marks in their proper position. Notify the Engineer in writing if stakes are disturbed. Use care to see that the work is constructed according to the required line and grade. If an error in line or grade is discovered, discontinue work and notify the Engineer immediately. No claim will be allowed on account of any delay caused by the need to review line and grade.

1.3.19.3 Furnish the Engineer with any reasonable assistance which it may required to help in driving stakes or in setting out the work.

1.3.19.4 The City will not stake grades for new ADA sidewalk ramps. Layout forms for ADA ramps to comply with ADA ramp requirements.

1.3.19.5 The City will provide a one-time staking of the project at no expense to the Contractor. Any additional staking requirements, changes, or re-staking costs will be the responsibility of the Contractor.

1.3.20 BLASTING

1.3.20.1 In all blasting operations, comply with the requirements of Administrative Code, Chapter SPS 307 – Explosives and Fireworks.

1.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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2 EROSION CONTROL, STORMWATER MANAGEMENT, AND WATER RESOURCES

2.1 GENERAL

2.1.1 SUMMARY

2.1.1.1 This section describes:

- A. Erosion control measures at and adjacent to the project site.
- B. Protection of wetlands, streams, and drainageways.
- C. Construction dewatering.

2.1.2 RELATED SECTIONS

2.1.2.1 Section 4 – Earthwork, Excavation, and Boring.

2.1.3 SUBMITTALS

2.1.3.1 Product Data: Submit product data for silt fence, inlet protection fabric, silt curtain, turbidity barrier, and polymer stabilizer.

2.1.3.2 Inspection Reports: Submit one copy of weekly inspection reports for erosion and sediment controls in accordance with DNR requirements.

2.1.3.3 Dewatering Procedures: Submit proposed procedures of dewatering, including anticipated pumping rates.

2.1.3.4 Permits: Submit one copy of all permits obtained for dewatering.

2.1.4 TESTING (NOT USED)

2.1.5 WARRANTIES

2.1.5.1 The work included in this section shall be warranted as specified in Section 01 – General Requirements.

2.1.6 MEASUREMENT AND PAYMENT

2.1.6.1 Silt Fence:

- A. Measurement: The City will measure Silt Fence by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Silt Fence". Payment is full compensation for furnishing, installing, maintaining, and removing silt fence.

2.1.6.2 Erosion Bales:

- A. Measurement: The City will measure Erosion Bales by the number of standard size bales acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Erosion Bales". Payment is full compensation for furnishing, installing, maintaining, and removing erosion bales.

2.1.6.3 Inlet Protection:

- A. Measurement: The City will measure Inlet Protection by the number of standard size inlets acceptably protected.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Inlet Protection". Payment is full compensation for furnishing, installing, maintaining, and removing inlet protection.

2.1.6.4 Silt Curtain:

- A. Measurement: The City will measure Silt Curtain by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Silt Curtain". Payment is full compensation for furnishing, installing, maintaining, and removing silt curtain.

2.1.6.5 Turbidity Barrier:

- A. Measurement: The City will measure Turbidity Barrier by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Turbidity Barrier". Payment is full compensation for furnishing, installing, maintaining, and removing turbidity barrier.

2.1.6.6 Construction Entrance:

- A. Measurement: The City will measure Construction Entrance by the number of construction entrances acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Construction Entrance". Payment is full compensation for furnishing, installing, maintaining, and removing construction entrances.

2.1.6.7 Polymer Stabilization:

- A. Measurement: The City will measure Polymer Stabilization by the square yard acceptably applied.

- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Polymer Stabilization". Payment is full compensation for furnishing and applying polymer stabilizer.

2.1.6.8 Dewatering: The cost for dewatering shall be included in the prices for the items for which dewatering is required.

2.2 PRODUCTS

2.2.1 EROSION CONTROL MATERIALS

2.2.1.1 General: Products used for erosion control shall comply with:

- A. The Wisconsin Department of Transportation (DOT) Erosion Control Product Acceptability List (PAL) available on the DOT website at:

<http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/tools/appr-prod/default.aspx>.

- B. The Wisconsin Department of Natural Resources (DNR) Technical Standards for Construction Site Erosion Control available on the DNR website at:

http://dnr.wi.gov/topic/stormwater/standards/const_standards.html.

2.2.1.2 Silt Fence: Silt fence shall meet the requirements of Section 628 of the Wisconsin Highway Specifications.

2.2.1.3 Erosion Bales: Erosion bales shall meet the requirements of Section 628 of the Wisconsin Highway Specifications.

2.2.1.4 Inlet Protection: Inlet protection shall meet the requirements of Section 628 of the Wisconsin Highway Specifications.

2.2.1.5 Silt Curtain: Silt curtain shall meet the requirements of Section 628 of the Wisconsin Highway Specifications for silt screen.

2.2.1.6 Turbidity Barrier: Turbidity barrier shall meet the requirements of Section 628 of the Wisconsin Highway Specifications.

2.2.1.7 Construction Entrance: Construction entrance shall meet the requirements of Section 628 of the Wisconsin Highway Specifications for tracking pads.

2.2.1.8 Polymer Stabilizer: Polymer stabilizer shall meet the requirements of Section 628 of the Wisconsin Highway Specifications for soil stabilizer type B.

2.2.1.9 Temporary Seed: Temporary seed mixture shall meet the requirements of Section 630.2.1.5.1.2 of the Wisconsin Highway Specifications.

2.2.1.10 Erosion Mat: See Section 14 – Site Improvements and Restoration.

2.3 EXECUTION

2.3.1 EROSION CONTROL

- 2.3.1.1 Erosion control measures are a part of this construction contract. The Contractor shall, as a minimum, follow:
- A. The Wisconsin Department of Natural Resources (DNR) Technical Standards for Construction Site Erosion Control.
 - B. The City's Standard Construction Details for erosion control.
- 2.3.1.2 All storm inlets within the project limits and those immediately downstream from the construction project shall be protected from sedimentation by the placement of temporary filter fabric over the inlets. This work shall be done as shown in the details. The inlets shall be protected during all phases of construction.
- 2.3.1.3 The downstream project limits shall be protected by ensuring that sediment cannot leave the construction site. This shall be accomplished by the placement of silt fence, erosion bales, silt curtain, or other erosion control best management practices (BMPs).
- 2.3.1.4 Tracking of sediment onto adjacent paved roadways shall be minimized during construction. Stone tracking pads of sufficient width and length shall be constructed early in the grading process to prevent sediment from being tracked onto adjacent streets. Any sediment reaching adjacent streets shall be removed by vacuum type street sweepers (not flushing) before the end of the workday.
- 2.3.1.5 All erosion control measures in place on this contract shall be inspected within 24 hours after each rainfall or daily during prolonged rainfall. Repair or replacement shall be made immediately. Sediment deposits shall be removed when deposits reach one half the height of the barrier. The Contractor shall remove any sediment deposits reaching storm sewers as a result of construction on this contract by cleaning of the sewers.
- 2.3.1.6 The Contractor shall follow any DNR approved erosion control plan issued for the construction site. The Contractor shall also fill out the DNR's Construction Site Inspection Report (Form 3400-187) weekly or after precipitation events. A copy of this form is available on the DNR website at:
<http://dnr.wi.gov/topic/stormwater/construction/forms.html>.
- 2.3.1.7 Re-establish temporary or permanent vegetation on disturbed areas within the time limits allowed by applicable standards.
- 2.3.1.8 Remove all erosion control measures installed after the site has been sufficiently stabilized.

2.3.2 PROTECTION OF WETLANDS, STREAMS, AND DRAINAGEWAYS

- 2.3.2.1 Protect wetlands, streams, and drainageways in accordance with Sections 107.18 and 107.19 of the Wisconsin Highway Specifications.

2.3.3 CONSTRUCTION DEWATERING

2.3.3.1 Surface Drainage:

- A. The Contractor is responsible for removing surface water entering excavations or not yet fully connected storm sewer pipe or structures by using appropriate dewatering techniques. Take steps to prevent or minimize surface water entering excavations.
- B. Provide a geotextile bag for water being pumped from excavations at all times. The geotextile bag shall be appropriately sized according to DNR technical standards. The geotextile bag shall be approved by the Engineer.
- C. Water may not be discharged in a manner that causes erosion of site or receiving channels.
- D. If the project is not covered by a DNR construction site storm water discharge permit, the Contractor shall contact the DNR to obtain a pit/trench dewatering permit.

2.3.3.2 Groundwater:

- A. If groundwater is present, the Contractor is responsible for dewatering the site prior to starting excavation and for maintaining groundwater a minimum of 24-inches below the bottom of the excavation. Substantial softening or loosening of the pipe subgrade soils can be experienced in the presence of groundwater when the confining effect of overburden pressure is removed. The dewatering system shall be of a sufficient size and capacity as required to control hydrostatic pressure on the trench sides and bottom to allow material to be excavated, pipe installed and backfill placed, all in a dry condition. The use of a crushed stone working mat, may be necessary to establish a stable bearing subgrade within open cut trenches.
- B. If dewatering (dewatering wells) are necessary, the Contractor shall contact the Wisconsin DNR, Private Water Supply Section, P.O. Box 7921, Madison, WI. 53707 for a permit for all wells installed or operated for which the single or aggregate capacity may be in excess of 70 gallons per minute. If discharge from the high capacity wells is routed around or bypasses the storm water runoff control system, also obtain a pit/trench dewatering permit from DNR.

- C. The dewatering operation shall be maintained until backfilling and compaction procedures are completed. Water pumped from the site shall be treated by temporary sedimentation basins, grit chambers, sand filters, upslope chambers, hydro-cyclones, swirl concentrators, or other appropriate controls designed and used to remove particles of 100 microns or greater for highest dewatering pumping rate. If water is demonstrated to have no particles greater than 100 microns during dewatering operations, then no control is needed before discharge.
- D. Water may not be discharged in a manner that causes erosion of site or receiving channels.
- E. Contractor shall take all appropriate measures to prevent contamination of groundwater system including well-head protection, backflow prevention, and temporary grading and surface flow limitations.

2.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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3 EXISTING CONDITIONS, SUBSURFACE INVESTIGATION, AND DEMOLITION

3.1 GENERAL

3.1.1 SUMMARY

3.1.1.1 This section describes activities required to prepare the site for construction including, but not limited to:

- A. Protection of existing improvements.
- B. Clearing and grubbing.
- C. Topsoil stripping.
- D. Removals.
- E. Abandonments.
- F. Disposal of debris.

3.1.2 RELATED SECTIONS

3.1.2.1 Section 2 – Erosion Control, Storm Water Management, and Water Resources.

3.1.3 SUBMITTALS

3.1.3.1 Disposal Location: If materials or debris are disposed of on private property, the Contractor shall obtain from the property owner a written permit for such disposal, and such permit or a copy thereof shall be filed with the Engineer.

3.1.4 TESTING (NOT USED)

3.1.5 WARRANTIES

3.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

3.1.6 MEASUREMENT AND PAYMENT

3.1.6.1 General:

- A. Site preparation will be considered incidental to the work except where separate bid items are included in Schedule of Prices. Plan notes related to removals and reinstallations shall be interpreted as directives to the Contractor for such work at no extra cost except where separate bid items are provided in Schedule of Prices.

3.1.6.2 Clearing and Grubbing:

- A. Measurement:

1. General: The City will measure Clearing and Grubbing separately, either by the station, inch of diameter, square yard, or acre, or as lump sums, as the Contract indicates.
 2. Incidental Work: The City will not measure incidental clearing and grubbing operations required to perform the work as follows:
 - a. Clearing areas of light brush, shrubs, and other vegetation that the Contractor can cut with a brush scythe or mowing machine.
 - b. Clearing areas containing logs, tree roots, roots of brush and shrubs, and other vegetation having a woody structure that the Contractor can remove with a rooter.
 - c. Clearing small trees of less than the minimum number and size specified for measurement.
 - d. Trimming overhanging limbs and branches to provide required clearance.
 - e. Clearing and grubbing borrow pits.
 3. By the Station: The City will measure Clearing and Grubbing by the full 100-foot station acceptably completed, measured as specified in Section 201.4 of the Wisconsin Highway Specifications.
 4. By the Square Yard: The City will measure Clearing and Grubbing by the square yard acceptably completed, measured as specified in Section 201.4 of the Wisconsin Highway Specifications.
 5. By the Acre: The City will measure Clearing and Grubbing by the acre acceptably completed, measured as specified in Section 201.4 of the Wisconsin Highway Specifications.
 6. By the Inch of Diameter: The City will measure Clearing and Grubbing by the inch of diameter acceptably completed, measured as specified in Section 201.4 of the Wisconsin Highway Specifications.
 7. As Lump Sums: The City will measure Clearing as a single lump sum and Grubbing as a single lump sum, each acceptably completed.
- B. Payment: Payment for measured quantities will be made at the applicable contract unit price for "Clearing" and for "Grubbing". Payment is full compensation for all clearing and for all grubbing actually required and performed within the clearing and grubbing limits on those portions of the work where clearing and grubbing is designated on the Plans or authorized; and for all handling, piling, rehandling and disposal of debris.

3.1.6.3 Topsoil Stripping:

- A. Topsoil stripping will not be paid for directly, but will be measured as part of excavation cut work.
- B. If topsoil is stripped in excess of the quantities required under the Contract for foundation preparation or for required topsoiling work, a deduction will be made from the measured quantity of excavation cut to account for the excess wasted topsoil.

3.1.6.4 Sawcutting at Pavement Limits:

- A. Measurement: The City will measure Sawcutting at Pavement Limits by the linear foot acceptably completed.
 - 1. Measurement will be made for sawcutting asphalt and concrete pavements at the construction limits and for driveways behind the sidewalk.
 - 2. Measurement will only be made for final sawcutting at the pavement limits. Any miscellaneous cutting, such as for trenches, temporary removal limits, and similar purposes, will not be measured.
 - 3. Measurement will not include sawcutting of curb and gutter, sidewalks, and similar miscellaneous surfacing. The cost of sawcutting these items will be considered incidental to the removal of the applicable item.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Sawcutting at Pavement Limits". Payment is full compensation for sawing of asphalt and/or concrete pavement at the construction limits as specified.

3.1.6.5 Remove Existing Concrete Roadway:

- A. Measurement: The City will measure Remove Existing Concrete Roadway by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Remove Existing Concrete Roadway". Payment is full compensation for removing existing concrete pavement in the street area.

3.1.6.6 Remove Existing Asphalt Roadway:

- A. Measurement: The City will measure Remove Existing Asphalt Roadway by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Remove Existing Asphalt Roadway". Payment is full compensation for removing existing asphalt pavement in the street area.

3.1.6.7 Remove Existing Roadway:

- A. Measurement: The City will measure Remove Existing Roadway by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Remove Existing Roadway". Payment is full compensation for removing existing concrete pavement, asphalt pavement, macadam pavement, brick pavement, and/or combination material pavement in the street area.

3.1.6.8 Remove Existing Curb and Gutter:

- A. Measurement: The City will measure Remove Existing Curb and Gutter by the linear foot acceptably completed, measured along the flowline of the gutter.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Remove Existing Curb and Gutter". Payment is full compensation for removing existing concrete curb and gutter.

3.1.6.9 Remove Existing Sidewalk:

- A. Measurement: The City will measure Remove Existing Sidewalk by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Remove Existing Sidewalk". Payment is full compensation for removing existing sidewalk and drive approaches.

3.1.6.10 Remove Pipe:

- A. Measurement: The City will measure Remove Pipe by the linear foot acceptably removed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Remove Pipe". Payment is full compensation for excavating, completely removing and disposing of the pipe, and backfilling the excavation.

3.1.6.11 Remove Sewer Manhole:

- A. Measurement: The City will measure Remove Sewer Manhole by the number of manholes acceptably removed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Remove Sewer Manhole". Payment is full compensation for excavating, completely removing and disposing of the manhole structure, salvaging the casting to the City, and backfilling the excavation.

3.1.6.12 Remove Inlet:

- A. Measurement: The City will measure Remove Inlet by the number of inlets acceptably removed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Remove Inlet". Payment is full compensation for excavating, completely removing and disposing of the inlet structure, salvaging the casting to the City, and backfilling the excavation.

3.1.6.13 Abandon Pipe:

- A. Measurement: The City will measure Abandon Pipe by the linear foot acceptably abandoned.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Abandon Pipe". Payment is full compensation for excavating as required, filling the pipe with CLSM and bulkheading the ends, and backfilling the excavation.

3.1.6.14 Abandon Sewer Manhole:

- A. Measurement: The City will measure Abandon Sewer Manhole by the number of manholes acceptably abandoned.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Abandon Sewer Manhole". Payment is full compensation for excavating as required, removing the required portion of manhole and filling the remaining portion, salvaging the casting to the City, and backfilling the excavation.

3.1.6.15 Abandon Inlet:

- A. Measurement: The City will measure Abandon Inlet by the number of inlets acceptably abandoned.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Abandon Inlet". Payment is full compensation for excavating as required, removing the required portion of inlet and filling the remaining portion, salvaging the casting to the City, and backfilling the excavation.

3.2 PRODUCTS

3.2.1 CLSM / FLOWABLE FILL

- 3.2.1.1 Controlled low strength material (CLSM) / flowable fill shall meet the following requirements:
 - A. Strength – 200 psi.

- B. Type I cement – 30 lbs.
- C. Fly ash – 250 lbs.
- D. Sand – 2728 lbs.
- E. Total air – 9.0% +/- 1%.
- F. Air entrainment – 35 oz.
- G. Water – 50 gal.
- H. Water/cement ratio – 1.49.
- I. Slump – 10 in +/- 1 in.

3.3 EXECUTION

3.3.1 SITE PREPARATION – GENERAL

- 3.3.1.1 Notify the various utilities in advance of construction operations as specified in Section 1 – General Requirements.
- 3.3.1.2 Remove mailboxes, fences, posts, signs, etc. encountered within the grading limits and reinstall them following grading operations.
- 3.3.1.3 Maintain mail delivery to businesses and residences during the course of the project. Provide temporary support for existing mail boxes or other temporary mailboxes as required to maintain service. All arrangements shall be acceptable to the U.S. Postal Service.

3.3.2 PRESERVATION OF TREES AND SHRUBS

- 3.3.2.1 The trees and shrubs that are to be preserved shall be thoroughly protected from scarring or other injury during grading operations. Some existing street trees may be very close to the excavation limits.
- 3.3.2.2 Do not strip the existing topsoil by “dragging” the bucket across the surface under trees. The City Forester will delineate in the field where “dragging” will not be allowed.
- 3.3.2.3 Excavation operations around trees that are to be preserved shall not disturb the original ground around the tree within a distance of 3.5 feet or twice the diameter of the tree, whichever is the greater distance. Exposed roots resulting from excavation shall be cut cleanly and covered with humus-bearing soil.
- 3.3.2.4 The stockpiling or leaning of materials against any tree is prohibited.
- 3.3.2.5 The pruning of overhead limbs or branches to accommodate construction or construction equipment is prohibited. If a branch is broken, immediately contact the City Forester.

- 3.3.2.6 All construction adjacent to street trees, where disturbance to the root zone may occur, will require the severing of roots with a sharp axe or saw or approved root cutter. Cutting with a bulldozer, grader, backhoe, etc. is not acceptable. The need for and extent of root cutting will be determined prior to construction by a meeting between the Contractor and the City Forester. All root cutting will be at the Contractor's expense.
- 3.3.2.7 Any damage to tree branches or roots, as determined by the City Forester, that causes pruning or removal of the tree will be charged to the Contractor.
- 3.3.2.8 Minimize damage to trees from the exhaust of all construction equipment by diverting the exhaust to the side and not up into the tree canopy.

3.3.3 CLEARING AND GRUBBING

- 3.3.3.1 Clearing and grubbing shall consist of cutting and disposing of all trees, brush, windfalls, logs, and other vegetation occurring within the clearing limits, or as specified on Plans or directed by the Engineer, and the removing and disposing of roots, stumps, stubs, grubs, logs and other timber from within the grubbing limits as hereinafter defined or which interfere with excavation, embankment, or designated clear vision areas, or as specified on Plans or directed by the Engineer.
- 3.3.3.2 Grubbing need not be performed on areas to be occupied by earth embankments 4 feet or more in height, unless special compaction of the foundation is required.
- 3.3.3.3 All stumps, roots, logs, or other timber more than 3 inches in diameter and all brush, matted roots, and other debris not suitable for the roadway foundation within the grubbing limits shall be removed to a depth of not less than 36 inches below new subgrade.
- 3.3.3.4 Trees and shrubs located beyond the clearing limits shall not be removed unless their removal is specially authorized.
- 3.3.3.5 Trees and shrubs to be left in place on the right-of-way shall not be damaged or injured by the Contractor.
- 3.3.3.6 Where feasible, trees shall be felled toward the center of the area to be cleared. Where trees cannot be felled without danger to traffic or injury to other trees, structures, or property, they shall be cut in sections from the top down.

3.3.4 TOPSOIL STRIPPING

- 3.3.4.1 Topsoil shall consist of the natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing soils adapted to the sustenance of plant life, and such topsoil shall be neither excessively acid nor excessively alkaline.

- 3.3.4.2 Clear areas from which topsoil is stripped by means of mowing and removing weeds or other vegetation to a height of approximately 6 inches. Remove litter such as brush, rock, and other foreign material that will interfere with subsequent vegetation establishment.
- 3.3.4.3 Strip humus-bearing soil to such depth as available, or as necessary to produce sufficient volumes to cover the designated areas to the required depths. Take care to avoid removing the underlying sterile soil.
- 3.3.4.4 Strip topsoil from areas to meet grades as shown on the Plans. Do not strip topsoil until City Forester is notified and has reviewed and approved areas in the proximity of City trees.
- 3.3.4.5 Stockpile topsoil where shown on the Plans, or place it directly on the designated areas provided they have been prepared to receive the topsoil.
- 3.3.4.6 Dispose of topsoil in excess of the amounts required to accomplish the specified topsoiling work.

3.3.5 REMOVALS

- 3.3.5.1 Saw the removal limits of all pavements to their full depth prior to removal.
- 3.3.5.2 Rubblization of existing concrete pavement before removal may damage existing underground utilities and is not allowed.
- 3.3.5.3 Some walk removals are shown on the Plans, however, other walk will be evaluated and marked in the field prior to construction. The City reserves the right to add or remove portions of walk to be removed and replaced as determined by the Engineer. All final removals will be marked in the field.
- 3.3.5.4 Remove all existing below-ground equipment where indicated on the Plans including concrete bases, conduit, wire, conductors, etc. and dispose of it. Conduit shall be removed or abandoned in place. Conduit can be abandoned in place only if it does not interfere with new construction or present a risk of damage to newly constructed items. The cost of removal of pull boxes, concrete bases, conduit, and conductors, shall be incidental to pavement removal. Backfill removed concrete base and pull box holes with dense aggregate placed in thoroughly compacted layers not exceeding 6 inches in depth or slurry backfill as directed by the Engineer.
- 3.3.5.5 Remove existing sewers and structures as indicated on the Plans or as necessary for construction of sewers and structures.

3.3.6 ABANDONMENTS

3.3.6.1 Sewers or manholes which are indicated to be abandoned and left in place shall be done in accordance with Chapter 3.2.24 of the Wisconsin Sewer and Water Specifications, except manholes shall be removed to a depth of 3-feet below the surface or to the bottom of the cone, whichever is deeper. Structures and sewers 15 inches and larger shall be completely filled with controlled lower-strength material (CLSM / flowable fill).

3.3.7 DISPOSAL

3.3.7.1 Except as otherwise indicated, all material removed from the project shall be disposed of by the Contractor beyond the limits of the job and prior to proceeding with grading operations. If material is placed on private property, the Contractor shall obtain from the property owner a written permit for such disposal. Burning of material from the project will not be allowed.

3.3.7.2 All frames and covers, including tree grates, that are replaced shall be salvaged and returned to the Municipal Garage.

3.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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4 EARTHWORK, EXCAVATION, AND BORING

4.1 GENERAL

4.1.1 SUMMARY

4.1.1.1 This section describes:

- A. Roadway and drainage excavation.
- B. Embankment filling.
- C. Additional fill excavation.
- D. Trenching and backfilling for utility construction.
- E. Furnishing and placing subgrade aggregate separation fabric.
- F. Furnishing and placing geotextile grid.
- G. Furnishing and placing crushed aggregate base course.

4.1.2 RELATED SECTIONS

- 4.1.2.1 Section 2 – Erosion Control, Stormwater Management, and Water Resources.
- 4.1.2.2 Section 3 – Existing Conditions, Subsurface Investigation, and Demolition.

4.1.3 SUBMITTALS

- 4.1.3.1 Geotextile Fabric and Geotextile Grid Product Data: Submit product data for geotextile fabric and geotextile grid proposed for use.
- 4.1.3.2 Crushed Aggregate Base Course Material Report: Submit sieve analysis for crushed aggregate base course proposed for use.
- 4.1.3.3 Crushed Aggregate Base Course Weight Tickets: Furnish and deliver to the Engineer with each load a ticket showing the net weight of the load. These tickets shall be printed with numbers in sequence and stamped by the weighing equipment where possible.
- 4.1.3.4 Field Test Reports: Submit test reports for trench backfill compaction to Engineer on a weekly basis.

4.1.4 TESTING

4.1.4.1 Roadway Proof-Rolling:

- A. Proof-roll prepared roadway foundation as specified in the "Roadway and Drainage Excavation" article, below, before placing fill materials.

- B. Proof-roll the roadway pavement subgrade as specified in the "Graveling" article, below, before placing crushed aggregate base course.

4.1.4.2 Trench Backfill:

- A. The Contractor shall perform all compaction testing for trenches. The cost for testing shall be incidental to construction costs.
- B. Provide at least three compaction tests each day where backfilling operations are occurring. One test shall be at the proposed final elevation of the backfill and two tests shall be located at intermediate depths. Recompact and retest areas that do not meet specifications or areas that have been damaged by weather or construction equipment before resuming backfilling operations. If test results fall out of tolerance, increase testing frequency until tested material is within specification.

4.1.5 WARRANTIES

- 4.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

4.1.6 MEASUREMENT AND PAYMENT

4.1.6.1 Excavation and Embankment Work:

- A. Shaping and Grading to Subgrade:
 - 1. Measurement: The City will measure Shaping and Grading to Subgrade by the linear foot of roadway foundation acceptably prepared, measured along the roadway centerline or reference line.
 - 2. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Shaping and Grading to Subgrade". Payment is full compensation for excavating, filling, shaping, grading, and compacting the subgrade to the width shown on the cross-sections and/or grading limits as required to prepare it for the proposed improvements.
- B. (size) Crushed Stone Backfill (Includes EBS):
 - 1. Measurement: The City will measure (size) Crushed Stone Backfill (Includes EBS) by the ton of material acceptably incorporated in the work. Aggregates obtained from wet pits or which contain total moisture in excess of 7 percent shall be stockpiled, aerated, or dried to reduce the moisture content to 7 percent or less before being weighed.

2. Payment: Payment for measured quantities will be made at the contract unit price per ton for "(size) Crushed Stone Backfill (Includes EBS)". Payment is full compensation for excavating and disposing of materials below subgrade as identified by the Engineer; and for furnishing, producing, crushing, screening, loading, hauling, placing, shaping, grading, watering, drying, compacting, maintaining crushed stone backfill to replace the removed material.

4.1.6.2 Additional Fill:

- A. Additional fill from off-site sources, if required for the work, will not be paid for separately unless indicated in the Special Provisions.

4.1.6.3 Trenching and Backfilling:

- A. Trenching and backfilling work will not be measured or paid for directly, but shall be considered as subsidiary work pertaining to and included in the various types of utility work except as otherwise specified below. The work shall include trench excavation, removal and disposal of unusable backfill material encountered during trench excavation, furnishing and placing the specified bedding and backfill materials, dewatering, and sheeting, shoring, and bracing.

B. Slurry Backfill:

1. Measurement: If use of slurry backfill is directed by the Engineer, the City will measure Slurry Backfill by the cubic yard acceptably placed.
2. Payment: Payment for measured quantities will be at the contract unit price per cubic yard for "Slurry Backfill". Payment is full compensation for furnishing and placing slurry backfill.

C. Solid Rock Excavation:

1. Measurement: If solid rock is encountered in utility trenches, the City will measure Solid Rock Excavation by the cubic yard acceptably completed.
2. Payment: Payment for measured quantities will be made at the contract unit price per cubic yard for "Solid Rock Excavation". Payment is full compensation for excavating and disposing of solid rock and for furnishing, placing, and compacting any additional bedding material needed as a result of the rock excavation.

D. Loose Rock Excavation:

1. Measurement: If loose rock is encountered in utility trenches, the City will measure Loose Rock Excavation by the cubic yard acceptably completed.

2. Payment: Payment for measured quantities will be made at the contract unit price per cubic yard for "Loose Rock Excavation". Payment is full compensation for excavating and disposing of loose rock and for furnishing, placing, and compacting any additional bedding material needed as a result of the rock excavation.

E. Frost Breaking and Removal:

1. Measurement: If thawing of frozen ground is necessary for underground construction activities, the City will measure Frost Breaking and Removal by the linear foot of trench acceptably thawed or broken.
2. Payment: Payment for measured quantities will be at the contract unit price per linear foot for "Frost Breaking and Removal". Payment is full compensation for thawing existing trench soils.

F. Geotextile Fabric Type SAS Non-Woven:

1. Measurement: The City will measure Geotextile Fabric Type SAS Non-Woven by the square yard acceptably completed. Extra fabric at areas of overlap will not be measured.
2. Payment: Payment for measured quantities will be at the contract unit price per square yard for "Geotextile Fabric Type SAS Non-Woven". Payment is full compensation for furnishing and installing geotextile fabric.

G. Geotextile Grid Type BX1100:

1. Measurement: The City will measure Geotextile Grid Type BX1100 by the square yard acceptably completed. Extra grid at areas of overlap will not be measured.
2. Payment: Payment for measured quantities will be at the contract unit price per square yard for "Geotextile Grid Type BX1100". Payment is full compensation for furnishing and installing geotextile grid.

H. Crushed Aggregate Base Course (size):

1. Measurement: The City will measure Crushed Aggregate Base Course (size) by the ton of material acceptably incorporated in the work. Aggregates obtained from wet pits or which contain total moisture in excess of 7 percent shall be stockpiled, aerated, or dried to reduce the moisture content to 7 percent or less before being weighed.

2. Payment: Payment for measured quantities will be made at the contract unit price per ton for "Crushed Aggregate Base Course (size)". Payment is full compensation for furnishing, producing, crushing, screening, loading, hauling, placing, shaping, grading, watering, drying, compacting, and maintaining base course.

4.2 PRODUCTS

4.2.1 EXCAVATION MATERIAL CLASSIFICATION

- 4.2.1.1 Unclassified Excavation: Roadway and drainage excavation will be unclassified except for materials to be undercut as described below.
- 4.2.1.2 Subgrade Undercut: Undercut shall include frost-heave material, unstable silty soils, wet and unstable soil, topsoil containing considerable humus or vegetable matter, rocks, or other undesirable foundation material that is located below the established pavement subgrade (the surface upon which the subbase, base, and/or surface courses will be constructed) as determined by the Engineer as the work is opened up and performed.

4.2.2 EMBANKMENT MATERIALS

- 4.2.2.1 Materials for embankment shall consist of suitable materials and shall contain no logs, stumps, brush or other perishable material. Sod and humus-bearing soils, in excess of the quantity needed for salvaged topsoil requirements and other soils not suitable for roadbed construction may be placed in the outside edges of the embankment, beyond the limits of an assumed one-to-one slope extending outward from the outer limits of the finished sidewalk line. Frozen lumps of soil shall not be permitted to be placed in embankments inside the above designated assumed slope limits.
- 4.2.2.2 Materials to be incorporated in the top foot of earth embankments and in portions of embankments through which it is proposed to bore holes for or to drive piling shall be earthy materials, free of any substantial quantity of gravel or broken stone which would significantly affect scarifying and finishing of the subgrade or driving of piling through the embankment. No stones shall be incorporated which would fail to pass a 3-inch ring.

4.2.3 ADDITIONAL FILL MATERIALS

- 4.2.3.1 Material for additional fill shall consist of satisfactory soil or mixture of satisfactory soil, stone, gravel or other acceptable materials which is of a character and quality satisfactory for the purpose intended. The material shall be free from sod, stumps, logs, grubs and other perishable and deleterious matter.

4.2.3.2 The Contractor shall make his own negotiations with property owners from whom he proposes to obtain material, provided, however, that in no case shall borrow when obtained from the proximity of the roadway be removed in such a manner as to create a nuisance or present an unsightly appearance.

4.2.4 TRENCH MATERIALS

4.2.4.1 Pipe Bedding and Cover Materials: Materials as required in Chapter 3.2.0 of the Wisconsin Sewer and Water Specifications for the application, unless otherwise stated in the Special Provisions.

4.2.4.2 Trench Backfill:

A. Under Existing or Proposed Pavements: Granular backfill meeting the requirements of Table 39 of Chapter 8.43.7 of the Wisconsin Sewer and Water Specifications. No excavated material will be allowed for reuse as trench backfill, unless otherwise stated in the Special Provisions.

B. In Non-Pavement Areas: Previously excavated materials meeting the requirements of Chapter 8.43.5 of the Wisconsin Sewer and Water Specifications, unless otherwise stated in the Special Provisions.

4.2.4.3 Slurry Backfill: Aggregate slurry backfill meeting the requirements of Chapter 8.43.8 of the Standard Sewer and Water Specifications.

4.2.4.4 Submit prices for alternate backfill procedures or materials within 48-hours of Engineer's request or Contractor's RFI. Do not proceed with use of alternate procedures or materials without approval of request or clarification.

4.2.5 GEOTEXTILE FABRIC TYPE SAS NON-WOVEN

4.2.5.1 Geotextile fabric shall meet the requirements of Section 645 of the Wisconsin Highway Specifications for Type SAS geotextile.

4.2.6 GEOTEXTILE GRID TYPE BX1100

4.2.6.1 Geotextile grid shall be a polymer grid structure composed of polypropylene or high-density polyethylene whose function is to reinforce roadway subgrade while allowing water to pass freely. Provide Tensar "BX1100", or approved equal.

4.2.7 CRUSHED AGGREGATE BASE COURSE

4.2.7.1 Crushed aggregate base course shall be material complying with Section 305 of the Wisconsin Highway Specifications.

4.2.7.2 The Contractor will have the option of using Crushed Stone, Crushed Gravel, or Crushed Concrete that meets the specified gradation. Reclaimed asphalt, reprocessed material, or blended material will not be acceptable.

4.2.8 CRUSHED STONE BACKFILL

- 4.2.8.1 Crushed stone backfill shall meet the requirements specified for crushed stone base course.

4.3 EXECUTION

4.3.1 ROADWAY AND DRAINAGE EXCAVATION

4.3.1.1 General:

- A. Roadway and drainage excavation shall consist of the excavation and satisfactory disposal of all materials taken from within the right-of-way for the construction of the roadway (including preparation of roadway foundation), roadbed, embankments, earth subgrade and shoulders, intersections, side ditches and dikes, channels, and waterways, and shall also include the grading of entrances, approaches, ditches and channels beyond the right-of-way in accordance with these specifications and to lines, grades and cross sections shown on the Plans. Except when otherwise provided, this work shall also include the removal and satisfactory disposal of base courses, embankment surcharge, masonry walls, foundations of buildings, or other structures that lie within the right-of-way, stone fences, stone piles and surplus and unsuitable materials; the replacement of unsuitable material with satisfactory material; the trimming and finishing of the roadway; and maintaining such work in a finished condition until acceptance.
- B. Roadway and drainage excavation does not include removing existing asphalt and concrete pavements, material obtained from borrow pits outside the right-of-way limits, nor excavation for structures or other excavation items for which separate and specific bid items are included in the Contract.
- C. If hazardous substances or archaeological or historic remains are encountered during excavation work, comply with the requirements of Section 01 – General Requirements.

4.3.1.2 Preparing Roadway Foundation:

- A. Vegetation of a height greater than 1 foot shall be cut and properly disposed of before ground is broken for excavation or before embankment is placed thereon. Heavy sod and other perishable material underlying proposed embankments within the limits of an assumed one-to-one slope extending outward from the outer limits of the sidewalk area shall be removed. Muck, peat and other unstable material shall be removed, disposed of, or otherwise treated as shown on the Plans.

- B. All suitable topsoil material from within the right-of-way limits shall be stripped and stockpiled or otherwise salvaged as shown on the Plans or as directed by the Engineer.
- C. Compact, or otherwise prepare as required, the existing ground within the roadway foundation as necessary to support the embankment and attain the specified compaction density. Prior to placing embankment materials, proof-roll the roadway foundation in the presence of the Engineer with a fully loaded tandem-axle dump truck. No material shall be placed on a soft or spongy subgrade or on a subgrade covered by ice or snow.
- D. No rocks, aggregate, or stone larger than 3 inches on any face will be allowed at surface of the subgrade.

4.3.1.3 Drainage During Construction:

- A. During construction, the roadway, ditches and channels shall be maintained in a well-drained condition at all times by keeping the excavation areas and embankments sloped to the approximate section of the ultimate earth grade. Blading or leveling operations will be required when placing embankments and during the process of excavation except when such excavation is in ledge rock or areas where leveling is not practical or necessary. Where salvaged topsoil is stored on the right-of-way during construction operations, it shall be so stockpiled to prevent interference with or obstruction to surface drainage. If it is necessary, in the prosecution of the work, to interrupt existing surface drainage, sewers, or under drainage, temporary drainage shall be provided until permanent drainage work is completed. The construction of all temporary drainage installations shall be considered as incidental to the construction of the work.
- B. Take all reasonable and necessary precautions to preserve and protect all existing tile drains, sewers and other subsurface drains, or parts thereof, which in the judgment of the Engineer may be continued in service without change. The Contractor shall repair at its own expense any and all damage to such facilities resulting from negligence or carelessness on the part of his operations.
- C. Spring or seepage water encountered shall be reported to the City Engineer if not provided for by the Plans.

4.3.1.4 Excavation Below Subgrade (EBS):

- A. Deposits of frost heave material, unstable silty soils, wet and unstable soil, topsoil containing considerable humus or vegetable matter, rocks, or other undesirable foundation material shall be removed from the area within the roadbed slopes to the depth shown on the Plans or as directed by the Engineer. Do not proceed with undercutting until authorized by the Engineer.

- B. Humus-bearing soils and other excavated materials not suitable for embankment construction shall be disposed of as outlined in "Disposal of Surplus or Unsuitable Material", below.
- C. Backfill shall be made with 1-1/4-inch or 3-inch crushed stone unless otherwise indicated on the Plans or in the Special Provisions.

4.3.1.5 Grading the Roadway, Intersections, and Entrances:

- A. All suitable material removed from excavation shall be used in the construction of the roadway, as far as practicable, and at such other places as shown on the Plans.
- B. All excavated slopes or areas and all embankment slopes or areas designated to be covered with topsoil or salvaged topsoil shall be undercut or underfilled to the necessary depth to provide for the specified amount of topsoil being placed and finished to the required grade lines and section.
- C. The excavating shall be so conducted as to avoid removing or loosening any material outside the required slopes, and any such material which may be removed or loosened shall be replaced and thoroughly compacted to the required cross section.
- D. All intersecting roads, approaches, entrances and driveways shall be graded as shown on the Plans or as laid out in the field by the Engineer. The work of constructing intersections and private entrances, trimming shoulders and slopes, finishing and blading the earth subgrade, and completing the ditches to proper alignment, grade and cross section shall follow the rough grading closely.
- E. Grading operations shall not be performed to the detriment of the work of trimming and finishing the roadway, and blading and maintaining the roadbed and earth subgrade. The Engineer shall have full authority to order the suspension of grading and other operations pending the adequate and proper performance of such trimming, finishing and maintenance work.
- F. Phase the work as to protect the subgrade from contamination, inundation or excessive water compromising the base. Areas that are found to be compromised shall be excavated below subgrade a minimum of 6 inches or as determined in the field by the Engineer, backfilled and compacted at the Contractor's expense.

4.3.1.6 Constructing Ditches, Dikes and Channels:

- A. Inlets, outlets, swamps, berms and intercepting ditches, dikes, or intercepting embankments and channels shall be constructed where and as shown on the Plans or where and as directed by the Engineer and shall be maintained to the required section until final acceptance. The work shall be performed in proper sequence with other work.
- B. Excavation from ditches and channels shall be completed as part of shaping and grading the roadway subgrade, unless otherwise specified.
- C. All suitable materials excavated from ditches and channels shall be used in the construction of the roadway and backfilling of abandoned ditches and channels, as far as practicable, or shall be otherwise disposed of as shown on the Plans or as directed by the Engineer.
- D. No waste or surplus excavation shall be deposited within 3 feet from the edge of the ditch or channel or within such greater distance, as may be required, to insure stability of the side slopes. Any such waste or surplus material shall be spread in thin uniform layers nearly leveled and shaped. Roots, stumps, logs and other objectionable material in the slopes and bottoms of ditches and channels shall be removed and the holes backfilled with suitable material, or they shall be cut to conform to the cross section shown on the Plans. Where necessary, sufficient openings shall be provided in spoil banks to permit surface drainage of adjacent lands.
- E. Intercepting ditches or dikes shall be constructed as soon as practical after clearing and grubbing operations are completed and prior to or during the operations of excavating the cuts. Suitable outlets or flumes to roadway ditches shall be provided where necessary in accordance with the details shown on the Plans.

4.3.1.7 Excavating Rock:

- A. Rock, when encountered in excavation, shall be removed to a depth of 6 inches below the earth subgrade between limits of the shoulder slopes. In the event design details covering the depth of rock excavation are incorporated in the Plans, the work shall conform thereto. When specific materials are not required by the Plans and special provisions or ordered by the Engineer, the backfill for areas of excavation below subgrade in rock excavation shall be selected material obtained from roadway and drainage excavation. When excavation methods employed by the Contractor leave undrained pockets in the rock surface, the Contractor shall, at his own expense, properly drain such depressions.

- B. Excavation of rock cuts shall be performed by such methods and with such equipment that the resulting backslopes conform to the slopes shown on the Plans or to the slopes designated by the stakes set for excavation, without creating depressions in or substantial displacement of material outside the lines, limits or slope planes defined by the stakes. The backslopes in rock cuts shall be "scaled" to dislodge loose rock, and material so removed shall be disposed of in the manner prescribed for other excavation.
- C. The slopes of rock cuts when designated to receive topsoil or salvaged topsoil shall be undercut the necessary depth to provide for placing the specified amount of topsoil and finishing to the required section.

4.3.1.8 Removing Masonry Walls, Foundations of Buildings, or Other Structures:

- A. Removing masonry walls, foundations of buildings or other structures shall consist of removal of that portion of such walls or foundations to a minimum of 2 feet below earth subgrade or 2 feet below the slopes or natural ground elevation as may be necessary due to the location of the walls or foundations. Those portions of all basements or other openings resulting from the removal of buildings or other structures, or openings resulting from the removal of walls or foundations of such buildings or structures, lying within the shoulder lines of the new roadway, shall be backfilled to subgrade elevation with granular backfill. When so provided, similar openings lying outside the ditch lines of the new roadway shall be backfilled with material secured from roadway excavation.

4.3.1.9 Disposing of Stones, Broken Rock and Boulders:

- A. All stones, broken rock and boulders not required for other construction included in the contract shall, insofar as possible, be placed in embankments outside the limits of any proposed structure or structure piling, and the voids between them shall be completely filled with satisfactory soil. All such material that cannot be incorporated in the work shall be disposed of by the Contractor at its own expense, either by burying in the ground within the right-of-way in an approved manner, or by placing at sites provided by the Contractor, not less than 300 feet outside the right-of-way or from a public street. When placed outside the right-of-way, the material shall be disposed of so as to present a neat and orderly appearance, and the Contractor shall obtain and file with the Engineer written permission from the owner on whose property the material is placed.

4.3.1.10 Disposal of Surplus or Unsuitable Material:

- A. Vegetation shall be disposed of as specified in Section 03 – Existing Conditions, Subsurface Investigation, and Demolition. Material containing humus or of a nature suitable to support vegetation but unsatisfactory for constructing embankments shall be conserved, when required, and utilized in salvaged topsoil operations. All surplus humus-bearing soils, and other excavated materials not suitable for embankment construction but suitable to uniformly widen embankments, to flatten slopes and to fill low places in the right-of-way shall be used for such purposes, unless otherwise provided.
- B. In no case shall excavated material be deposited along the roadsides above the elevation of the adjacent roadbed, unless so provided on the Plans or by authorization.
- C. Surplus excavation which is not or cannot be disposed of in a manner as herein provided shall be disposed of by the Contractor at his own expense in places specified by the Engineer within the City of Waukesha. In all cases the material shall be disposed of so as to present a neat and trim appearance, and in no case shall such material be disposed of in such a manner as to create a nuisance.
- D. Overhaul will not be allowed for the disposal of surplus or unsuitable material.

4.3.1.11 Finish Grading:

- A. The grading, trimming and finishing shall be completed prior to construction of the subbase, base or surface courses, or acceptance of the work.
- B. Adjustment in slopes, to avoid injury to standing trees or to harmonize with existing landscape features, especially at the intersection of cuts and fills, shall be made and the transition to such adjusted slopes shall be gradual.
- C. The crests of earth cut banks shall be rounded as indicated on the Plans or as directed by the Engineer.
- D. All earth slopes shall be constructed to a surface that will merge with adjacent terrain and be in substantial accordance with the cross sections.
- E. During grading operations and pending final acceptance prior to placement of base or surface courses, the Contractor shall provide continuous maintenance of the entire roadbed and perform all blading and repair work necessary to keep the grade smooth and to the required grade and cross section.
- F. Washouts caused by erosion shall be refilled and properly compacted.
- G. The shoulders shall be trimmed, shaped and restored to the finished cross section by means of a grader and other equipment, supplemented by hand work where necessary to produce smooth surfaces and slopes and uniform cross sections. In the case of a graded roadbed without surfacing the entire roadbed shall be trimmed and shaped in the same manner.

- H. Loose and waste stone not incorporated in and made a part of required construction, that would fail to pass a 3-inch ring, shall be removed from the surface of the roadway and from the surface of the ground within all areas of the clearing and grubbing limits. No 3-inch or larger stones or consolidated material shall be allowed within the top 18-inches of fill areas.
- I. The dragging, pushing or scraping of material across or along the finished pavement or surface course will not be permitted.
- J. The slopes of embankments, excavations, borrow pits and roadside pits shall be trimmed and finished to the established or specified lines and grades; ditches and channels shall be cleared of debris and obstructions and their slopes and beds trimmed smooth and true to line and grade; and excess earth, debris, spoil banks, or other waste material adjacent to culverts, bridges, ditches, channels, poles, posts, trees, or other objects, shall be removed, shaped, trimmed and left in a neat orderly condition. Stones, roots or other waste matter exposed on embankment or excavation slopes, which are liable to be loosened and dislodged, shall be removed and all slash and debris from clearing and grubbing operations disposed of and the entire roadway left in a neat, presentable condition. Holes and depressions appearing on the surface within the grubbing limits and caused by grubbing operations shall be filled with suitable material.
- K. Subgrades shall be formed in accordance with the Plans within a tolerance of minus 2 inches.
- L. Sideslopes shall be graded to a minimum of 1-1/2 feet horizontal to 1 foot vertical or as shown on the Plans or directed by the Engineer.
- M. Grade shall be cut to a vertical face at the edge of abutting pavements.
- N. Areas of unyielding or unsuitable material shall be excavated and backfilled with material as ordered by the Engineer. The right is reserved to make such minor adjustments in the Finished Grade line from that as shown on the Plans as may be necessary or desirable to maintain the characteristics of a stabilized foundation by minimizing the amount of cutting into or filling over such stabilized foundation, provided such adjustments do not impair the riding qualities, drainage or appearance of the finished pavement, or cause, in effect, a deviation from a grade established by appropriate municipal ordinance.

4.3.2 EMBANKMENTS

4.3.2.1 General:

- A. This work shall consist of placing in embankments and in miscellaneous backfill areas, material obtained from roadway and drainage excavation, additional fill excavation, or excavation for structures, all in accordance with these specifications and in conformity with the lines, grades, cross sections and dimensions shown on the Plans or as ordered by the Engineer.

4.3.2.2 Preparing Roadway Foundation:

- A. Preparing roadway foundation shall be in accordance with the requirements under the "Roadway and Drainage Excavation" article, above, provided further that where special compaction is specified, the foundation shall be compacted as provided below.
- B. Ice and snow shall be removed from the surface of the ground prior to placing embankment thereon.
- C. Unless otherwise provided in the contract, the construction of embankments shall be discontinued in the fall or early winter when weather conditions prevail which will cause substantial freezing of the materials as they are placed in the embankment, except when the materials used are from rock excavation and contain only minor quantities of silt, clay, loam or similar materials.

4.3.2.3 Placing Layers:

- A. Embankment shall, except as hereinafter specified be constructed in layers. The construction of an embankment shall begin at the lowest point of the fill below the grade, at the bottom of ravines, and shall be constructed in layers by spreading and leveling the material during placement. Individual layers shall be spread evenly to uniform thickness throughout and parallel with the finished grade for the full width of the embankment, unless otherwise directed. The thickness of the layer shall be as necessary to secure the required compaction, but shall not exceed 12 inches prior to compaction. Each layer shall be compacted as hereinafter provided.
- B. On side hills too steep to operate hauling equipment, over low, wet ground, in wet marshes, or when filling in water, a single layer may be constructed to thickness no greater than necessary to support the hauling equipment while placing subsequent layers.

4.3.2.4 Compaction:

- A. General:
 - 1. All embankments shall be compacted in accordance with the requirements for standard compaction or for special compaction. Standard compaction will be required, unless special compaction is called for on the Plans or in the Contract.

2. Embankment material shall not be compacted when the moisture content is such as to cause excessive rutting by the hauling equipment, or excessive displacement or distortion under compacting equipment. Where such conditions exist, the materials shall be allowed to dry prior to compacting. When necessary, drying of such materials shall be accelerated by aeration or manipulation by means of blade graders, harrows, discs or other similar equipment.
3. When embankment material does not contain sufficient moisture to compact properly, water shall be added in quantities deemed necessary to aid and accelerate and to secure effective compaction.

B. Standard Compaction:

1. The material for the embankment shall be deposited, spread and leveled, as hereinbefore provided, in layers not exceeding 12 inches in thickness before compaction. Each layer of the embankment shall be compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. The required compaction shall be attained for each layer before any material for a succeeding layer is placed thereon.
2. Hauling and leveling equipment shall be routed and distributed over each layer of the fill in such a manner as to make use of the compaction afforded thereby. In addition to the compactions so attained, the compaction shall be performed by means of tamping rollers, pneumatic-tired rollers, vibratory rollers, or other types of equipment devised for the purpose which will produce the required results in the materials encountered and be subject to the approval of the Engineer.
3. Tamping rollers, when used for compaction, shall exert a weight of not less than 150 pounds per square inch of tamping surface on each tamping foot in a transverse row.
4. Pneumatic-tired rollers, when used for compaction, shall have a weight of not less than 150 pounds per linear inch of over-all rolling width.

C. Special Compaction:

1. When special compaction is required, the work shall be performed as directed and in accordance with the provisions of Sections 207.3.6.3 and 207.3.6.4 "Special Compaction" of the Wisconsin Highway Specifications.

4.3.2.5 Slopes:

- A. Embankment slopes shall be built to the lines and section shown on the Plans or as directed by the Engineer. The slopes of rock fill embankments shall have all voids completely filled with rock fines or soil and trimmed to a smooth uniform appearance.
- B. Allowance shall be made in the construction of embankments, whose slopes are designated to receive topsoil or salvaged topsoil, whereby the placing of such topsoil will result in the finished embankment conforming to the required section.

4.3.2.6 Backfilling Structures:

- A. The work of backfilling shall consist of placing and compacting all required embankment over and adjacent to all culverts, bridges, retaining walls and other structures and shall include all backfilling which is not performed incidental to the excavation for such structures.
- B. The materials and construction methods shall be in accordance with the requirements as specified under Excavation for Structures, Section 206.3.12 of Wisconsin Highway Specifications.
- C. Where required in the Special Provisions or on the Plans, granular backfill shall be used for backfill.
- D. When special compaction of the embankment at the structure site is specified the backfill material shall also be compacted to 95% of maximum density.

4.3.2.7 Finish Grading:

- A. The earth grade shall be trimmed, finished and maintained as specified under roadway and drainage excavation construction methods.
- B. Rock, stone and boulders excavated by plowing and scarifying operations and required to be removed and disposed of will not be measured for payment.

4.3.3 ADDITIONAL FILL EXCAVATION

4.3.3.1 General:

- A. Additional fill excavation shall consist of furnishing, excavating, hauling and placing material required to complete the roadbed, embankments, subgrade, shoulders, intersections, approaches, entrances, etc., when sufficient quantities of satisfactory material for such purposes cannot be obtained from within the limits of roadway and drainage excavation, excavation for structures and other designated excavation and when such additional material is obtained from borrow pits provided by the Contractor outside the right-of-way limits.

4.3.3.2 Construction Methods:

- A. The area from which material for additional fill excavation will be obtained shall be cleared and grubbed in the same manner as specified for roadway and drainage excavation. Borrow pits shall be excavated in such a manner as to permit accurate measurement. When additional fill excavation material is obtained from pits located within sight of a public street, the available topsoil or other soil overlying such pit and of a nature as would be conducive to plant growth shall be stripped off and placed in stockpiles, in sufficient quantities to cover all surfaces of excavated areas within such pit to a depth of 4 to 6 inches. After the pit has been trimmed and finished, such salvaged material shall be uniformly spread over all excavated areas of such borrow pit.
- B. All stone, broken rock, boulders and other materials which are not satisfactory for use for the purposes intended shall be disposed of by the Contractor at its own cost and expense as specified therefore under roadway and drainage excavation.
- C. All stumps, trees, logs, brush, tops and other debris resulting from clearing and grubbing work in borrow pit areas shall be disposed of by the Contractor as specified therefore under clearing and grubbing.

4.3.4 TRENCHING AND BACKFILLING

- 4.3.4.1 Trenching and backfilling shall be in accordance with Parts II and III of the Wisconsin Sewer and Water Specifications and the following requirements.
- 4.3.4.2 Sidesloping of trenches will not be allowed where damage to sidewalk, curb, structures, underground utilities, and trees would be caused by such sidesloping.
- 4.3.4.3 The Contractor is responsible for damage to adjoining buildings and grounds caused by the construction.
- 4.3.4.4 The location of structures and obstacles shall not be taken as conclusive. Verification to the satisfaction of the Contractor shall be assumed as a condition of its bid; and therefore, the Contractor shall be solely responsible for all damages resulting from his/her activities.
- 4.3.4.5 The Contractor shall be solely responsible for providing trench support in accordance with all applicable State and Federal regulations. The City and City's representatives shall be held harmless in all matters regarding shoring and bracing.
- 4.3.4.6 Do not remove any pavement beyond what is necessary for installing the utility line than what can be expected to be installed that day. Once the utility work is complete, pavement can be removed for the road reconstruction.
- 4.3.4.7 If hazardous substances or archaeological or historic remains are encountered during trenching work, comply with the requirements of Section 01 – General Requirements.

- 4.3.4.8 Dispose of excess soil. The disposal site used shall be approved by the Engineer.
- 4.3.4.9 Compact trench backfill as specified in "Part 4 Schedules and Charts", below.
- 4.3.4.10 If required by the Engineer at some locations, slurry backfill shall be provided.
- 4.3.4.11 Rock excavation (solid and loose) in trenches shall conform to Chapter 2.2.9 of the Wisconsin Sewer and Water Specifications and the following:
 - A. Solid rock excavation shall include ledge rock which requires drilling and will be paid for under the bid item for "Solid Rock Excavation".
 - B. Loose rock excavation shall include all boulders exceeding one cubic yard in volume and will be paid for under the bid item for "Loose Rock Excavation".
 - C. Shales, hard pan, masonry and concrete rubble, boulders less than one cubic yard will not be considered rock excavation.
- 4.3.4.12 Thawing of frozen ground shall be accomplished by a method which does not emit excessive smoke or flame, or otherwise inconvenience the public. The Engineer reserves the right to prohibit burning whenever he deems it is undesirable. The method used must be approved by the Engineer and the City Fire Department. If thawing of frozen ground is necessary for underground construction activities, it will be paid for under the bid item for "Frost Breaking and Removal." The width and depth of frost thawing shall be completed to the dimensions necessary in order to complete the proposed work.

4.3.5 PLACING GEOTEXTILE FABRIC TYPE SAS NON-WOVEN

- 4.3.5.1 Install subgrade aggregate separation fabric where directed by the Engineer. Place fabric in accordance with the requirements of Section 645 of the Wisconsin Highway Specifications for Type SAS geotextile.

4.3.6 PLACING GEOTEXTILE GRID TYPE BX1100

- 4.3.6.1 Install geotextile grid where directed by the Engineer. Place grid in accordance with the requirements of Section 645 of the Wisconsin Highway Specifications for Type SR geogrid.

4.3.7 GRAVELING

4.3.7.1 General:

- A. Place crushed aggregate base course in accordance with Section 305 of the Wisconsin Highway Specifications and as specified below.

4.3.7.2 Subgrade:

- A. Prior to the placing crushed aggregate base course, proof-roll the subgrade in the presence of the Engineer with a fully loaded tandem-axle dump truck. No material shall be placed on a soft or spongy subgrade or on a subgrade covered by ice or snow.
- B. No material shall be placed on a dusty subgrade where the existing conditions would hinder or preclude proper compaction of the course or courses being placed; nor where the lack of moisture would allow such rapid dissipation of moisture from the mix that the proper moisture content of the mix cannot be maintained during compaction operations.

4.3.7.3 Construction Methods:

- A. The gravel or crushed stone base course shall be constructed to the width and section shown on the Plans or in the Special Provisions and in layers of approximately equal thickness, not to exceed the lift thickness specified in "Part 4 Schedules and Charts", below.
- B. Each layer shall be constructed as far in advance of the succeeding layer as the Engineer may direct. The work shall, in general proceed from the point on the project nearest the source of supply of the aggregate in order that the hauling equipment, will travel over the previously placed material, and the hauling equipment shall be routed as uniformly as possible over all portions of the previously constructed courses or layers of the base course.
- C. The material shall be deposited on the subgrade or previously placed layer in such a manner that it may be spread to a uniform layer of the required dimensions. Excessive manipulation or mixing which will cause segregation between the coarse and fine materials shall be avoided.
- D. Blade machines of an approved type or other equipment when producing equivalent or better results, shall be used at the point of dumping to spread the aggregate and to aid in maintaining the subgrade or previously constructed layers immediately in advance of the placing of any layer or course. Such equipment shall be available and in use at all times while material is being delivered and placed.
- E. After a layer or course has been placed and spread to the required thickness, width and contour, it shall be compacted to the extent necessary to produce a condition such that there will be no appreciable displacement of the material laterally or longitudinally under traffic.
- F. In the event the material is deficient in moisture content, to readily accomplish the result, it shall be moistened to the degree necessary during compaction operation by means of equipment adapted to the purpose.

G. All areas where proper compaction is not obtainable due to segregation of materials, excess fines, or other deficiencies in the aggregate, shall be reworked as necessary or the material in them removed and replaced with material that will yield the required results.

H. Prior to and during compaction operations, the material shall be shaped and maintained to the proper dimensions and contour by means of blade graders or other suitable equipment. The surface of each layer shall be kept true and smooth at all times.

4.3.7.4 Maintenance:

A. The Contractor shall be responsible for and maintain the work until final acceptance thereof, except as provided under Sections 104.6 and 105.10 of the Wisconsin Highway Specifications.

4.4 PART 4 SCHEDULES AND CHARTS

4.4.1 COMPACTION SCHEDULE

<u>Location</u>	<u>Lift Thickness</u>	<u>Compaction ⁽¹⁾</u>
Structure Slab Subgrade	8"	95%
Pavement and Walk Subgrade	12"	Standard Compaction
Subgrade Outside Structures, Pavements, and Walks	12"	Standard Compaction
Crushed Aggregate Base Course	12"	Standard Compaction
Trench Backfill, Top 3 Feet	12"	95%
Trench Backfill, Below Top 3 Feet		
Initial Lift	24"	90%
Additional Lifts	12"	90%

⁽¹⁾ Percent of maximum density determined in accordance with ASTM D698 (Standard Proctor test).

END OF SECTION

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5 SEWERS AND SEWER STRUCTURES

5.1 GENERAL

5.1.1 SUMMARY

5.1.1.1 This section describes:

- A. Furnishing and installing sewers and sewer structures.
- B. Repairing sewer structures.
- C. Rehabilitating sewers.
- D. Rehabilitating manholes.
- E. Furnishing and installing riprap.
- F. Televising sanitary and storm sewers.

5.1.2 RELATED SECTIONS

5.1.2.1 Section 4 – Earthwork, Excavation, and Boring.

5.1.3 SUBMITTALS

5.1.3.1 Sewer Product Data: Submit product data for pipe, fittings, valves, and couplings.

5.1.3.2 Sewer Structure Shop Drawings: Submit shop drawings for sewer manholes, inlets, and other structures.

- A. Include certification that installed steps when tested in accordance with Section 10 of AASHTO T280 can withstand a vertical load of 800 pounds and a horizontal load of 400 pounds.

5.1.3.3 Sewer Bypass Plan: For projects involving repair, rehabilitation, or replacement of existing sanitary sewer lines or appurtenances, submit a proposed sewerage diversion and pumping plan prior to the preconstruction meeting.

5.1.3.4 Sewer Structure Repair Submittals: For projects with sewer structure repair work, submit product data for all sewer structure repair materials.

5.1.3.5 Sewer Lining Submittals: For projects with sewer lining work, submit the following:

- A. Manufacturer's product literature, application, and installation requirements for materials used in liner.
- B. Manufacturer's product certification for materials used in liner.
- C. Liner pipe finished thickness design.

- D. Pre- and post-construction videos and reports.
- 5.1.3.6 Manhole Rehabilitation Submittals: For projects with manhole rehabilitation work, submit product data for all rehabilitation materials.
- 5.1.3.7 Riprap and Fabric Product Data:
 - A. Submit information on sources of riprap. Provide access to sources to enable Engineer to inspect and obtain samples. Do not deliver riprap until reviewed by Engineer.
 - B. Submit fabric product data. Include material samples, certification of physical properties, and installation procedures.
- 5.1.3.8 MSDS Information: Submit manufacturer's safety data sheets (MSDS) for each solvent, primer, coating, adhesive, and sealant material to be used at the project site.
- 5.1.3.9 Test Reports: Submit test reports for:
 - A. Plant load testing for concrete pipe.
 - B. Leakage tests for sanitary sewer.
 - C. Pressure tests for pressure sanitary sewer.
 - D. Deflection tests for ASTM D3034 PVC sewer pipe.
- 5.1.3.10 Sewer Televising Report: Submit videos and reports for the specified sewer televising.
- 5.1.3.11 Record Drawings: Accurately record locations of service laterals and field changes on a set of Plans. Prior to final application for payment, deliver record drawings to Engineer.

5.1.4 TESTING

- 5.1.4.1 Concrete Pipe Plant Testing: Three-edge bearing load test circular reinforced concrete sewer pipe per ASTM C497 is required for pipe manufactured for this project. For pipe testing frequency, pipe lot shall be defined as pipe of same diameter and class manufactured by the same process in one plant, over a period not to exceed approximately two weeks. Testing frequency shall be as follows:
 - A. For lots of 100 or more pipes, 1 percent of number of pipe in lot with a minimum of 2 pipes selected.
 - B. For lots less than 100 pipes, 1 pipe will be selected.
 - C. For lots less than 10 pipes, testing may be waived by Engineer if manufacturing plant has satisfactory specification compliance on other pipe lots.

- 5.1.4.2 Sanitary Sewer Leakage Testing: Perform sanitary sewer leakage testing using low pressure air test in accordance with Chapter 3.7.3 of the Wisconsin Sewer and Water Specifications.
- 5.1.4.3 Pressure Sanitary Sewer Pressure Testing: Perform hydrostatic pressure testing on pressure sanitary sewer in accordance with Chapter 3.2.6(n) of the Wisconsin Sewer and Water Specifications.
- 5.1.4.4 PVC Sewer Deflection Testing: Perform deflection testing on ASTM D3034 PVC sewer pipe in accordance with Chapter 3.2.6(i)4. of the Wisconsin Sewer and Water Specifications.

5.1.5 WARRANTIES

- 5.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

5.1.6 MEASUREMENT AND PAYMENT

5.1.6.1 (diameter and type) Sanitary Sewer Pipe:

- A. Measurement: The City will measure (diameter and type) Sanitary Sewer Pipe by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(diameter and type) Sanitary Sewer Pipe". Payment is full compensation for furnishing and installing sanitary sewer; for excavating; for furnishing and installing bedding, cover, and backfill; for diverting existing flow around the work area; and for testing.

5.1.6.2 (diameter) Sanitary Sewer Lateral:

- A. Measurement: The City will measure (diameter) Sanitary Sewer Lateral by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(diameter) Sanitary Sewer Lateral". Payment is full compensation for furnishing and installing sanitary lateral; for excavating; for connecting to existing lateral where applicable; for furnishing and installing bedding, cover, and backfill; and for testing.

5.1.6.3 (diameter and type) Pressure Sanitary Sewer Pipe:

- A. Measurement: The City will measure (diameter and type) Pressure Sanitary Sewer Pipe by the linear foot acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(diameter and type) Pressure Sanitary Sewer Pipe". Payment is full compensation for furnishing and installing pressure sanitary sewer; for excavating; for furnishing and installing bedding, cover, and backfill; for diverting existing flow around the work area; and for testing.

5.1.6.4 (diameter) Lateral Replacement (Open Cut):

- A. Measurement: The City will measure (diameter) Lateral Replacement (Open Cut) by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(diameter) Lateral Replacement (Open Cut)". Payment is full compensation for furnishing and installing sanitary lateral; for excavating; for connecting to existing lateral; for furnishing and installing bedding, cover, and backfill; and for testing.

5.1.6.5 (diameter) Lateral Replacement (Pipe Bursting):

- A. Measurement: The City will measure (diameter) Lateral Replacement (Pipe Bursting) by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(diameter) Lateral Replacement (Pipe Bursting)". Payment is full compensation for furnishing and installing sanitary lateral using pipe bursting and for testing.

5.1.6.6 Excavation and Lateral Connection at Right-of-Way (Pipe Bursting):

- A. Measurement: The City will measure Excavation and Lateral Connection at Right-of-Way (Pipe Bursting) by the number of connections acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Excavation and Lateral Connection at Right-of-Way (Pipe Bursting)". Payment is full compensation for excavating, connecting to existing lateral, and backfilling.

5.1.6.7 (diameter) Sanitary Manhole:

- A. Measurement: The City will measure (diameter) Sanitary Manhole by the vertical foot acceptably completed, measured to the nearest tenth of a foot from invert of out flowing sewer to the finished surface.

- B. Payment: Payment for measured quantities will be made at the contract unit price per vertical foot for "(diameter) Sanitary Manhole". Payment is full compensation for furnishing and installing manhole including risers, base, cone/top, adjusting rings, external sealing wrap, and appurtenances; for installing the City-furnished casting; for adjusting structure to finished grade; and for excavating and backfilling. Furnish and installing chimney seal will be paid for separately.

5.1.6.8 (internal or external) Chimney Seal:

- A. Measurement: The City will measure (internal or external) Chimney Seal by the number of chimney seals acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "(internal or external) Chimney Seal". Payment is full compensation for furnishing and installing the designated type of chimney seal on an existing or new sanitary manhole chimney.

5.1.6.9 (diameter) Sanitary Sewer Outside Drop:

- A. Measurement: The City will measure (diameter) Sanitary Sewer Outside Drop by the vertical foot acceptably completed, measured to the nearest tenth of a foot between high and low inverts of drop assembly.
- B. Payment: Payment for measured quantities will be made at the contract unit price per vertical foot for "(diameter) Sanitary Sewer Outside Drop". Payment is full compensation for furnishing and installing drop pipe and associated anchoring and bedding material; and for excavating and backfilling.

5.1.6.10 (diameter and type) Storm Sewer Pipe:

- A. Measurement: The City will measure (diameter and type) Storm Sewer Pipe by the linear foot acceptably completed. Storm sewer, less than 48-in. diameter (width), will be measured horizontally from center to center of proposed or existing manholes or to end of sewer pipe not terminating in a manhole. Storm sewer, 48-in. diameter (width) or greater, will be measured horizontally from inside face to inside face of manholes or structures or to end of sewer pipe not terminating in a manhole or structure. Storm sewer leads or drains will be measured horizontally from center line of storm inlet to center line of manhole for sewer less than 48-in., or from center line of storm inlet to inside face of structures for sewers 48-in. or greater.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(diameter and type) Storm Sewer Pipe". Payment is full compensation for Payment is full compensation for furnishing and installing storm sewer; for excavating; for furnishing and installing bedding, cover, and backfill; for diverting existing flow around the work area; and for testing.

5.1.6.11 (diameter and type) Flared End Section:

- A. Measurement: The City will measure (diameter and type) Flared End Section by the number of end sections acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "(diameter and type) Flared End Section". Payment is full compensation for furnishing and installing flared end section; and for excavating and backfilling.

5.1.6.12 Flared End Section Trash Rack:

- A. Measurement: The City will measure Flared End Section Trash Rack by the number of end section trash racks acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Flared End Section Trash Rack". Payment is full compensation for furnishing and installing flared end section trash rack.

5.1.6.13 (diameter) Storm Manhole:

- A. Measurement: The City will measure (diameter) Storm Manhole by the number of storm manholes acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "(diameter) Storm Manhole". Payment is full compensation for furnishing and installing manhole including risers, base, cone/top, adjusting rings, and appurtenances; for installing the City-furnished casting; for adjusting structure to finished grade; and for excavating and backfilling.

5.1.6.14 (size) Storm Inlet:

- A. Measurement: The City will measure (size) Storm Inlet by the number of storm inlets acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "(size) Storm Inlet". Payment is full compensation for furnishing and installing storm inlet including risers, base, adjusting rings, and appurtenances; for installing the City-furnished casting; for adjusting structure to finished grade; and for excavating and backfilling.

5.1.6.15 Chimney Replacement:

- A. Measurement: The City will measure Chimney Replacement by the number of chimneys acceptably replaced.

- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Chimney Replacement". Payment is full compensation for removing the existing casting and manhole chimney; for furnishing and installing new adjusting rings; for reinstalling the existing casting or a new City-furnished casting; and for excavating and backfilling. Furnishing and installing a chimney seal on a sanitary manhole chimney will be paid for separately.

5.1.6.16 Storm Sewer Inlet Repair:

- A. Measurement: The City will measure Storm Sewer Inlet Repair by the vertical foot of inlet wall acceptably repaired.
- B. Payment: Payment for measured quantities will be made at the contract unit price per vertical foot for "Storm Sewer Inlet Repair". Payment is full compensation for furnishing and installing materials to repair the inlet walls.

5.1.6.17 Storm Sewer Manhole Repair:

- A. Measurement: The City will measure Storm Sewer Manhole Repair by the vertical foot of manhole wall acceptably repaired.
- B. Payment: Payment for measured quantities will be made at the contract unit price per vertical foot for "Storm Sewer Manhole Repair". Payment is full compensation for furnishing and installing materials to repair the manhole walls.

5.1.6.18 Sewer Rehabilitation:

- A. The City will measure and pay for acceptably completed sanitary sewer rehabilitation work under the following items:
 - 1. Per Each Sanitary Sewer Spot Repair.
 - 2. Per Linear Foot of (diameter) CIPP (type) Sewer Pipe.
 - 3. Per Each Sanitary Lateral Reinstatement.
 - 4. Per Each Storm Lateral Reinstatement.
 - 5. Per Each Sanitary Lateral Connection Test and Seal.
 - 6. Payment for each item is full compensation for the specified work.

5.1.6.19 Sewer Lateral Rehabilitation:

- A. The City will measure and pay for acceptably completed sanitary sewer lateral rehabilitation work under the following items:
 - 1. Per Each Sanitary Lateral Cleanout.
 - 2. Per Each Sanitary Lateral Cleaning and Prelining Video Inspection.

3. Per Each Sanitary Lateral Spot Repair (Up to 5 Feet of Repair at Each Spot).
4. Per Each Sanitary Lateral Lining (CIPP) Within 25 (twenty-five) Feet of Sewer Main.
5. Per Linear Foot of Sanitary Lateral Lining (CIPP) Additional Length Over 25 (twenty-five) Feet from Sewer Main.

B. Payment for each item is full compensation for the specified work.

5.1.6.20 Manhole Rehabilitation:

A. The City will measure and pay for acceptably completed manhole rehabilitation work under the following items:

1. Per Each Rehabilitate (type) Manhole w/ Cementitious Liner.
2. Per Each Sanitary Manhole Bench / Invert / Trough Work Minor.
3. Per Each Sanitary Manhole Bench / Invert / Trough Work Major.

B. Payment for each item is full compensation for the specified work.

5.1.6.21 (size) Riprap:

A. Measurement: The City will measure (size) Riprap by the cubic yard acceptably completed.

B. Payment: Payment for measured quantities will be made at the contract unit price per cubic yard for "(size) Riprap". Payment is full compensation for and for furnishing and installing riprap.

5.1.6.22 Riprap Filter Fabric (type):

A. Measurement: The City will measure Riprap Filter Fabric (type) by the square yard acceptably completed.

B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Riprap Filter Fabric (type)". Payment is full compensation for preparing the bed; and for furnishing and installing filter fabric.

5.1.6.23 Sanitary Sewer Cleaning and Televising – Prepaving:

A. Measurement: The City will measure Sanitary Sewer Cleaning and Televising – Prepaving by the linear foot acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Sanitary Sewer Cleaning and Televising – Prepaving". Payment is full compensation for televising sanitary sewer and submitting the specified documentation.

5.1.6.24 Storm Sewer Cleaning and Televising – Prepaving:

- A. Measurement: The City will measure Storm Sewer Cleaning and Televising – Prepaving by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Storm Sewer Cleaning and Televising – Prepaving". Payment is full compensation for televising storm sewer and submitting the specified documentation.

5.1.6.25 Sanitary Sewer Lateral Televising – Prepaving:

- A. Measurement: The City will measure Sanitary Sewer Lateral Televising – Prepaving by the number of laterals acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Sanitary Sewer Lateral Televising – Prepaving". Payment is full compensation for televising sanitary lateral and submitting the specified documentation.

5.1.6.26 Storm Sewer Lateral Televising – Prepaving:

- A. Measurement: The City will measure Storm Sewer Lateral Televising – Prepaving by the number of laterals acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Storm Sewer Lateral Televising – Prepaving". Payment is full compensation for televising storm lateral and submitting the specified documentation.

5.2 PRODUCTS

5.2.1 SANITARY SEWER

5.2.1.1 Materials for sanitary sewer and sanitary laterals shall conform to Part III and Part V of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.

5.2.1.2 Sewer Main Pipe:

- A. Sanitary sewer shall be:
 - 1. PVC conforming to ASTM D3034, having a dimensional ratio of SDR-35 and gasketed joints where cover over pipe is 15 feet or less.

2. PVC conforming to ASTM D3034, having a dimensional ratio of SDR-26 and gasketed joints where cover over the pipe exceeds 15 feet.
3. PVC (green in color for in-ground identification) conforming to AWWA C-900 with gasketed joints where designated on the Plans.

B. Sewer main to sewer main connections shall be:

1. Gasketed PVC connectors for PVC to PVC connections.
2. Fernco Shielded Coupling, or approved equal, for dissimilar pipe material.

5.2.1.3 Sanitary Laterals:

A. Laterals installed by open cut shall be:

1. PVC conforming to ASTM D3034, having the same dimensional ratio as the proposed sewer main and gasketed joints.
2. PVC conforming to AWWA C-900 with gasketed joints where designated on the Plans.

B. Laterals installed by pipe bursting shall be high density polyethylene pipe (HDPE) iron pipe sizing (IPS) with a dimensional ratio (DR) of 17. Alternative pipe material may be considered provided it is compatible with the bursting equipment and approved by the Engineer.

C. Sewer lateral to sewer main connections shall be:

1. Inline wye fitting for connection of new mains to new or existing laterals.
2. Inserta Tee, or approved equal, for connection of existing mains to new laterals.

D. Sewer lateral to sewer lateral connections shall be:

1. Gasketed PVC connectors for PVC to PVC connections.
2. Fernco Shielded Couplings, or approved equal, for dissimilar pipe material.

5.2.2 PRESSURE SANITARY SEWER

5.2.2.1 Materials for pressure sanitary sewer shall conform to Part III of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.

5.2.2.2 Pressure sanitary sewer shall be one of the following as designated in the Special Provisions and/or Schedule of Prices:

- A. PVC pressure pipe complying with Chapter 8.51.2 of the Wisconsin Sewer and Water Specifications.
- B. HDPE pipe complying with Chapter 8.51.3 of the Wisconsin Sewer and Water Specifications.

5.2.3 STORM SEWER

- 5.2.3.1 Materials for storm sewer shall conform to Part III and Part V of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.
- 5.2.3.2 Storm sewer shall use reinforced concrete pipe (RCP) unless noted otherwise on the Plans. All pipes shall have an approved gasket joint. Use the following pipe classes:
 - A. Class V for 12-inch diameter pipe.
 - B. Class IV for 15-inch diameter pipe.
 - C. Class III for 18-inch diameter pipe and larger.
- 5.2.3.3 Where indicated on the Plans, PVC storm sewer shall PVC pipe conforming to ASTM D3034, having a dimensional ratio of SDR-35 and gasketed joints.
- 5.2.3.4 Provide RCP storm sewer bends of the same class as adjacent pipe sections.
- 5.2.3.5 All pipe to manhole connections shall provide for a watertight seal between pipe and manhole. Connect concrete storm sewer to precast concrete manholes and inlets by means of brick and mortar connection.
- 5.2.3.6 Reinforced concrete flared end sections shall conform to the requirements for Class II Reinforced Concrete Pipe of ASTM C76 and shall be used at the outfall of the storm sewer. Unless otherwise indicated, flared end sections shall be provided with a galvanized steel trash rack.

5.2.4 SEWER STRUCTURES

- 5.2.4.1 Materials for sanitary and storm structures shall conform to Part III of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.
- 5.2.4.2 Manholes: All manholes are to be reinforced precast concrete complying with ASTM C478. Manholes shall have pre-formed troughs and benches. Troughs for all incoming pipes shall be 4 inches deep or to the springline of the pipe, whichever is greater. The chimneys on new manholes shall be a minimum of 4 inches and a maximum of 8 inches. All manholes shall be built to the proposed grades.

- 5.2.4.3 Manhole Outside Drops: Manholes with outside drops shall be constructed in accordance with File No. 19 in the Wisconsin Sewer and Water Specifications, except Class "D" concrete will not be permitted. The outside drops are not to be precast with the structure.
- 5.2.4.4 Adjusting Rings: The entire chimney on all sanitary and storm manholes shall consist of adjustment rings manufactured from ARPRO® Expanded Polypropylene (EPP), black 5000 series meeting ASTM D3575 and ASTM D4819; B6D7G4L3M24S2T17W7 having a 27-inch I.D. The rings shall be manufactured using a high compression molding process to produce a finished density of 120 g/l ((7.5 pcf). Material shall be Pro-Ring as manufactured by Cretex Specialty Products. Paving rings are not permitted.
- A. "Grade" adjustment rings may contain either an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside with a flat top.
 - B. "Finish" or "Flat" rings may either have a keyway (groove) on the underside for vertical alignment and/or an adhesive trench with a flat upper surface. These rings shall be available in heights (thicknesses) which will allow final adjustment of the frame and cover or grate to finished grade within the specified tolerance (see "Sewer Structure Construction" article). "Finish" rings may also have a keyway on the upper surface of the inner diameter to facilitate installation of an "Angle" ring.
 - C. "Angle" rings may either have an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside. When required, the "Angle" ring or rings shall allow final adjustment of the frame and cover or grate to finished grade within the specified tolerance (see "Sewer Structure Construction" article).
 - D. For new manholes, the minimum height of adjusting rings for a chimney section above the cone as measured from the top of the cone or slab top shall be 4-inch with the maximum height of 8-inch. If more than 8 inches of adjusting rings are needed to set the casting to finished grade, then an additional barrel section shall be installed on the manhole.
 - E. Adhesive or sealant used for watertight installation of the EPP manhole grade adjustment rings shall be M-1 Structural Adhesive/Sealant or approved equal meeting the following specifications:
 - 1. ASTM C920, Type S, Grade NS, Class 25, Uses NT, T, M, G, A and O.
 - 2. Federal Specification TT-S-00230-C Type II, Class A.
 - 3. Corps of Engineers CRD-C-541, Type II, Class A.

- 5.2.4.5 Chimney Seals: Internal or external (as designated for the Contract) frame-chimney seal for sanitary manholes shall be manufactured by Cretex Specialty Products. The width of the seal shall be the minimum that is necessary to seal the joint between the frame and the Expanded Polypropylene (EPP) rings. Storm manholes do not require chimney seals.
- 5.2.4.6 External Sealing Wrap: An external sealing wrap shall be placed at all joints between precast sanitary manhole sections. The external sealing wrap shall meet, or exceed, the requirements of ASTM C877, Type II. External joint seals shall be Cretex Wrap External Manhole Joint Seals, as manufactured by Cretex Specialties Products, or approved equal.
- 5.2.4.7 Steps: Sanitary structure step construction shall meet the following requirements.
- A. Steps shall meet AASHTO M199.
 - B. Be installed 16-inches center to center maximum spacing.
 - C. Project a minimum clear distance of 4-inches from the wall at the point of embedment.
 - D. Minimum length of 10-inches.
 - E. Minimum wall embedment of 3-inches.
 - F. Ferrous metal steps not painted or treated to resist corrosion shall have a minimum cross section dimension of 1-inch.
 - G. Steps of approved polypropylene plastic-coated reinforcement bar are acceptable. Reinforcing bar must be a minimum of 1/2-inches and meet the requirements in ASTM A615.
- 5.2.4.8 Storm Inlets: Storm inlets shall be reinforced precast concrete complying with ASTM C478. Inlets shall be 24-inch X 36-inch unless a larger size is necessary for the connecting pipes. A 2-foot sump is required in all new storm inlet structures unless shown otherwise on the Plans.
- 5.2.4.9 Castings: The City will furnish all sanitary and storm sewer manhole frames and covers and storm inlet frames and grates for installation by the Contractor. These will be stored at the Waukesha Municipal Garage, 300 Sentry Drive, Waukesha, and must be hauled from this yard to the construction site by the Contractor and placed in their proper positions at its expense. Any breakage, which occurs after delivery to the Contractor, shall be replaced and paid for by the Contractor.

5.2.4.10 Repair Mortar: Repair mortar shall be a one component, quick set, high strength, non-shrink; polymer modified cementitious patching mortar, which has been formulated for vertical or overhead use meeting the requirements of ASTM C109 for Compressive Strength, C348 and C-78 for Flexural Strength, and C882 for Slant Shear Bond Strength. Repair mortar shall not contain any chlorides, gypsums, plasters, iron particles, aluminum powder, or gas-forming agents nor shall it promote the corrosion of any steel that it may come in contact with. Material shall be Octocrete as manufactured by IPA Systems, Inc. or approved equal.

5.2.4.11 Cementitious Grout: Cementitious grout shall be a premixed, non-metallic, high strength, non-shrink grout which meets the requirements of ASTM C191 and C827 as well as CRD-C-588 and ASTM C621. When mixed to a mortar or "plastic" consistency, it shall have minimum one day and 28-day compressive strength of 6,000 and 9,000 psi, respectively. Material shall be Ipatop-Penngrout as manufactured by IPA Systems, Inc. or approved equal.

5.2.5 SEWER STRUCTURE REPAIR MATERIALS

5.2.5.1 Use products meeting the requirements specified for new sewer structures.

5.2.6 SEWER REHABILITATION MATERIALS

5.2.6.1 Resin: The resin for sewer rehabilitation work shall be a polyester resin for general chemical applications with up to 5% by mass thixotropic agent which will not interfere with visual inspection and which may be added for viscosity control. Resins may contain pigments, dyes, or colorants which will not interfere with visual inspection of cured liner.

5.2.6.2 Reinforcing Felt: The reinforcing felt shall be non-woven, needle interlocked polyester felt formed into sheets to provide required finished thickness. Felt tubes may be made of single or multiple layer construction, with any layer not less than 1.5 mm thick. Mechanical strengthener membrane or strips may be sandwiched in between layers where required to control longitudinal stretching. Liners shall have a bonded internal polyurethane membrane, which must be left on the internal surface of liner after curing. Minimum thickness of bonded polyurethane membrane and inner liner, shall be 0.3 mm, +/- 5%, and shall not affect structural dimension requirements of cured liner.

5.2.6.3 Liner Properties: The felt content shall ensure cured finished thickness of liner as specified. The finished thickness of cured liner to be as specified (+10%-4%) and shall not include thickness of polyurethane inner liner. The resin content shall be 10 to 15% by volume greater than volume of felt in liner bag. Cured liner shall meet the following minimum structural standards:

<u>Property</u>	<u>Standard</u>	<u>Value</u>
Tensile Strength	ASTM D638	3,000 psi
Flexural Modulus of Elasticity	ASTM D790	250,000 – 400,000 psi
Flexural Strength	ASTM D790	4,500 psi
5.2.6.4 Lateral Connection Seals: The packer shall be capable of 4-inch or 6-inch laterals and facilitate sealing a minimum of two feet of the lateral. The grout used shall be for use in sewers and be an acrylic based gel, Avanti AV-100 with Avanti AC-50W Root Inhibitor and Avanti AV-257 Icoset (copolymer latex) additives incorporated per the manufacturer’s specifications, or approved equal.		
5.2.6.5 Fabrication: The liner shall be fabricated such that when installed it will fit internal circumference of pipe. Allowance shall be made for circumferential stretching during insertion.		
5.2.6.6 Applicable Standard: The liner shall meet the requirements of ASTM F1216.		
5.2.6.7 Design Considerations:		
A. Furnish all documentation of the design of the CIPP liner. The CIPP liner thickness design shall be in accordance with Appendix XI of ASTM F1216.		
B. The existing pipe shall not be considered as providing any structural support to the liner pipe.		
C. In the liner thickness calculations, the minimum ovality of the host pipe shall be 5 percent, the enhancement factor (K) shall not be greater than 7.0.		
D. Depth of cover and water table elevation shall be the depth at the manholes.		
E. H-20 live load (except under the railroad tracks where Railway E-80 loading is to be used).		
F. The minimum safety factor shall be 2.0.		
G. The flexural modulus of elasticity shall be reduced 50% to account for long term effects and used in the design equation EL.		

5.2.7 SEWER LATERAL REHABILITATION MATERIALS

5.2.7.1 Acceptable Product: The product used shall be the T-Liner and Vac-A-Tee as manufactured by LMK Technologies or an approved equal.

5.2.7.2 System Description: The rehabilitation shall be accomplished using a non-woven textile tube of particular length and a thermo-set resin with physical and chemical properties appropriate for the application. The lateral tube located within a translucent inversion bladder shall be vacuum impregnated with the synthetic resin and then placed inside of a protective carrying device. The mainline portion of the liner shall be physically attached to the lateral portion and affixed around a rigid "T" launching device. The protective "T" launching device shall be winched into the existing sewer. When the "T" launching device is properly positioned at the lateral connection, the mainline bladder shall be inflated by pressurized air that presses the main liner against the host pipe. The lateral portion shall then be inverted up through the lateral service line by the action of the inversion bladder. Once the resin-saturated liner is cured, the inversion bladder and launching/carrying devices shall be removed.

5.2.7.3 Material Liner Assembly: The liner assembly shall be continuous in length and consist of one or more layers of absorbent textile material (i.e., needle punched felt, circular knit or circular braid) that meet the requirements of ASTM F1216 and ASTM D5813 Sections 6 and 8. The textile tube and sheet shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe segments, and have flexibility to fit irregular pipe sections. The wet-out textile tube and sheet shall meet ASTM F1216, 7.2 applicable, and shall have a uniform thickness and 5 to 10 % excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure.

A. Bladder Assembly. The outside layer of the textile tube (before inversion) and interior of the textile sheet shall be coated with an impermeable, translucent flexible membrane. The textile sheet before insertion shall be permanently marked with a "Lateral Identification" correlating to the address of the building and the lateral pipe services. The sheet and tube shall be surrounded by a second impermeable, flexible translucent membrane (translucent bladder) that will contain the resin and facilitate vacuum impregnation while monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

B. Mainline Connection. The mainsheet and lateral tube shall be a one-piece assembly formed in the shape of a "T". No intermediate or encapsulated elastomeric layers shall be in the textile that may cause de-lamination in the cured in-place pipe. The main sheet shall be flat with one end overlapping the second end and sized accordingly to create a circular lining equal to the inner diameter of the main pipe. The lateral tube shall be continuous in length and the wall thickness shall be uniform. The lateral tube shall be capable of conforming to offset joints, bells, and disfigured pipe sections.

5.2.7.4 Resin System:

A. The resin/liner system shall conform to ASTM D5813 Section 8.2.2 - 10,000-hour test.

- B. The resin shall be a corrosion resistant polyester, vinylester, epoxy or silicate resin and catalyst system that when properly cured within the composite liner assembly, meets the requirements of ASTM F1216, the physical properties herein, and those which are to be utilized in the design of the CIPP, for this project.
- C. The resin shall produce CIPP, which will comply with the structural and chemical resistance requirements of ASTM F1216. The CIPP initial structural properties shall be:

<u>Property</u>	<u>ASTM</u>	<u>Test Minimum Value PSI</u>
Flexural Strength	D790	4,500
Flexural Modulus	D790	250,000

5.2.7.5 Design Considerations:

- A. The CIPP shall be designed per ASTM F1216, Appendix X1.
- B. The CIPP design for the lateral tube shall assume no bonding to the original pipe.

5.2.8 MANHOLE REHABILITATION MATERIALS

5.2.8.1 Patching Material:

- A. A quick setting, fiber-reinforced, high early strength, calcium aluminate corrosion resistant hand mixed and hand applied cementitious material for patching and filling voids and cracks.
- B. Approved products are:
 - 1. Quadex Hyperform.
 - 2. Standard Cement Fast Set Bench Repair Cement.
 - 3. Strong-Seal QSR.
- C. Material shall meet the following minimum requirements:

<u>Property</u>	<u>Standard</u>	<u>Value</u>
Compressive Strength:	ASTM C109	>1800 psi, 1 hr >2600 psi, 24 hrs >3000 psi, 28 days
Bond: Calcium Aluminate Cement:	ASTM C882	>1600 psi, 28 days Sulfate resistant
Applied Density:		105 pcf ± 5
Shrinkage:	ASTM C596	0% at 90% R.H.

Placement Time:	5 to 10 minutes
Set Time:	15 to 30 minutes

5.2.8.2 Infiltration Control Material:

A. A rapid setting high early strength hand-applied cementitious product specifically formulated for infiltration control and making repairs to concrete, block, brick or other masonry structures.

B. Approved products are:

1. Quadex Quadplug.
2. Standard Cement Custom Plug Cement.
3. Strong-Seal Strong-Plug.

C. Material shall meet the following minimum requirements:

<u>Property</u>	<u>Standard</u>	<u>Value</u>
Compressive Strength:	ASTM C109	>1000 psi, 1hr >2500 psi, 24 hrs
Sulfate Resistance:	ASTM C267	No Weight loss after 15 cycles @ 2000 ppm
Freeze/Thaw:	ASTM C666 "Method A"	100 cycles
Pull Out Strength:	ASTM C234	14,000 lbs.
Set Time:		<1.0 minute

5.2.8.3 Cementitious Grout Material:

A. A rapid setting cementitious grout specifically formulated for stopping very active infiltration and filling voids. The cementitious grout shall be volume stable and have a minimum 28-day compressive strength of 250 psi. The material shall be Strong-Seal Grout 250 or an approved equal.

5.2.8.4 Chemical Grout Material:

A. Unless otherwise specified by the Engineer, acrylamide and/or acrylic based grouts shall be utilized and have the following characteristics:

1. A minimum of ten percent (10%) acrylamide base material by weight in the total grout mix. A higher concentration of acrylamide base material is recommended to increase strength or offset dilution during injection.

B. Material shall be Avanti AV-100, Avanti AV-118, or an approved equal.

5.2.8.5 Cementitious Liner Material:

- A. A corrosion resistant, fiber-reinforced, cementitious liner material shall be mixed and low-pressure spray applied to form the structural monolithic, cementitious liner. Material shall be factory blended requiring only the addition of water at the jobsite. Material shall be a blend of 100% pure fused aluminate clinker with a minimum aluminate content of 38% and calcium aluminate cement and shall be sulfate resistant and suitable for application in environments with pH level 1.0 or higher. Material shall be reinforced with alkaline resistant fiberglass rods not less than 1/2 inch in length.
- B. Approved products are:
 - 1. Quadex Aluminaliner.
 - 2. Standard Cement Maximum CA Plus Cement.
 - 3. Strong-Seal High Performance Mix.

C. Material shall meet the following minimum requirements at 28 days:

<u>Property</u>	<u>Standard</u>	<u>Value</u>
Compressive Strength:	ASTM C109	>9,000 psi
Tensile Strength:	ASTM C496	>800 psi
Flexural Strength:	ASTM C293	>1,500 psi
Shrinkage:	ASTM C596	0% at 90% R.H.
Bond:	ASTM C882	>2,400 psi
Density, when applied:		140 pcf ±5
Freeze/Thaw:	ASTM C666	300 cycles, no visible damage

5.2.8.6 Water:

- A. Water shall be clean and potable.

5.2.9 RIPRAP AND GEOTEXTILE FABRIC

- 5.2.9.1 Riprap shall conform to the requirements of Section 606 of the Wisconsin Highway Specifications. Provide the riprap size (gradation) designated on the Plans or in the Special Provisions.
- 5.2.9.2 Riprap shall be placed on a geotextile fabric conforming to the requirements of Section 645 of the of the Wisconsin Highway Specifications. Provide the fabric type designated on the Plans or in the Special Provisions.

5.3 EXECUTION

5.3.1 SANITARY SEWER CONSTRUCTION

- 5.3.1.1 Construction of sanitary sewer shall conform to Part III and Part V of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.
- 5.3.1.2 Crushed limestone chips are required from 4 inches under the pipe to 12 inches over the pipe as a minimum. The remainder of the trench shall be backfilled as specified in Section 4 – Earthwork, Excavation, and Boring.
- 5.3.1.3 Provide all pumps, conduits, and other equipment required to divert the flow of sewage around the work area. Ensure that surcharging and backups do not occur on public and private property. Make a temporary connection between the existing and proposed sewers and remove any diversion methods at the end of the day.
- 5.3.1.4 All connections to manholes shall be in accordance with Chapter 3.5.7 of the Wisconsin Sewer and Water Specifications. When sewer pipes are connected to manholes with a preformed trough in the base, any pipe placed in the trough and extending beyond the interior wall of the manhole, shall have the portion of the pipe extending above the edges of the trough trimmed back to the interior wall of the manhole. The top edges of the pipe shall match in elevation the top edges of the trough.
- 5.3.1.5 The connections to the existing manholes or sewers shall be in a method approved by the Engineer. The length of pipe between the existing sewer and new structure that is removed and replaced shall be incidental to the work and shall not be included in the total payment quantity.
- 5.3.1.6 All sewer pipes shall terminate at the inside wall of the manhole. All annular spaces shall be filled with a mastic or cementitious filler to prevent the breakage of the pipe while jetting.
- 5.3.1.7 If the Contractor damages any sewer or manhole during construction, the cost of the necessary repairs including any pavement repairs shall be at the Contractor's expense. The method of repair shall be approved by the Engineer.
- 5.3.1.8 Ensure that flow is not impeded during the adjustment or repair of the sewer structures or road reconstruction. Remove any debris in the sewer structures and lines resulting from the work. If the sewer structure or lines require flushing by City crews, the cost will be assessed to the Contractor.
- 5.3.1.9 Sanitary Laterals:
 - A. Laterals shall not to be connected to a manhole, unless approved by the Engineer.

- B. On the Plans, a lateral is shown for existing properties in their approximate location. Some of the laterals shown on the plan may be determined to be inactive. All laterals which are encountered shall be inspected and verification of their use made. Laterals which are deemed to be abandoned shall be bulkheaded.
- C. In the open cut sections, replace the existing active laterals from the proposed sanitary sewer to as close to the right-of-way as possible. The actual location shall be determined by the Engineer to avoid obstacles such as landscaping, carriage walks, retaining walls, trees, etc.
- D. Connection of new laterals to new sanitary main shall be constructed using a wye fitting.
- E. Existing lateral reconnections to new sanitary main shall be constructed using a wye fitting.
- F. Connection of new sanitary laterals to existing sanitary main shall be as follows based on the existing main material:
 - 1. ABS - Truss Pipe:
 - a. Location: Not closer than 36 inches to an existing joint or fitting or closer than 48 inches to an existing lateral.
 - b. Hole: Core drill or saw-cut with appropriate cutting tools.
 - c. Connection Device: Inserta Tee.
 - 2. Concrete Pipe:
 - a. Location: Not closer than 24 inches to an existing joint or fitting or closer than 48 inches to an existing lateral.
 - b. Hole: Core with appropriate cutting tools.
 - c. Connection Device: Inserta Tee.
 - 3. PVC Pipe:
 - a. Location: Not closer than 36 inches to an existing joint or fitting or closer than 48 inches to an existing lateral.
 - b. Hole: Core drill or saw-cut with appropriate cutting tools.
 - c. Connection Device: Inserta Tee.
 - 4. Vitrified Clay Pipe:

- a. Location: Not closer than 24 inches to an existing joint or fitting or closer than 48 inches to an existing lateral.
- b. Hole: Core with appropriate cutting tools.
- c. Connection Device: Inserta Tee.

5.3.2 PRESSURE SANITARY SEWER CONSTRUCTION

- 5.3.2.1 Construction of pressure sanitary sewer shall conform to Part III of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.

5.3.3 STORM SEWER CONSTRUCTION

- 5.3.3.1 Construction of storm sewer shall conform to Part III and Part V of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.
- 5.3.3.2 Crushed limestone chips are required from 4 inches under the pipe to 12 inches over the pipe as a minimum. The remainder of the trench shall be backfilled as specified in Section 4 – Earthwork, Excavation, and Boring.
- 5.3.3.3 Provide all pumps, conduits, and other equipment required to divert existing flows around the work area. Ensure that surcharging and backups do not occur on public and private property. If pumping is required on a 24-hour basis, the equipment supplied shall be equipped to minimize noise. Pumping and other permits required for the diversion shall be the responsibility of the Contractor.
- 5.3.3.4 The connections to the existing or proposed structures or sewers shall be in a method approved by the Engineer. The cost for connecting existing sewer lines into proposed sewers or manholes will not be paid for separately, but will be included in the unit bid price for proposed sewers and manholes.

5.3.4 SEWER STRUCTURE CONSTRUCTION

- 5.3.4.1 Construction of sanitary and storm sewer structures shall conform to Part III of the Wisconsin Sewer and Water Specifications except as otherwise indicated in this Specification or on the Plans.
- 5.3.4.2 All manholes and inlets are to be built to proposed grade and alignment.
- 5.3.4.3 The Contractor shall be responsible for ensuring the correct City-furnished castings are placed on the structures.
- 5.3.4.4 The frames and covers from any structures which are removed or rebuilt shall be salvaged and returned to the City Garage by the Contractor.
- 5.3.4.5 Chimney Installation:

- A. Installation and surface preparation shall be in accordance with the manufacturer's instructions.
 - B. Repair any surface defects or irregularities of the top of the manhole using a uniform bed of non-shrink grout.
 - C. The joint between the first grade ring and manhole cone shall be sealed using an adhesive/sealant.
 - D. The joints between all manhole adjustment rings shall be sealed using an adhesive/sealant.
 - E. The joint between the top manhole adjustment ring and the frame shall not be sealed with adhesive/sealant. On sanitary manholes, this joint will be sealed with an internal frame-chimney seal. The width of the seal shall be the minimum that is necessary to seal the joint between the frame and the expanded polypropylene rings.
 - F. All castings shall be centered over the opening of the corbel and adjusting rings. The top adjusting ring upon which the casting is set shall be level from side to side unless a pitch is required to match the surface in paved areas.
- 5.3.4.6 Install chimney seals in all new sanitary manholes and those existing sanitary manholes noted in the Plans. Seals shall not be installed until the chimneys are inspected by the Engineer.
- 5.3.4.7 Adjustment to Final Grade:
- A. Adjust all manholes and inlets in concrete pavements to between 0 to 3/8 inches below final pavement grade.
 - B. Adjust all manholes and inlets in HMA pavements to between 1/4 to 3/8 inches below final pavement grade.
 - C. Adjust all manholes and inlets in turf areas to between 1/4 to 1/2 inches below finished grade.
 - D. No other material shall be used in the construction of the chimney section beyond those materials specified. This includes shims of any material, bricks, stones, etc. If after pavement placement, foreign material is discovered (i.e., shims) in a chimney, the pavement surrounding the structure shall be removed and replaced at the Contractor's expense to the limits described below:
 - 1. Required correction at manholes in concrete pavement:
 - a. Sawcut the concrete pavement along longitudinal and transverse joints in order to re-set the manhole chimney according to the specifications. The concrete areas to be removed must be full panels.

- b. Place new concrete around the manhole according to the concrete pavement section of these specifications.
2. Required correction at manholes in HMA pavement:
 - a. Sawcut the HMA pavement that is to be removed in order to re-set the manhole chimney according to the specifications.
 - b. The HMA surface shall be milled from the flange to the nearest HMA pavement joint (if the structure is in the centerline, the area to be milled is flange to flange). The length of the milled area shall be equal to the width.
 - c. The lower courses around the manhole shall be replaced and compacted.
 - d. Place a tack coat and pave a new surface lift of HMA pavement that matches the existing HMA pavement and the re-set manhole.
 - e. The seam created at the existing HMA pavement shall be infrared heated to blend and fuse the new HMA pavement to the existing.

5.3.5 SEWER STRUCTURE REPAIR

5.3.5.1 Storm Sewer Inlet Repair:

- A. Any repairs made to storm sewer inlets shall be considered storm sewer inlet repair and paid under the bid item for "Storm Sewer Inlet Repair". The Engineer will designate the depth of repairs in the field. All work on storm sewer inlets will only be completed to the walls of the structures. No work will be necessary on the storm sewer inlet base.
- B. Storm sewer inlets shall be backplastered to one course below the "repaired" or "reconstructed" area.

5.3.5.2 Storm Sewer Manhole Repair:

- A. When storm manholes need to be rebuilt and tuck pointed, they will be paid under the bid item for "Storm Sewer Manhole Repair".
- B. For storm sewer manholes requiring only chimney work, some minor tuck-pointing to the top two courses of block may be required. This work will be considered incidental to the contract and not paid for as a separate bid item.

5.3.5.3 Chimney Replacement:

- A. The replacement and adjustment of chimneys on existing sanitary and storm manholes within the paving limits shall consist of removing the entire chimney down to the cone section and replacing with the expanded polypropylene adjusting rings to the proposed elevations. This work will be paid for under the bid item for "Chimney Replacement".
- B. Install chimneys and adjust to final grade following the requirements specified for new manholes.
- C. Any repairs required to sewer pipes resulting from the chimney work of the sewer structure shall be made at the Contractor's expense. The Engineer shall approve the type of repair.

5.3.5.4 Ensure that flow is not impeded during the adjustment of the sewer structures or road reconstruction. Remove any debris in the sewer structures and lines resulting from the work. If the sewer structure or lines require flushing by City crews, the cost will be assessed to the Contractor.

5.3.5.5 Use slurry backfill around all manholes and storm inlets when the excavation for the adjustment work is deeper than 1-foot. Slurry will not be paid for separately but will be considered part of the cost for whatever is being adjusted.

5.3.6 SEWER REHABILITATION

5.3.6.1 General:

- A. Install cured-in-place pipe (CIPP) liner in the sanitary or storm sewer as indicated on the Plans. Coordinate the work to avoid any disruptions in the schedule or the integrity of the finished liner between structures.
- B. Work with the City to schedule the installation of the liner in order to avoid disruption to existing businesses and residences as much as possible. This may involve installation at night or weekends.
- C. Notifying the City at least two weeks prior to beginning any work.
- D. City water for use on this contract may be obtained from the City as specified in Section 1 – General Requirements.

- E. Televising inspection video, televising inspection reports, and original as built drawings are available for viewing at the office of the Director of Public Works. The Contractor may request a copy of this data by contacting the office of the Director of Public Works at 262-524-3600. The City accepts no responsibility for accuracy of televised data and their interpretation for construction purposes and makes no other warranties, expressed or implied. The usage of these videos in no way relieves the Contractor from performing the necessary work required under this project.
- F. The video files can be played with Windows Media Player. Preliminary inspection of these videos that reveal conditions that will prevent the proper installation of or changes in design of the CIPP shall immediately be brought to the attention of the City. Point repairs necessary due to this inspection will be paid for under the bid item "Sanitary Sewer Spot Repair". The method of repair shall be approved by the Engineer.
- G. The Plans show service connections to the mainline sewer. The Contractor is responsible for locating and verifying which service connections are active for reconnection purposes. All capped services and/or non-used connections shall be abandoned. The Contractor shall work with the City to verify which services are active or not. Non-active services that are reinstated will not be paid for and shall be repaired in a method approved by the Engineer at the Contractor's expense.
- H. Upon receipt of the two-week notice, the City will send an informational letter to the property owners and/or residents within the project limits with general information explaining the project, including the temporary sewer service disconnection, and informing that the Contractor will be notifying them with more specific information to follow.
- I. The Contractor shall notify the residents or businesses directly affected by the lining operation a minimum of 3 days prior by mailer or door hanger. For commercial properties or where multiple tenants occupy buildings, the Contractor shall notify the tenants and building owner. The City does not have information on multiple tenant or commercial buildings, so the Contractor shall work with the building owner or visit the building for contact information. This notification must include the Contractor's name, foreman's name and cell phone number, expected timeframe of the segment of work, advance notification of noise and odor related to the work, etc.

5.3.6.2 Preparation:

- A. Remove all dirt, grease, mineral deposits, rocks, roots and any other material or obstructions from the sewer lines and manholes that would affect the proper installation of the CIPP. Any protruding tap removal, gasket removal, or grouting work shall be incidental to the cost of installing the liner. Do not pass foreign materials into other pipe sections. The Contractor may dispose of any material cleaned from the sewers at the City of Waukesha Clean Water Plant, 600 Sentry Drive, Waukesha, Wisconsin.
- B. Televis and document all sewer line conditions after cleaning the lines, but prior to installing the liner. If the television inspection shows the cleaning to be unsatisfactory, re-clean and re-televis the sewer line until it is acceptable to the City. All televising shall be done to the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards using the PipeTech software by Peninsular Technologies.
Inspections conducted with other software packages or converted to other formats will not be accepted. The cost for this shall be included in the bid item for "Sewer Lining".
- C. For sanitary sewer relining projects, provide all pumps, conduits and other equipment required to divert the flow of sewage around the sewer segment. Ensure that surcharging and backups do not occur on public or private property. If pumping is required on a 24-hour basis, the equipment supplied shall be equipped to minimize noise.
- D. For storm sewer relining projects, provide all pumps, conduits, and other equipment required to divert existing flows around the work area. Ensure that surcharging and backups do not occur on public and private property. If pumping is required on a 24-hour basis, the equipment supplied shall be equipped to minimize noise. Pumping and other permits required for the diversion shall be the responsibility of the Contractor.

5.3.6.3 Installation:

- A. The liner shall be installed through an existing manhole by an air inversion process or the application of hydrostatic head sufficient to fully extend liner to next designated manhole or termination point and according to ASTM F1216. No pull-in-place methods shall be allowed. Lubricant may be used.
- B. Place a hydrophilic gasket at the end of each lined sewer section, defined as the length of sewer between two adjacent structures, to create a water-tight seal between the host pipe and the CIPP liner. The hydrophilic gasket shall be the Insignia End Seal Sleeve or an approved equal.

- C. Reinstatement the service connections determined to be active by means of a remote control cutting device for a minimum of 95% of the flow capacity. All reinstated connections shall be smooth. If needed, reinstated service connections shall be brushed to ensure that all edges are smooth. Sanitary services shall not be out of service for more than 24 hours during lining process. It is the City's intent NOT to reinstate laterals that are not active. Cost for this work shall be paid for under the bid item for "Sanitary Lateral Reinstatement" or "Storm Lateral Reinstatement".
- D. For laterals that are not to be lined, test and seal the lateral connections after reinstatement.
- E. Laterals shall be air tested by isolating the area to be tested with the packer and applying positive pressure into the isolated "void" area. A sensing unit shall be used for continuous monitoring of the void pressure. This sensing unit shall be located within the void area and accurately transmits pressure readout to the control panel. The test procedure shall consist of applying air pressure into each isolated void area. To isolate a void, the lateral sealing packer shall be positioned straddling the lateral. The operator shall inflate the packer ends to isolate the lateral and insert an inflatable inversion tube. The lateral shall be tested with a gauge pressure of 1/2 psi per foot of depth of sewer or a minimum of 4 psi, whichever is larger. The void pressure shall be observed during this test for a minimum of 10 seconds. If the void pressure drop is greater than 1 psi in 10 seconds, the lateral shall be considered to have failed the air test. If no pressure can be built up, the connection shall also have failed the test. Any connection failing the test shall be sealed and retested utilizing the same method and procedures until it does pass the test. The cost of retesting lateral connections shall be considered incidental and included in the cost of sealing sanitary sewer lateral connection. Cost for this work shall be paid for under the bid item for "Sanitary Lateral Connection Test and Seal".

5.3.6.4 Post Installation Requirements:

- A. If the Contractor damages any sewer during construction, including but not limited to the installation of the CIPP, the cost of the necessary repairs including any pavement repairs, shall be at the Contractor's expense. The method of repair shall be approved by the Engineer.
- B. Televis and document using PipeTech by Peninsular Technologies all sewer line conditions after the liner is installed and the service connections are reinstated and tested. **Inspections conducted with other software packages or converted to other formats will not be accepted.** The completed liner shall be continuous over the entire length of each segment (manhole to manhole) and shall be free of defects such as foreign inclusions, dry spots, pinholes, and delamination. The completed liner pipe shall be leak proof and a tight seal shall be provided between the liner and manhole wall.

- C. Any defects in the liner that will affect the strength of the liner, its flow carrying capacity, or damage to the liner and/or pipe caused by the routing out of the lateral connections, shall be repaired at the Contractor's expense. The type of repair shall be approved by the Engineer.

5.3.7 SEWER LATERAL REHABILITATION

5.3.7.1 General:

- A. Furnish all labor, materials, tools, equipment and incidentals necessary to completely rehabilitate the existing sanitary sewer laterals within the paving limits where shown on the Plans by using a cured-in-place lining method.
- B. In order to complete the sanitary sewer lateral rehabilitation, perform the following:
 - 1. Install a cleanout near the back of walk or work with property owners to utilize an existing cleanout inside the building.
 - 2. Clean the lateral and perform a pre-lining inspection.
 - 3. Repair and/or grout the lateral if necessary.
 - 4. Rehabilitate the sanitary sewer lateral from the public sewer main to the back of walk towards the property and perform a post-lining inspection.
- C. All work shall be in accordance with the current State of Wisconsin Plumbing Code.
- D. Inspections of the sanitary mains and laterals from the main line to the property have been performed prior to this contract and are available for review. When possible, the location and depth of the lateral were obtained at the back of walk. These locations were then surveyed for future reference. Upon request, the City will relocate the laterals using the survey data collected. If additional televising work is needed to locate the laterals, this work may be coordinated with the City.

5.3.7.2 Preparation:

- A. Install a cleanout at the back of sidewalk. Make all efforts to install the sanitary sewer cleanout in a location that minimizes surface disturbance to the residents. If this is not possible, inform the City of the location of the cleanout prior to installation. No permanent structures such as stairs, sidewalks, landscaping, or trees shall be removed without the consent of the City and/or homeowner.
- B. Installation Procedure:
 - 1. In grass areas, the sod shall be neatly cut and removed. In pavement areas, the pavement shall be straight-line marked, cut, and removed. This area should be protected with a barricade at all times.

2. The vacuum excavated borehole shall be approximately twenty (20)-Inches diameter and all spoils shall be deposited in a vacuum truck.
3. A riser pipe of an appropriate length shall be solvent welded to the saddle.
4. The adhesive/sealant shall be applied to the underside of the saddle at no less than a 1/4-inch thick layer.
5. The saddle and riser pipe shall be carefully inserted into the bore hole, setting the saddle onto the pipe, applying a downward force causing the saddle to expand and snap onto the lateral pipe.
6. Immediately after the saddle has been affixed to the lateral pipe, the riser pipe should be secured by backfilling the bore hole with sand or pea-gravel to within 6-inches of the original grade.

C. Testing and Cutting:

1. An exfiltration test shall be performed by filling the riser pipe with a 6-foot column of water. The test shall be performed no less than 2-hours from the time of affixing the saddle to the pipe. The column of water shall be held for 5 minutes. The water level shall be measured from the top of the riser pipe. Zero leakage is allowed.
2. A diamond core saw shall be introduced into the riser pipe, the crown of the pipe cut, and the coupon removed.
3. An approved cap and frost sleeve shall be installed 1-foot below ground level.

5.3.7.3 Installation:

- A. The installation shall be done according to the liner manufacturer's requirements.
- B. The lateral pipe shall be remotely accessed from the main pipe and from a cleanout. This shall be accomplished by the installation of a resin impregnated one-piece main and lateral lining by means of air inflation and inversion. The liner shall be pressed against the host pipe by pressurizing a bladder that is held in place until the thermo-set resins have cured. When cured, the liner shall extend over a predetermined length of the service lateral and a particular section of the main pipe as a continuous, one-piece, tight fitting, corrosion resistant and verifiable non-leaking cured in-place pipe.
- C. The main/lateral lining shall be in accordance with ASTM F2561.
- D. Cleaning and Inspection: As per NASSCO Standards.

- E. Accessing the Lateral: A cleanout shall be located on the exterior of the building. The cleanout fitting shall be either tee shaped or back to back wye shaped where the lateral meets the cleanout riser pipe. The cleanout shall be located no less than within 2-feet of the finished liner.
- F. Plugging: The upstream side of the cleanout shall be plugged during insertion and curing of the liner assembly ensuring no flows enter the pipe and no air, steam, or odors will enter the building. When required, the main pipe flows shall be by-passed. The pumping system shall be sized for normal to peak flow conditions. The upstream manhole shall be monitored at all times and an emergency deflating system shall be incorporated so that the plugs may be removed at any time without requiring confined space entry.
- G. Inspection of Pipelines: The interior of the pipeline shall be carefully inspected to determine the location of any condition that prevents proper installation, such as roots, and collapsed or crushed pipe sections. These conditions shall be noted. Experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television shall perform inspection of pipelines.
- H. Line Obstructions: The existing service lateral shall be clear of obstructions that prevent the proper insertion and expansion of the lining system. Changes in pipe size shall be accommodated, if the lateral tube is sized according to the pipe diameter and condition. Obstructions may include dropped or offset joints of no more than 20% of inside pipe diameter.
- I. Resin Impregnation: The lateral tube and mainline sheet to be encapsulated within the translucent bladder (liner/bladder assembly) shall be vacuum-impregnated with resin (wet-out) under controlled conditions. The volume of resin used shall be sufficient to fill all voids in the textile lining material at nominal thickness and diameter. The volume shall be adjusted by adding 5% to 10% excess resin for the change in resin volume due to polymerization and to allow for any migration of resin into the cracks and joints in the original pipe. No dry or unsaturated area in the mainline sheet or lateral tube shall be acceptable upon visual inspection.

- J. Liner Insertion: The lateral tube and inversion bladder shall be inserted into the carrying device. The mainline liner and bladder shall be wrapped around the "T" launching device and held firmly by placing four hydrophilic O-rings around the main liner. An adhesive sealant 300 ml in volume shall be applied to the main/lateral interface and shall be applied as a 2-inch wide band on the main liner. Both the launching and carrying device shall be pulled into the pipe using a cable winch. The pull shall be complete when the open port of the "T" launching device is aligned with the interface of the service connection and mainline pipe. The lateral tube shall be completely protected during the pull. The mainline liner shall be supported on a rigid "T" launcher that is elevated above the pipe invert through the use of a rotating skid system. The liner assembly shall not be contaminated or diluted by exposure to dirt, debris, or water during the pull.
- K. Bladder: The main bladder shall be inflated causing the main sheet to unwrap and expand, embedding the hydrophilic O-rings between the main liner and the main pipe as the main liner is pressed tight against the main pipe. The lateral tube shall be inverted by the action of the lateral bladder through the center of the main liner as it extends up into the lateral pipe to a termination point that shall be no less than 2-feet from the exterior cleanout. The main/lateral bladder assembly shall extend past all ends of the liner.
- L. Curing: After liner placement is complete, pressure shall be maintained pressing the liner firmly against the inner pipe wall. The liner shall be chemically cured at ambient temperatures or by a suitable heat source. The heating equipment shall be capable of delivering a mixture of steam and air throughout the liner bladder assembly to uniformly raise the temperature above the temperature required to cure the resin. The curing of the CIPP shall take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of the soil). The heat source temperatures shall be monitored and logged during the cure and cool down cycles. The manufacturer's recommended cure schedule shall be submitted.
- M. CIPP Processing: Curing shall be done without pressure interruption with air or a mixture of air and steam for the proper duration of time per the resin manufacturer's recommendations. When the heat source is removed and the temperature on both ends of the CIPP reaches 100 degrees Fahrenheit or less, the processing shall be finished.

5.3.7.4 Finish:

- A. The finished CIPP shall be continuous over the entire length of the rehabilitated sewer service lateral and main pipe for a minimum of 5 inches on both sides of the lateral connection. The CIPP shall be smooth with minimal wrinkling for increased flow rate. The CIPP shall be free of dry spots, lifts, and delaminated portions. The CIPP shall taper at each end providing a smooth transition for accommodating video equipment and maintaining proper flow in the mainline. After the work is completed, provide the City with video footage documenting the repair and the visual markings identifying the sewer lateral address as completed work. The finished product shall provide an airtight/ watertight verifiable non-leaking connection between the main sewer and sewer service lateral.

5.3.8 MANHOLE REHABILITATION

5.3.8.1 General:

- A. Supply all labor, materials, equipment and appliances necessary for rehabilitating the interior of sanitary and storm sewer manholes for the purpose of eliminating infiltration, exfiltration, providing corrosion protection (as necessary), repair of cracks and voids, and restoration of the structural integrity of the manhole.
- B. "Rehabilitate (type) Manhole w/ Cementitious Liner" shall consist of the application of the liner material listed under "Cementitious Liner Material" in Part 2 of this Section to all interior manhole surfaces. Chimney sections scheduled for replacement as indicated on the Plans shall be replaced prior to the manhole rehabilitation as specified in the "Chimney Replacement" requirements in the "Sewer Structure Repair" article above and shall not be lined. The application of grouting material to control active infiltration prior lining the manhole shall be incidental to this item. Manholes shall be rehabilitated after the installation of the CIPP liner (if applicable) to allow the benches to be built up and sloped to prevent water or sewage from ponding. The cost of this work will be paid for under the bid item for "Rehabilitate (type) Manhole w/ Cementitious Liner".
- C. Use, mix, apply and cure all products in accordance with the manufacturer's recommendations and instructions.

5.3.8.2 Manhole Preparation:

- A. Prepare surfaces in accordance with the manufacturer's instructions.
- B. Place covers over all pipe inverts to prevent extraneous material from entering the sewer lines.
- C. Clean the interior surfaces of the manhole with high-pressure (3,000 psi minimum) water spray, using detergent, muriatic acid, antibacterial agent, or other chemicals to remove grease, oil, and other contaminants that would prevent good bond between the existing manhole interior surface and the liner material.

- D. Remove loose, unsound, and protruding brick, mortar, and concrete using a masons hammer and chisel and/or scraper.
- E. Repair and fill voids greater than 2 inches in depth with patching materials specified in above. The patching material shall be applied in accordance with the manufacturer's instructions.
- F. Take the following steps to stop active leaks in the manholes:
 - 1. Stop active leaks with patching material or infiltration control material. Apply material in accordance with the manufacturer's instructions.
 - 2. Install weep holes as required to localize infiltration during application of patching material or infiltration control material.
 - 3. Plug weep holes after application with infiltration control material before application of liner material.
 - 4. For severe infiltration, drill as required to pressure grout using a chemical grout. Apply the grout in accordance with manufacturer's instructions.
- G. Prepare, clean and repair manhole benches and inverts in the same manner as prescribed above for manhole walls.
- H. Personnel shall be trained in appropriate and satisfactory safety methods regarding the materials used under this contract. These methods shall include handling, mixing, and transporting of the materials.

5.3.8.3 Cleaning:

- A. Protect upstream and downstream sewers from excess chemical grout and other construction debris. Clean manhole interiors and remove all construction-related materials, equipment and appliances from the manholes prior to reinstatement of the manholes to service.

5.3.8.4 Application of Cementitious Liner Material and Acceptance Testing:

- A. Saturated Surface: Ensure that the surface is damp and totally saturated with water without noticeable free water droplets or running water just before application of the liner material.
- B. Spraying and Minimum Thickness: Spray apply the liner material in one or more passes from the bottom of the wall to the bottom of frame to form a structurally enhanced monolithic liner. Minimum total thickness achieved shall be 1/2 inch.
- C. Finishing: Ensure a quality finish to the manhole or structure by following the following steps:

1. Trowel the surface of sprayed liner material to a relatively smooth finish. Care should be taken to not over trowel; and
 2. A brush finish shall be applied to the trowel finished surface.
- D. Time between Applications: Follow the manufacturer's instructions whenever more than 24 hours have elapsed between applications of the cementitious material.
- E. Application to Bench: When applying cementitious material to the bench area of the manhole:
1. Remove covers.
 2. Spray the bench with liner material mixed in accordance with the manufacturer's instructions.
 3. Spray-apply the liner material to produce a gradual slope from the walls to the edge of the channel to form a structurally enhanced monolithic liner. A minimum thickness at the edge of the channel of 1/2 inch shall be achieved. The finished invert surfaces shall be smooth and free of ridges.
 4. Round the full circumference of the intersection of the wall and the bench to a uniform radius.
- F. Upon completion of manhole rehabilitation and cleaning, all manholes shall be visually inspected by Contractor.
- G. Visual inspection shall determine if the manhole is free from leaks and defects.
- 5.3.8.5 A leak or defect shall be corrected at no additional cost to the City.
- 5.3.8.6 "Bench / Invert / Trough Work Minor" shall be determined by the Engineer and consist of repairs to the bench and invert to improve flow conditions. This shall include building up the bench from the springline of the pipe, at a minimum, and sloping up at least 2 inches per foot. The minimum channel depth shall be 4 inches. The cost of this work will be paid for under the bid item for "Sanitary Manhole Bench / Invert / Trough Work Minor".
- 5.3.8.7 "Bench / Invert / Trough Work Major" shall consist of the removal of the existing bottom and pouring a new invert and bench or substantial alterations to the existing invert and bench to improve flow conditions. The cost of this work will be paid for under the bid item for "Sanitary Manhole Bench / Invert / Trough Work Major".
- 5.3.9 RIPRAP PLACEMENT**
- 5.3.9.1 Riprap outfall stabilization shall be installed in accordance with Section 606 of the Wisconsin Highway Specifications and as indicated on the Plans.

- 5.3.9.2 Geotextile filter fabric shall be installed under all riprap in accordance with Section 645 of the Wisconsin Highway Specifications and as indicated on the Plans.

5.3.10 SEWER TELEVISION

5.3.10.1 The Contractor shall hire an independent television inspection service to perform a closed-circuit television inspection:

- A. For all sewers, leads, and laterals (sanitary and storm) within the project limits after all underground work has been completed but before the final pavement has been placed. The underground work shall be defined as comprising any activity that could potentially damage a sewer facility, which includes but is not limited to utility installation (including third party utility work), traffic signal and street light bases and conduits, and tree planting.
- B. For other sewers as specified in the Special Provisions.

5.3.10.2 The televising work shall be done in accordance with the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards.

5.3.10.3 Equipment:

- A. The televising camera used for the inspection shall be one specifically designed and constructed for sewer inspection. The camera shall be a color, pan-and-tilt type capable of radial inspection of the top, bottom, and sides of the pipe including lateral connections. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of the City. If the equipment proves to be unsatisfactory, it shall be replaced with adequate equipment.
- B. Lateral cameras shall be color, shall be self-leveling, and equipped with a footage counter to provide on screen display of footage measurement.
- C. The Contractor shall collect all inspection data using PipeTech Software by Peninsular Technologies. Inspections conducted with other software packages or converted to other formats will not be accepted.

5.3.10.4 Procedure:

- A. The main line sewer sections, defined as the length of pipe from center of manhole or structure to center of manhole or structure, shall be televised one section at a time.

- B. For the televising of laterals, the main line sewer television camera shall be used to position the lateral camera launcher. At a minimum, the lateral sewer camera shall inspect laterals to the right-of-way limits, or in the case of a lateral replacement, to the upstream limit of the replacement plus an additional 5 feet upstream. Video recording shall continue during the entire camera withdrawal sequence. The television inspection of the lateral must be from inside the main line sewer up into the lateral and shall include a spot location with depth at the curblineline and back of sidewalk. Inspections from cleanouts, excavations, or other access points will not be accepted.
- C. The Contractor shall fully televise both ends of the main line pipe so the connections at the manholes can be evaluated.
- D. Wherever possible the inspections shall be performed in the upstream to downstream direction.
- E. When sewer conditions prevent forward movement of the camera, the camera shall be withdrawn, and the Contractor shall televise the line from the opposite direction.
- F. The camera shall be directed through the sewer at a uniform, slow rate. In no case shall the video camera record while moving at a speed greater than 30 feet per minute. If the inspection is rejected due to camera speeds exceeding 30 feet per minute, the inspection recordings shall be redone at no additional cost to the City.
- G. Flow levels within existing sewers to be inspected shall not exceed 5% of the pipe diameter. If water levels prevent adequate televising of the sewer, then conducting the work during low flow periods or other methods like plugging and bypass pumping shall be implemented.
- H. For inspection of new sewers (not yet in service), the Contractor shall introduce clean water into the upstream manhole and keep water flowing until flow is observed at the downstream manhole location.
- I. The survey unit shall be slowed, stopped, or backed-up to perform detailed inspections of significant features. The camera shall be stopped at all defects; changes in material, water level, or size; side connections; manholes; junctions; or other unusual areas. When stopped at the defect or feature, the operator shall pan the camera to the area and along the circumference of the pipe.
- J. The operator shall also record audio of the type of defect or feature, clock position, footage, extent or other pertinent data.

- K. Audio shall be recorded during each inspection by the operating technician, electronic voice text recognition or approved equal on the inspection video as the sewer is inspected and shall include the sewer location, identification of beginning and terminating manholes including location (address or cross streets), inspection direction, length of inspection, side sewer identification, flow information, complete descriptions of the sewer line conditions as they are encountered, description of the rehabilitation work, reason for termination, and other relevant commentary to the inspections. Voice descriptions should be made: 1) at points of pipe failure or weakness, 2) at points of infiltration, 3) at the location of service connections, 4) at points where unusual conditions are noted, and 5) at points where digital still photos are taken.
- L. In addition, the audio reports shall include the distance traveled on the specific run, a description of abnormal conditions in the sewer and side sewer connections as they are encountered, explanations for pausing, backing up, or stopping the survey, and the final measured center to center distances between consecutive manholes. The audio portion of the composite video shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of the oral report. Audio dubbing after the inspection is prohibited.
- M. If the video and/or audio recording is of poor quality, the City has the right to require a re-submittal of the affected sewer sections and the inspection will not be deemed complete until an acceptable video and audio recording is made, submitted to, and accepted by the City.
- N. Measurement for location of defects and actual length of pipe shall be by means of a calibrated meter on the camera with a digital readout on the video monitor. This readout shall be included in the video recording. Marking on cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Measurement will be accurate to one foot per 100 feet of inspected pipe. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the City.
- O. All inspections shall be performed by NASSCO PACP certified personnel. Use of PACP certified technicians to review/document defects in the office (post process) is not acceptable.
- P. Any structural defects found along the main line sewer and laterals shall be immediately brought to the Engineer's attention for a determination of the necessary repair.

5.3.10.5 Documentation:

- A. The inspection data shall be compatible with the City's GIS and Asset Management Systems and shall be collected with PipeTech.
- B. Television Inspection Logs: Electronic media location records shall be kept by the Contractor and shall clearly show the location, by distance in 1/10 of a foot, from the center of the starting manhole or structure to each observation during inspection. Observations shall include, but not limited to, infiltration, service connections, unusual conditions, roots, storm sewer connections, cracks, fractures, broken pipe, presence of scale and corrosion, and other discernible features, as defined in the PACP defect codes, shall be recorded on electronic media and a copy of such records shall be supplied to the City.
- C. Digital photographs of the pipe condition and all defects shall be taken by the Contractor. Photographs shall be located by distance in 1/10 of a foot, from the center of the starting manhole or structure.
- D. Electronic media recordings collected with including the digital video, images, and data files shall be created for each sewer section and lateral inspected. Files shall be submitted on DVD, flash drive, or portable hard drive. The purpose of electronic media recording shall be to supply a visual and audio record of the condition of the sewer lines that may be replayed by the City. Once recorded, the video shall become the property of the City.

5.3.10.6 The City will provide maps showing the structure and section numbers to be used.

5.3.10.7 For televising of sewer work completed under the same Contract, the Contractor will be notified in writing of any deficiencies revealed by the television inspection that will require repair, following which the Contractor shall excavate and make the necessary repairs and schedule a television re-inspection of the repaired or corrected areas. Television re-inspection shall be at the Contractor's expense.

5.3.10.8 If applicable, the Contractor may submit the post CIPP lining inspection as the Pre-Paving televising provided all other underground work is complete prior to the inspection. If the post CIPP inspection is used, the cost of inspecting those sections is incidental to the lining process and will not be paid for under separate bid items.

5.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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6 CONCRETE AND CONCRETE STRUCTURES

6.1 GENERAL

6.1.1 SUMMARY

6.1.1.1 This section describes general requirements for all concrete work.

6.1.2 RELATED SECTIONS

6.1.2.1 Section 7 – Concrete Pavement.

6.1.3 SUBMITTALS

6.1.3.1 Mix Designs: Submit proposed mix designs to Engineer ten days prior to beginning concrete work. Do not begin concrete production until mixes have been reviewed.

6.1.3.2 Product Data: Submit product data for joint filler, joint sealer, waterstops, curing compound, and other specified concrete accessories.

6.1.3.3 Reinforcement Certification: Submit fabricator's certification that reinforcement complies with the specified requirements.

6.1.3.4 Delivery Tickets: Submit delivery tickets to Engineer for each load of concrete delivered to project.

6.1.3.5 Test Reports: Submit copy of field and laboratory test results to Engineer within 24 hours of testing.

6.1.4 TESTING

6.1.4.1 The Contractor shall be responsible for testing of all concrete. Test concrete to measure slump, entrained-air content, temperature, and compressive strength to determine compliance with specifications. Furnish test apparatus and cylinders, perform on-site sampling and testing, and have compressive strength cylinders tested by a qualified laboratory.

6.1.4.2 On-site tests shall be performed under observation of Engineer unless waived. Concrete testing shall include:

- A. Slumps Test: Perform prior to concrete placement each day, and whenever there is a change in consistency of concrete.
- B. Entrained Air Test: Perform prior to concrete placement each day, and whenever there is a change in consistency of concrete.
- C. Concrete Temperature: Perform prior to concrete placement each day, and whenever there is a change in consistency of concrete.

- D. Concrete Cylinders: Made concrete cylinders daily for each mix of concrete as follows:
 - E. For every 1000 linear feet or fraction thereof of concrete curb and/or gutter, three cylinders shall be made and tested.
 - F. For the initial 100 cubic yards or fraction thereof of concrete for other uses, three cylinders shall be made and tested.
 - G. After the initial 100 cubic yards each day, for every 200 cubic yards or fraction thereof of concrete for other uses, three cylinders shall be made and tested.
 - H. If high early strength concrete is used, prepare at least two additional cylinders per high early strength location for use in determining that the required strength has been obtained for opening pavement to traffic.
- 6.1.4.3 Cure cylinders in field on top of slab, under curing blanket (if applicable).
- 6.1.4.4 Test procedures shall be in accordance with ASTM C31, C39, C143, C172, C231, and C1064.
- 6.1.4.5 At any time, the Engineer requires additional concrete tests to be performed, the Contractor shall comply. These additional tests will be at the Contractor's expense.
- 6.1.4.6 Any concrete found not to meet City requirements shall be immediately removed and replaced by the contractor at the Contractor's expense.
- 6.1.4.7 The City may perform tests to verify that concrete slump, air content, temperature, and strength meet specified requirements. However, these tests are not intended to provide Contractor with information he may need to assure that materials and workmanship meet requirements of specifications, and their performance will not relieve Contractor of responsibility of performing his own tests for that purpose.
- 6.1.4.8 Slump and Air Content Testing Evaluation:
 - A. If measured slump, air content, or temperature falls outside specified limits, immediately check another portion of same batch. In event of a second failure, the concrete shall be rejected.
- 6.1.4.9 Compressive Strength Evaluation:
 - A. All tests to be performed by an approved independent testing laboratory.
 - B. Compressive strength test shall be conducted at 7-days (one cylinder) and 28-days (two cylinders).
 - C. The average of test results for the two 28-day cylinders shall be used to determine compliance, except that neither cylinder may be less than 10 percent below required strength.

- D. If the average 28-day compressive strength is less than the specified strength, the Engineer may direct the Contractor to core the subject area to determine its structural adequacy and whether to direct removal. Cut and test cores according to AASHTO T24 as and where the Engineer directs. A certified technician shall perform and the Engineer shall observe the coring of the concrete pavement. Fill all core holes with an approved non-shrink grout, and provide traffic control during coring at the Contractor's expense.

6.1.5 WARRANTIES

- 6.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements and as follows.
- 6.1.5.2 The warranty (guarantee) period for all concrete work shall be two years from the date of Substantial Completion.
 - A. The Contractor and/or its bonding company are responsible for replacing any concrete that shows construction defects within the warranty period. (Any concrete that has been damaged after initial set shall be replaced at the Contractor's expense. Patching with epoxy or any other type of material will not be permitted.)

6.1.6 MEASUREMENT AND PAYMENT

- 6.1.6.1 Except as provided below, the City will not pay directly for the concrete specified under this section. Concrete is incidental to the various bid items using it. Payment under those bid items includes providing materials, including aggregates and associated aggregate source testing, cement, fly ash, admixtures, and other specified concrete accessories; for preparing, transporting, storing, protecting and curing concrete; and for Contractor requirements related to testing.
- 6.1.6.2 Extra Bags of Cement:
 - A. Measurement: The City will measure Engineer-requested Extra Bags of Cement by the number of extra 94-pound bags of cement acceptably added to the concrete mixture.
 - B. Payment: Payment for measured quantities will be made at the contract unit price per bag for "Extra Bags of Cement". Payment is full compensation for furnishing and mixing the extra bags of cement into the concrete mixture.

6.2 PRODUCTS

6.2.1 CONCRETE

- 6.2.1.1 Concrete shall conform to Section 501 of the Wisconsin Highway Specifications. Use air entrained concrete, Grade A, Grade A2, or Grade A-FA with Class C Fly Ash with the following modification:

A. The compressive strength of the concrete shall be a minimum of 3000 psi at 4 days and 4000 psi at 28 days.

6.2.1.2 The Engineer may designate high-early-strength concrete in locations as needed. High-early-strength concrete shall consist of one extra bag of cement per cubic yard of concrete.

6.2.1.3 The Contractor may request the use of 7-bag high-early-strength concrete, but its use shall be approved by the Engineer. All additional costs associated with the use of high-early-strength concrete as requested by the Contractor shall be at the Contractor's expense.

6.2.2 FORMS

6.2.2.1 Metal Forms:

A. Metal forms shall be of shaped steel sections. The sections shall have a length of at least 10 feet, except on curves of less than 175 feet radius, where shorter or flexible sections must be used. Metal forms shall have a depth equal to the thickness of the concrete to be placed against them. They shall not deflect more than 1/4 inch when tested as a simple beam with a span of 10 feet and a load equal to that which the finish or subgrading apparatus will put upon them. The use of bent, twisted or worn out forms will not be allowed.

B. Forms 8 inches or more in height shall be 8 inches wide at the base; forms less than 8 inches in height shall have a base width of not less than 6 inches.

C. At least three stake pockets for bracing pins or stakes shall be provided for each 10 feet of form and the bracing and support must be ample to prevent the springing of the forms under the pressure of the concrete or the weight or thrust of machinery operating on the forms.

6.2.2.2 Wood Forms:

A. To be used only in special cases with the permission and under the direction of the Engineer.

6.2.3 REINFORCEMENT

6.2.3.1 Reinforcement shall conform to Section 505 of the Wisconsin Highway Specifications.

6.2.4 JOINT FILLER AND SEALER

6.2.4.1 Joint Filler: Expansion joint filler shall conform to Section 415 of the Wisconsin Highway Specifications. Joint filler used shall be of the length, width and depth necessary to affect a full and complete separation for expansion purposes.

6.2.4.2 Joint Sealer: Shall conform to Section 415 of the Wisconsin Highway Specifications.

6.2.5 WATERSTOPS

- 6.2.5.1 If not otherwise specified in the Special Provisions, waterstops shall conform to Section 502 of the Wisconsin Highway Specifications.

6.2.6 CURING MATERIALS

- 6.2.6.1 Liquid curing compounds shall conform to the requirements of the standard specifications for Liquid Membrane-Forming Compounds for curing concrete, AASHTO M148, Type 1 or 2.
- A. Concrete pavement and concrete curb and gutter in conjunction with pavement shall be cured with an AASHTO M148, Type 2 white pigmented curing compound.
 - B. Concrete curb and gutter not in conjunction with pavement and concrete sidewalks and driveways shall be cured with an AASHTO M148, Type 1 curing compound with a white fugitive dye added.
- 6.2.6.2 Use the same curing product throughout the project for each of the above applications.

6.3 EXECUTION

6.3.1 FORMS

6.3.1.1 Setting:

- A. Forms shall be set upon the compacted base and to exact grade and alignment, for a distance of at least 300 feet in advance of the placing of the concrete. Forms shall be thoroughly cleaned and oiled before concrete is placed against them. After setting, the top of forms shall be checked with a 10 foot straightedge and any variation from that straightedge in excess on 1/8 inch shall be corrected.
- B. Particular attention shall be given to the setting of the forms and forming of the slabs at the outer edges to insure adequate drainage and freedom from depressions which may hold water.

6.3.1.2 Form Time:

- A. Pavement and curb and gutter forms shall be left in place until the concrete they enclose is at least 15 hours old, and of sufficient strength. If a machine is used for slip-forming the pavement and/or curb and gutter, or if the forms are removed after 6 hours with the permission of the Engineer, all exposed surfaces shall be cured in accordance with Subsection 415.3.12 of the Wisconsin Highway Specifications.

- B. The method of removing forms shall be such as will not damage the concrete. Any voids or rock pockets of more than casual occurrence found after the forms are removed shall be filled immediately with a well-mixed grout, composed of 1 part of Portland Cement and 3 parts of fine aggregate for concrete masonry. Sidewalk forms shall be left in place until the concrete they enclose is at least 6 hours old.

6.3.2 PLACING CONCRETE

- 6.3.2.1 Mix, deliver, and place concrete in accordance with the requirements of Sections 415 and 501 of the Wisconsin Highway Specifications except as modified in this Specification.

6.3.3 CURING OF CONCRETE

- 6.3.3.1 Unless otherwise provided in the contract, all concrete surfaces shall be cured by the impervious coating method.
- 6.3.3.2 As soon after finishing operations as the free water has disappeared, the concrete surface shall be sealed by spraying on it a uniform coating of curing material in such a manner as to provide a continuous water impermeable film on the entire concrete pavement surface.
- 6.3.3.3 In order to insure uniform consistency and dispersion of pigment in the curing material, it shall be well agitated in the supply drum immediately before transfer to the distributor and kept thoroughly agitated during application. The curing compound shall be applied at a rate of not less than 1 gallon per 200 square feet of surface area.
- 6.3.3.4 The curing compound may be applied in either one or two applications in accordance with the directions of the manufacturer. However, if applied in two coatings, the second shall be applied not later than 30 minutes after the first. In the event the coating is damaged within 72 hours after being applied due to joint sawing or otherwise, the affected areas shall be recoated without delay and at the same rate as prescribed above for the original application.
- 6.3.3.5 Type 2 white pigmented curing compound shall be applied by means of power spraying equipment. Should the spraying equipment fail and duplicate spraying equipment is not immediately available, further placing of concrete shall be suspended until properly operating spray equipment is provided and the portion of finished concrete not satisfactorily coated with the curing compound shall be cured by other means satisfactory to the Engineer.
- 6.3.3.6 Type 1 curing compound may be applied with a hand operated sprayer.

6.3.4 IDENTIFICATION MARK STAMP

- 6.3.4.1 An approved stamp or inlaid metal plate shall be placed in all walks, curb and gutter, and pavements constructed in the City.
- 6.3.4.2 In walk and curb and gutter construction, the stamp shall be placed every 150 feet or fraction thereof constructed.
- 6.3.4.3 In pavement construction, the stamp shall be placed at the beginning and end of every day's pour.
- 6.3.4.4 Stamps shall be placed as directed by the Engineer.

6.3.5 PROTECTION OF CONCRETE

- 6.3.5.1 Erect and maintain suitable barricades and employ personnel, if required by the Engineer, to exclude traffic from the newly constructed pavement for the period herein prescribed. Such barriers shall be so arranged as to not, in any way, interfere with or impede public traffic on any lane intended to be kept open. Signs and lights shall be maintained, if necessary, to clearly indicate the lanes open to the public. When it is necessary to provide for traffic across the pavement, construct suitable and substantial crossings to bridge over the concrete which will be adequate for the traffic, and satisfactory to the Engineer. Any part of the pavement damaged by traffic or other causes occurring prior to its final acceptance shall be immediately repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer. Protect the pavement against both public traffic and the traffic caused by construction activities.
- 6.3.5.2 Fresh concrete shall be protected from rain wherever necessary by tarpaulins, waterproof paper, or other suitable means. No concrete shall be walked on or in any way defaced after being placed until it has thoroughly set to the satisfaction of the Engineer. Concrete found to be defaced shall be immediately removed and replaced at the expense of the Contractor in a manner satisfactory to the Engineer.

6.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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7 CONCRETE PAVEMENT

7.1 GENERAL

7.1.1 SUMMARY

7.1.1.1 This section describes:

- A. Furnishing and placing concrete pavement.
- B. Furnishing and placing concrete curb and gutter.
- C. Furnishing and placing concrete sidewalk, including curb ramps and drives.

7.1.2 RELATED SECTIONS

- 7.1.2.1 Section 4 – Earthwork, Excavation, and Boring: For subgrade preparation and crushed aggregate base course placement.
- 7.1.2.2 Section 5 – Sewers and Sewer Structures: For manhole and inlet final grade adjustments.
- 7.1.2.3 Section 6 – Concrete and Concrete Structures: For general concrete requirements.

7.1.3 SUBMITTALS

- 7.1.3.1 Product Data: Submit product data for detectable warning fields.
- 7.1.3.2 Smoothness Profiling Test Results: Submit documentation report for concrete roadway smoothness profiling.

7.1.4 TESTING

- 7.1.4.1 Roadway Base Course Proof-Rolling:
 - A. Proof-roll prepared roadway base course as specified in the "Preparation" article, below, before placing concrete materials.
- 7.1.4.2 Concrete Mixture Testing: Concrete mixture testing shall comply with the requirements of Section 6 – Concrete and Concrete Structures.
- 7.1.4.3 Concrete Smoothness Testing:

- A. Concrete Pavement: Test the pavement surface at Engineer-selected locations with a 10-foot straightedge or other Engineer-specified device. The Engineer may direct the Contractor to mark and grind down areas showing high spots greater than 1/8 inch but not exceeding 1/2 inch in 10 feet. Grind until there are no deviations greater than 1/8 inch when retested with the straightedge. The Engineer may direct the Contractor to remove and replace areas with deviations greater than 1/2 inch in 10 feet. If required, grinding or removal shall comply with the requirements of Section 415 of the Wisconsin Highway Specifications.
 - B. Concrete Curb and Gutter: Before performing the final surface finish, check the curb and gutter surface with a 10-foot straightedge, and correct areas that vary 1/4 inch from the testing edge by adding or removing concrete while the concrete is still plastic.
 - C. Concrete Sidewalk, Curb Ramps, and Drives: Before performing the final surface finish, check the sidewalk, ramp, or drive surface with a 10-foot straightedge, and correct areas that vary 1/4 inch from the testing edge by adding or removing concrete while the concrete is still plastic.
- 7.1.4.4 Concrete Roadway Smoothness Profiling: When the applicable bid item is included in the Schedule of Prices, perform profile testing on designated roadways in accordance with Section 440.3 of the Wisconsin Highway Specifications. Correct pavement areas not complying with the specified requirements.

7.1.5 WARRANTIES

- 7.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements and as follows.
- 7.1.5.2 The warranty (guarantee) period for all concrete work shall be two years from the date of Substantial Completion.
 - A. The Contractor and/or its bonding company are responsible for replacing any concrete that shows construction defects within the warranty period. (Any concrete that has been damaged after initial set shall be replaced at the Contractor's expense. Patching with epoxy or any other type of material will not be permitted.)

7.1.6 MEASUREMENT AND PAYMENT

7.1.6.1 (depth) Concrete Pavement:

- A. Measurement: The City will measure (depth) Concrete Pavement by the square yard acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "(depth) Concrete Pavement". Payment is full compensation for furnishing all new materials, including concrete, reinforcing tie bars (if shown or specified), and concrete accessories; for constructing pavement, including hand forming where required; and for disposing of surplus materials.

7.1.6.2 (depth) Doweled Concrete Pavement:

- A. Measurement: The City will measure (depth) Doweled Concrete Pavement by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "(depth) Doweled Concrete Pavement". Payment is full compensation for furnishing all new materials, including concrete, dowels, tie bars, other reinforcing (if shown or specified), and concrete accessories; for constructing pavement, including hand forming where required; and for disposing of surplus materials.

7.1.6.3 (width and type) Concrete Curb & Gutter:

- A. Measurement: The City will measure (width and type) Concrete Curb & Gutter by the linear foot acceptably completed. Measurement will be along the base of the curb face or along the flow line of the gutter, and such measurement will be continuous along such line extended across driveway and alley entrance returns. No deduction in length will be made for drainage structures installed in the curbing such as catch basins, drop inlets, etc.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(width and type) Concrete Curb & Gutter". Payment is full compensation for sawcutting at the limits; for furnishing all new materials, including concrete, reinforcing (if shown or specified), and concrete accessories; for constructing curb and gutter, including hand forming where required; and for disposing of surplus materials.

7.1.6.4 (depth) Concrete Sidewalk:

- A. Measurement: The City will measure (depth) Concrete Sidewalk by the square foot acceptably completed.
- B. Payment: Payment will be made at the contract unit price per square foot for "(depth) Concrete Sidewalk". Payment is full compensation for sawcutting at the limits; for furnishing all new materials, including concrete and concrete accessories; for constructing walks and curb ramps; and for disposing of surplus materials.

7.1.6.5 (depth) Concrete Sidewalk & Drive:

- A. Measurement: The City will measure (depth) Concrete Sidewalk & Drive by the square foot acceptably completed.
- B. Payment: Payment will be made at the contract unit price per square foot for "(depth) Concrete Sidewalk & Drive". Payment is full compensation for sawcutting at the limits; for furnishing all new materials, including concrete and concrete accessories; for constructing walks and drive approaches; and for disposing of surplus materials.

7.1.6.6 Pedestrian Curb:

- A. Measurement: The City will measure Pedestrian Curb by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Pedestrian Curb". Payment is full compensation for sawcutting at the limits; for furnishing all new materials, including concrete and concrete accessories; for constructing curb, including hand forming where required; and for disposing of surplus materials.

7.1.6.7 Curb Ramp Detectable Warning Fields:

- A. Measurement: The City will measure Curb Ramp Detectable Warning Fields by the square foot acceptably completed.
- B. Payment: Payment will be made at the contract unit price per square foot for "Curb Ramp Detectable Warning Fields". Payment is full compensation for furnishing and installing detectable warning fields.

7.1.6.8 Concrete Pavement Removal and Replacement:

- A. Measurement: The City will measure Concrete Pavement Removal and Replacement by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Concrete Pavement Removal and Replacement". Payment is full compensation for sawcutting at the limits; for removing existing concrete, asphalt, and other materials; for furnishing all new materials, including crushed aggregate base course, concrete, reinforcing, and concrete accessories; for preparing the foundation; for constructing pavement; and for disposing of debris and surplus materials.

7.1.6.9 Concrete Curb & Gutter Removal and Replacement:

- A. Measurement: The City will measure Concrete Curb & Gutter Removal and Replacement by the linear foot acceptably completed. Measurement will be along the base of the curb face or along the flow line of the gutter, and such measurement will be continuous along such line extended across driveway and alley entrance returns. No deduction in length will be made for drainage structures installed in the curbing such as catch basins, drop inlets, etc.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Concrete Curb & Gutter Removal and Replacement". Payment is full compensation for sawcutting at the limits; for removing existing curb and gutter and other materials; for furnishing all new materials, including crushed aggregate base course, concrete, reinforcing (if shown or specified), concrete accessories, and turf restoration materials; for preparing the foundation; for constructing curb and gutter; for restoring the disturbed turf areas; and for disposing of debris and surplus materials.

7.1.6.10 Concrete Sidewalk Removal and Replacement:

- A. Measurement: The City will measure Concrete Sidewalk Removal and Replacement by the square foot acceptably completed.
- B. Payment: Payment will be made at the contract unit price per square foot for "Concrete Sidewalk Removal and Replacement". Payment is full compensation for sawcutting at the limits; for removing existing sidewalk and other materials; for furnishing all new materials, including foundation material, concrete, concrete accessories, and turf restoration materials; for preparing the foundation; for constructing sidewalks; for restoring the disturbed turf areas; and for disposing of debris and surplus materials.

7.1.6.11 Concrete Roadway Smoothness Profiling:

- A. Measurement: The City will measure Concrete Roadway Smoothness Profiling by the linear foot of roadway acceptably profiled, measured along the roadway centerline or reference line. Measurement will not be made for each wheel track of each lane profiled.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Concrete Roadway Smoothness Profiling". Payment is full compensation for furnishing and operating the profiler; and for documenting and reporting profile results. Correcting the final surface, if required, and re-profiling corrected segments will be the Contractor's expense.

7.2 PRODUCTS

7.2.1 CONCRETE MATERIALS

- 7.2.1.1 Concrete materials and mixes shall comply with the requirements of Section 6 – Concrete and Concrete Structures.

7.2.2 DETECTABLE WARNING FIELDS

- 7.2.2.1 Neenah Foundry 2-foot x 2-foot quick concrete or 2-foot x 4-foot solid panels in construction yellow, or approved equivalent.

7.3 EXECUTION

7.3.1 PREPARATION

- 7.3.1.1 Prior to the placing of concrete, the crushed aggregate base course shall be proof-roll with a fully loaded tandem-axle dump truck. Any soft, spongy, or otherwise unsuitable areas shall be remedied as required in Section 4 – Earthwork, Excavation, and Boring.
- 7.3.1.2 Manhole and catch basin frames, valve boxes, and similar existing structures within the area to be paved shall be adjusted by the Contractor to come flush with the pavement surface, regardless of the amount of said adjustment. Comply with the requirements of Section 5 – Sewers and Sewer Structures and the Special Provisions.

7.3.2 CONCRETE PAVEMENT

7.3.2.1 General:

- A. Construct concrete pavement in accordance with Section 415 of the Wisconsin Highway Specifications and the following requirements.

7.3.2.2 Construction Methods:

- A. Construct concrete pavement with the width, thickness, and crown shown on the Plans. Joint construction and spacing shall be as detailed.
- B. Where abutting existing pavement, drilled bars shall be spaced at 15 inches on-center for a 12-foot lane and 12 inches on-center for an 11-foot lane for transverse joints. For the joints parallel to the centerline the spacing shall be 3 feet on-center. The hole for the tie bar shall be drilled to a depth of 7 inches and to a diameter as to provide a tight driven fit.
- C. Finish the concrete pavement first with a broom and then with an artificial turf drag according to Section 415.3.8.2 or the Wisconsin Highway Specifications.
- D. Test and, if necessary, correct the surface of the concrete pavement as specified under the "Testing" article, above.

- E. If sanitary and storm sewer structures cannot be set to proper elevation and slope without the use of shims and according to the requirements of Section 05 – Sewers and Sewer Structures, then the concrete pavement shall be “boxed out” with forms to nearest longitudinal and transverse joint. The entire concrete panel or panels shall be left out around the structure to the preplanned joint locations. The final placement of the slabs shall be coordinated with cure times and planned access routes for installation of concrete.
- F. Concrete paving shall not occur until all underground utility work is complete.

7.3.2.3 Opening to Traffic:

- A. Traffic shall be excluded from the newly constructed pavement for a period of 4 equivalent curing days after the concrete is placed or when the compressive strength reaches 3000psi. The pavement may be opened to traffic prior to the expiration of the 4-day period if the provisions of Section 415.3.15 of the Wisconsin Highway Specifications are met.

7.3.2.4 Concrete Pavement Removal and Replacement:

- A. Under the Concrete Pavement Removal and Replacement bid item, do the following.
- B. Sawcut the work limits, remove old concrete, asphalt, and other existing materials, clean up all debris, do any grading, and furnish all crushed aggregate base course needed to prepare the foundation. The foundation or material underlying the proposed pavement shall be compacted thoroughly and finished to a firm, true surface. The foundation shall be thoroughly moistened immediately prior to placing of the concrete. Removal of existing materials and grading shall include the removing and grubbing of roots where necessary to 2 inches below the subgrade.
- C. Where abutting existing pavement, drilled bars shall be spaced at 15 inches on-center for a 12-foot lane and 12 inches on-center for an 11-foot lane for transverse joints. For joints parallel to the centerline the spacing shall be 3 feet on-center. The hole for the tie bar shall be drilled to a depth of 7 inches and to a diameter as to provide a tight driven fit.
- D. If the Contractor should in any way damage the pavement adjacent to the pavement being replaced during the course of removal, the Contractor shall replace at its own expense the entire section or sections to which damage was done.

7.3.3 CONCRETE CURB AND GUTTER

7.3.3.1 General:

- A. Construct concrete curb and gutter in accordance with Section 601 of the Wisconsin Highway Specifications and the following requirements.

7.3.3.2 Preparation of Foundation:

- A. The foundation or material underlying the proposed curb and gutter shall be compacted thoroughly and finished to a firm, true surface. The foundation shall be thoroughly moistened immediately prior to placing of the concrete.

7.3.3.3 Forming and Placing:

- A. The profile of the curb and gutter shall conform to the Plan details.
- B. Any area around a tree that has a root zone that conflicts with the normal curb machine clearance must be hand-formed for a distance determined in the field by the City Forester (typically 10 to 15 feet). No notching, scraping or excess root removal in order to get the curb machine past the tree will be allowed.

7.3.3.4 Joints:

A. Expansion Joints:

1. If constructing curb, gutter, or curb and gutter next to asphaltic pavement, locate joints everywhere that tangent and radial curb, or curb and gutter meet; on each side of every inlet 3 feet from the inlet, but no closer than 6 feet from another joint; and on tangent sections place between 6 feet and 300 feet.
2. If constructing curb, gutter, or curb and gutter next to concrete pavement constructed with expansion joints, then place expansion joints to match the expansion joint locations in the pavement.
3. Set joints at right angles to the face of the curb and at right angles to the flow line and surface of gutters. Use 1-inch wide joint filler.
4. Place a 1/2-inch expansion joint, filled with joint filler, between the backs of all curbs and abutting the sidewalk and driveways.

B. Contraction Joints:

1. Place contraction joints constructed next to asphaltic pavement at a maximum of 20 feet on-center.
2. Place contraction joints constructed next to concrete pavement to match the joints in the pavement.

7.3.3.5 Smoothness:

- A. The top and face of the curb and also the top of the apron on combined curb and gutter shall be finished true to line and grade and without any irregularities of surface noticeable to the eye. The gutter shall not deviate from the proposed line and grade more than 1/4 of an inch, nor shall any portion of the surface or face of the curb or gutter depart more than 1/4 of an inch from a straightedge 10 feet in length when placed on the curb parallel to the centerline of the street, nor shall any part of the exposed surfaces present a wavy appearance.

7.3.3.6 Finish:

- A. For the final finishing operations, the surface shall be lightly broomed perpendicular to the direction of travel. The broom shall be a fine haired broom. The brooming shall be done at the proper time to provide brush marks the full surface of the curb and gutter without picking up excessive sand and cement. The broom shall be maintained in good usable condition.

7.3.3.7 Backfilling:

- A. Immediately upon removal of forms, curb or curb and gutter shall be backfilled to a minimum width of 12 inches and to within 4 inches of the top of the curb and flush with the top of the flange. If a machine is used for forming the curb or curb and gutter, or if the forms are removed after 6 hours with the permission of the Engineer, all exposed surfaces shall be cured as specified.

7.3.3.8 Protection:

- A. Traffic shall be excluded from the newly constructed curb and gutter for a period of 4 equivalent curing days after the concrete is placed or longer if, in the opinion of the Engineer, weather conditions make it advisable to extend this time. The pavement may be opened to traffic prior to the expiration of the 4-day period if the provisions of Section 415.3.15 of the Wisconsin Highway Specifications are met.

7.3.3.9 Concrete Curb & Gutter Removal and Replacement:

- A. Under the Concrete Curb & Gutter Removal and Replacement bid item, do the following.
- B. Sawcut the work limits, remove old concrete and other existing materials, clean up all debris, do any grading, and furnish all crushed aggregate base course needed to prepare the foundation. The foundation or material underlying the proposed curb and gutter shall be compacted thoroughly and finished to a firm, true surface. The foundation shall be thoroughly moistened immediately prior to placing of the concrete. Removal of existing materials and grading shall include the removing and grubbing of roots where necessary to 2 inches below the subgrade.

- C. Topsoil and seed all areas disturbed by the construction of curb and gutter replacement immediately after the removal of the forms. Comply with the requirements of Section 14 – Site Improvements and Restoration.
- D. If the Contractor should in any way damage the curb and gutter adjacent to the curb and gutter being replaced during the course of removal, the Contractor shall replace at its own expense the entire section or sections to which damage was done.

7.3.4 CONCRETE SIDEWALK

7.3.4.1 General:

- A. Construct concrete sidewalk, including curb ramps and drives, in accordance with Section 602 of the Wisconsin Highway Specifications and the following requirements.

7.3.4.2 Preparation of Foundation:

- A. The foundation or material underlying the proposed sidewalk shall be compacted thoroughly and finished to a firm, true surface. The foundation shall be thoroughly moistened immediately prior to placing of the concrete.

7.3.4.3 Forming and Placing:

- A. All sidewalks shall not be less than 5 feet in width, except where there are existing standard concrete sidewalks of different widths, in which case the new sidewalks shall conform to the width of the existing standard sidewalk as determined by the Engineer.
- B. All new concrete sidewalk and all sidewalk replacement shall be placed to have a minimum thickness of 4 inches and a slope perpendicular and toward the centerline of the road of 1.5 percent. In areas where new sidewalks are being installed and the location of driveways and alley lines can be determined and where concrete sidewalk is being replaced across driveways and alleys, the sidewalk shall have a minimum thickness as indicated below for driveway approaches.
- C. Sidewalk shall be constructed by a Contractor who is bonded to perform such work in the City of Waukesha.
- D. When spread on the base course, concrete shall be consolidated until a free mortar appears on the surface and the shall be surface trowel finished and broomed.
- E. Existing concrete carriage walks (between the sidewalk and curb and gutter) shall be replaced if requested in writing by the property owner.

7.3.4.4 Joints:

- A. Expansion Joints: A 1/2-inch transverse expansion joint filler shall be placed opposite each side of driveways, opposite each side of alley crossings, and at intervals not to exceed 60 feet. Sidewalks in business districts shall be separated from abutting buildings by a 1 inch expansion joint filler.
- B. Contraction Joints:
 - 1. All contraction joints in concrete sidewalks shall be constructed by the use of a double edger or groover with a minimum size being 6 inches wide, 8 inches long, and having a tongue depth of 1 inch and a tongue width of 1/4 inch at the top.
 - 2. For sidewalk of uniform width, transverse joints shall be constructed at right angles to the centerline of the sidewalk. Where required, longitudinal joints shall be constructed parallel to the centerline of the walk, unless otherwise provided. The transverse and longitudinal joints shall be at right angles to each other insofar as feasible, and the joints shall be constructed as laid out in the field by the Engineer.
 - 3. Align sidewalk and driveway approach joints if possible. Sidewalk joints shall not be spaced more than 6.5 feet, and shall not be less than 2.5 feet, on a 5-foot wide standard sidewalk.

7.3.4.5 Smoothness:

- A. The surface of the sidewalk shall be true to line and grade and without any irregularities of surface noticeable to the eye. The sidewalk shall not deviate from the proposed line and grade more than 1/4 of an inch, nor shall any portion of the surface depart more than 1/4 of an inch from a straightedge 10 feet in length when placed on the surface in any direction.

7.3.4.6 Finishing:

- A. For the final finishing operation, the surface shall be lightly broomed perpendicular to direction of travel. The broom shall be a fine haired push broom. The broom shall be dragged across the full width of the sidewalk. Brooming shall be done at the proper time to provide brush marks across the full width of the sidewalk without picking up excessive cement or sand. The broom shall be maintained in good usable condition.

7.3.4.7 Backfilling:

- A. After removal of forms, dirt shall be immediately backfilled against the new concrete to a minimum width of 12 inches.

7.3.4.8 Protection:

- A. After the walk is completed, it shall be kept moist and protected from both traffic and the weather for 3 days or longer if the weather conditions are such as to require it. Where sidewalk is constructed across driveways, it shall be kept moist and protected from both vehicular traffic and the weather for 4 equivalent curing days, or longer if the weather conditions are such as to require it.

7.3.4.9 Concrete Sidewalk Removal and Replacement:

- A. Under the Concrete Sidewalk Removal and Replacement bid item, do the following.
- B. Sawcut the work limits, remove old concrete and other existing materials, clean up all debris, do any grading, and furnish all granular materials (crushed gravel or bankrun sand) needed to prepare the foundation. The foundation or material underlying the proposed sidewalk shall be compacted thoroughly and finished to a firm, true surface. The foundation shall be thoroughly moistened immediately prior to placing of the concrete. Removal of existing materials and grading shall include the removing and grubbing of roots where necessary to 2 inches below the subgrade.
- C. Topsoil and seed all areas disturbed by the construction of sidewalk replacement immediately after the removal of the forms. Comply with the requirements of Section 14 – Site Improvements and Restoration.
- D. If the Contractor should in any way damage the sidewalk adjacent to the walk being replaced during the course of removal, the Contractor shall replace at its own expense the entire section or sections to which damage was done.

7.3.4.10 Curb Ramps:

- A. Curb ramps shall be constructed where shown on the Plans or directed by the Engineer. Curb ramps shall conform to the Detail Drawings included in the Plans. The Contractor shall make sure each ramp complies with regulations before it is poured. All curb ramps constructed shall have a detectable warning field.
- B. At intersections on this project where there are no curb ramps or where existing curb ramps do not meet current standards, the Contractor shall construct a new curb ramp by replacing sections of curb and gutter, turf and walk, as directed by the Engineer.
- C. In order to achieve the acceptable slope the adjacent walk may be lowered, which will then require additional grading and or filling adjacent to the walk and in the terrace area. Contractor shall typically set ADA ramp slope greater than 1.5%, but less than 8%, to minimize sidewalk removal and replacement distances. The City will not stake grades for ADA ramps.

- D. At curb ramps where obstacles behind the walk (i.e., walls, landscaping) will limit grading, the use of a variable height (Pedestrian) curb will be utilized. A detail for this curb is shown on the Detail Drawings included in the Plans.
- E. For the final finishing operations, the curb ramp surface shall be lightly broomed perpendicular to the direction of travel.

7.3.4.11 K. Concrete Driveways:

- A. Drive approaches within the project limits shall be replaced. Unless otherwise indicated, residential drives and alleys shall be 6-inch thick concrete and non-residential drives and alleys shall be 7-inch thick concrete. The drive approach so constructed shall conform to the “Typical Detail of Standard Drive Approach”. All drive approaches are to be placed on 4 inches of compacted crushed aggregate base course.
- B. All new walk necessary across driveways shall match the thickness specified for drive approaches above.
- C. Portions of concrete driveways behind the walk may be removed as directed by the Engineer and replaced. Unless otherwise indicated, base course and concrete shall be of the thicknesses indicated above for drives approaches.
- D. For the final finishing operations, the drive surface shall be lightly broomed perpendicular to the direction of travel, except taper sections of the approaches may be broomed parallel with the direction of travel.

7.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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8 HMA PAVEMENT

8.1 GENERAL

8.1.1 SUMMARY

8.1.1.1 This section describes:

- A. Furnishing and placing hot mix asphalt (HMA) pavement.
- B. Milling of existing asphalt pavement.
- C. Pavement crack sealing.

8.1.2 RELATED SECTIONS

- 8.1.2.1 Section 4 – Earthwork, Excavation, and Boring: For subgrade preparation and crushed aggregate base course placement.
- 8.1.2.2 Section 5 – Sewers and Sewer Structures: For manhole and inlet final grade adjustments.

8.1.3 SUBMITTALS

8.1.3.1 Asphalt Design Mix:

- A. Prior to construction, submit to the Engineer a report prepared by a current WisDOT approved testing laboratory which shall include:
 - 1. A proposed mix design utilizing bituminous material and mineral aggregate material which the Contractor intends to use in the execution of the contract. Separate test designs shall apply to binder course and wearing course mixtures. This design shall conform to the Wisconsin Highway Specifications.
 - 2. A complete sieve analysis of aggregate to be employed in the execution of the contract.
 - 3. Test information indicating performance of the design mix including specific gravity compaction data.
- B. This data shall be presented to the Engineer for approval not less than two (2) weeks prior to beginning work.
- C. The Contractor shall strictly adhere to the approved design mix while carrying out the contract. The mix for surface or binder course shall not be altered from the approved design without written approval of the Engineer.

- 8.1.3.2 Asphalt Equipment Data: At the Engineer's request, submit a list of all equipment to be used for this contract, stating name, year of manufacture, capacity, and location. At the Engineer's request, furnish a certificate of inspection from the manufacturers of the mixing machine, laying machine, and rollers to be used, which will guarantee that said equipment is in good operating order.
- 8.1.3.3 Asphalt Test Reports: Submit asphalt quality control testing results as specified in the "Testing" article, below.
- 8.1.3.4 Smoothness Profiling Test Results: Submit documentation report for HMA roadway smoothness profiling.
- 8.1.3.5 Pavement Repair Membrane Product Data: Submit product data for pavement repair membrane.
- 8.1.3.6 Crack Filling Sealant Product Data: Submit product data for crack filling sealant.

8.1.4 TESTING

- 8.1.4.1 Roadway Base Course Proof-Rolling:
 - A. Proof-roll prepared roadway base course as specified in the "Asphalt Pavement" article, below, before placing asphalt materials.
- 8.1.4.2 Asphalt Quality Control: A quality control program is defined as all activities, including mix design, process control inspection, sampling and testing, and necessary adjustments in the process that are related to the production of a HMA pavement which meets the requirements of the specifications.
 - A. Plant Testing: The Contractor shall provide and maintain a quality control program according to the State of Wisconsin Quality Management Program (QMP) for HMA pavement. QMP testing shall be in accordance with the Section 460.2.8 of the Wisconsin Highway Specifications with the following exception: *The Contractor shall test material from the plant at least once per day, and shall provide the Engineer with the test results within 24 hours of testing completion.*
 - B. Field Testing: During the placement of the lower and surface courses of HMA pavement, the Contractor shall provide Nuclear Density Testing of the pavement. Tests shall be according to Section 460.3.3 of the Wisconsin Highway Specifications with the following exception: *Random testing schedule shall be one test per 100-Tons of HMA pavement placed within a single layer. The Contractor shall provide the Engineer with the test results within 24 hours of testing completion.*
- 8.1.4.3 Asphalt Surface Tolerance Testing: The Contractor shall measure the asphalt surface tolerance at street structures as specified in the "Asphalt Pavement" article, below.

- 8.1.4.4 Asphalt Smoothness Testing: The Contractor shall measure the smoothness of asphalt as specified in the "Asphalt Pavement" article, below.
- 8.1.4.5 HMA Roadway Smoothness Profiling: When the applicable bid item is included in the Schedule of Prices, perform profile testing on designated roadways in accordance with Section 440.3 of the Wisconsin Highway Specifications. Correct pavement areas not complying with the specified requirements.
- 8.1.4.6 Asphalt Thickness Testing: For asphalt pavement paid for on a square yard basis, the City will measure the asphalt thickness as specified in the "Asphalt Pavement" article, below.

8.1.5 WARRANTIES

- 8.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements and as follows.
- 8.1.5.2 Asphalt Pavement: The warranty (guarantee) period for all asphalt pavement work shall be two years from the date of Substantial Completion. Pavement deficiencies found during the warranty period shall be addressed as follows:
 - A. All paving joints (longitudinal and transverse) that open shall be routed and crack sealed as determined by the Engineer.
 - B. All pre-mature cracks shall be crack sealed or routed and crack sealed as determined by the Engineer.
 - C. Any other pavement irregularities shall be addresses in a method approved by the Engineer.
- 8.1.5.3 Pavement Crack Sealing: The warranty (guarantee) period for all crack sealing work shall be three years from the date of Substantial Completion.
 - A. This guarantee shall consist of replacing (following the requirements of this Specification) the crack sealing material if it pulls out of the crack or if the sealed crack opens.

8.1.6 MEASUREMENT AND PAYMENT

8.1.6.1 HMA Pavement (mixture type):

- A. Measurement: The City will measure HMA Pavement (mixture type) by the ton as specified in Section 450.4 of the Wisconsin Highway Specifications.

- B. Payment: Payment for measured quantities will be made at the contract unit price per ton for "HMA Pavement (mixture type)". Payment is full compensation for furnishing and placing HMA pavement, including binder, prime coat, and tack coat; for mixture design; for preparing the foundation; for adjusting street structures; for mobilizing for the various courses required; for milling of binder course wedges, sweeping, and other binder course preparation; and for quality control, surface tolerance, and straightedge smoothness testing.

8.1.6.2 Milling Existing Asphalt Roadway - (depth):

- A. Measurement: The City will measure Milling Existing Asphalt Roadway - (depth) by the square yard of pavement acceptably milled to the average depth specified.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Milling Existing Asphalt Roadway - (depth)". Payment is full compensation for milling the pavement, providing temporary asphalt ramps as needed, and clean up and removal of the milled material.

8.1.6.3 Foundation Preparation:

- A. Measurement: The City will measure Foundation Preparation by the square yard acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Foundation Preparation". Payment is full compensation for removing any materials that has become loose from milled surfaces prior to overlay paving.

8.1.6.4 Pavement Repair Membrane:

- A. Measurement: The City will measure Pavement Repair Membrane by the square yard acceptably placed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Pavement Repair Membrane". Payment is full compensation for furnishing all materials; for cleaning, drying, and filling cracks; and for preparing the pavement surface and placing the repair membrane.

8.1.6.5 Pavement Crack Sealing:

- A. Measurement: The City will measure Pavement Crack Sealing by the ton of sealant acceptably placed.

1. The Contractor shall store all crack filling sealant at the City DPW garage at 300 Sentry Drive. Each day the Contractor shall verify the weight of the empty truck prior to first load, the truck with first load, and the truck after the final load of the day using the scale at the DPW garage. The City reserves the right to ask for additional verified loads.
 2. The Contractor shall keep the Engineer apprised of the total amount of crack filling sealant used on a daily basis.
- B. Payment: Payment for measured quantities will be made at the contract unit price per ton for "Pavement Crack Sealing". Payment is full compensation for traffic control, routing cracks to be sealed, cleaning and drying routed cracks, furnishing the specified sealant, filling and squeegeeing cracks with sealant, furnishing and installing blotting material, and cleaning the pavement surface after filling the cracks.

8.1.6.6 HMA Roadway Smoothness Profiling:

- A. Measurement: The City will measure HMA Roadway Smoothness Profiling by the linear foot of roadway acceptably profiled, measured along the roadway centerline or reference line. Measurement will not be made for each wheel track of each lane profiled.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "HMA Roadway Smoothness Profiling". Payment is full compensation for furnishing and operating the profiler; and for documenting and reporting profile results. Correcting the final surface, if required, and re-profiling corrected segments will be the Contractor's expense.

8.2 PRODUCTS

8.2.1 ASPHALT MATERIALS

- 8.2.1.1 Hot mix asphalt shall conform to Sections 450, 455, and 460 of the Wisconsin Highway Specifications except as modified in this Specification.
- 8.2.1.2 The mixture type(s) required shall be as designated on the Drawings or in the Special Provisions.

8.2.2 PAVEMENT REPAIR MEMBRANE

- 8.2.2.1 Rubberized asphalt impregnated non-woven polypropylene fabric; Propex "Petrotac", or approved equivalent.

8.2.3 CRACK FILLING SEALANT

- 8.2.3.1 Sealant shall be a premium quality rubber asphalt joint sealer complying with the requirements of ASTM D6690.

8.3 EXECUTION

8.3.1 ASPHALT PAVEMENT

8.3.1.1 General:

- A. A pre-paving meeting shall be held with the Paving Contractor, the General Contractor, and the City prior to paving to review paving procedures (i.e., to minimize cold joints).
- B. Pavement courses shall be placed on separate days unless approved by the Engineer. No claim for additional Mobilization costs, delay, or other contract time extensions will be allowed even if the Contract Deadline has expired.
- C. All landscaping and concrete pavement, curb and gutter, and sidewalks shall be completed before the surface course is placed.

8.3.1.2 Equipment:

- A. The equipment furnished and use for the work required shall conform to equipment described in Section 450.3.1 of the Wisconsin Highway Specifications.
- B. Compaction Equipment:
 - 1. Compaction equipment shall, at all times, include two self-propelled steel drum rollers and may include one self-propelled pneumatic-tired roller, of the type specified, when placing binder courses.
 - 2. Compaction equipment shall, at all times, include two self-propelled steel drum rollers, of the type specified, when placing surface courses.
- C. Scales: The City reserves the right to have any load of material delivered to a truck scale to check the weight of the load. No claim for loss or delay will be allowed on this account.

8.3.1.3 Construction Methods:

- A. Prior to the placing of a prime coat, the crushed aggregate base course shall be proof-roll with a fully loaded tandem-axle dump truck. Any soft, spongy, or otherwise unsuitable areas shall be remedied as required in Section 4 – Earthwork, Excavation, and Boring.
- B. A prime coat, of the type designated by the Engineer, shall be applied to the crushed aggregate base course at a rate of at least 0.2 of a gallon per square yard but not to exceed 0.5 of a gallon per square yard. Prime coat application dates shall follow restrictions in NR 422.16. The cost of the prime coat is to be included in the unit bid price of HMA pavement.

- C. Prior to placement of the lower course, all butt joints shall be inspected to assure a clean edge. If the edge has deteriorated, it shall be re-saw cut. The re-sawing of a butt joint at the pavement limits will not be paid for.
- D. Prior to the placement of the binder course all street structures (manholes, water valves, etc.) shall be adjusted to finished binder grade or within minus 1-1/2 inches of finished binder grade.
- E. Asphalt mixtures shall be laid only on a prepared, firm and compacted base or foundation course, which is substantially surface-dry and free of loose and foreign material.
- F. Asphalt mixtures shall not be placed over frozen subgrade or base or where the roadbed underlying the foundation or base is temporarily unstable from the effects of frost heaving.
- G. Asphalt mixtures shall not be placed when it is raining or snowing and any mixture exposed to rain or snow before final rolling which has, in the judgment of the Engineer, been adversely affected thereby shall be removed and replaced at the Contractor's expense.
- H. Asphalt mixtures shall not be placed when the air temperature approximately 3 feet above ground at the site of the work, in the shade and away from the effects of artificial heat is less than 40°F, except that binder course mixtures may be placed at a lesser temperature when approved by the Engineer.
- I. Asphalt mixture which, in the judgment of the Engineer, is not sufficiently mixed or is defective in any manner shall be rejected.
- J. Prior to the placing of the surface course, the Contractor, at its expense, shall repair any depressions or other signs of failure in the binder course as directed by the Engineer.
- K. Final approval of the lower course shall be obtained prior to the placement of the surface course.
- L. After the lower course and before the surface course is placed, all butt joints shall be inspected to assure a clean edge. A partial depth saw cut may be required to provide a clean edge, if the edge has deteriorated.
- M. Sweep the street before the placement of the next course.
- N. Following the approval of the last lift of binder course, by the Engineer, all street structures (manholes, water valves, etc.) shall be raised and adjusted to final grade. The area excavated to raise the structure shall be backfilled with high-early-strength concrete meeting the requirements of Section 416.2.5.1 of the Wisconsin Highway Specifications, to the elevation of the binder course.

- O. Manholes, valves and other street structures may be adjusted to final grade prior to the placement of the lower course. Any street structure found to be adjusted to the wrong elevation after the lower course has been placed shall be readjusted prior to the placement of the surface course. Manholes and street structures raised to final grade prior to the placement of the lower course shall be ramped with asphalt until the surface course is placed. Prior to the placement of the surface course, remove these ramps.
- P. Prior to the placing of the surface course, all foreign matter shall be removed from the binder course surface. The binder course shall then be uniformly covered with a tack coat, designated by the Engineer, and applied at a rate of 0.10 gallons per square yard. The cost for this tack coat shall be included in the unit bid price of HMA pavement.
- Q. Longitudinal joints in the surface shall, at no time, be placed immediately over similar joints in the binder course beneath. A minimum distance of six (6) inches shall be required between the location of the joints in any given course and the location of similar joints in the course placed above it.
- R. Except where the edges are supported by a curb, gutter, or similar structure, the outside edges of the binder and surface courses shall be sloped and pressed in place by means of a self-adjusting constant pressure edge plate, held in proper position on the finishing machine. The edge of the pavement shall be sloped approximately 1 inch from the vertical and no material shall extend beyond the limits of the base. Irregularities in alignment along the outside edges and along the longitudinal joint shall be corrected by adding or removing paving mixtures before the edges are rolled. Excess asphalt mixture deposited on the existing base, binder or surface course outside the limits of the lane being laid, shall be removed immediately. Contact surfaces of curbs, gutter, manholes and similar structures shall be painted with liquid asphalt before the asphalt mixture is placed.
- S. After the spreading and strike-off and while still hot, the binder and/or surface course shall be compacted according to Section 460.3.3 of the Wisconsin Highway Specifications except that self-propelled pneumatic-tired rollers shall not be required when compacting surface courses.
- T. Remove any excess asphalt from manhole lids, pickholes water valve box openings and ensure that these structures are clean and clear of HMA material.

8.3.1.4 Asphalt Surface Tolerance:

- A. Surface tolerance at concrete curb flange at curb ramp locations: The HMA Pavement surface shall be placed flush with the flange of the concrete curb at all curb ramp locations. If the surface is installed greater than 1/8-inch above the curb flange at the curb ramps, the Contractor shall be required to remedy as directed in the Pavement Deficiency Correction section of these specifications.
- B. Surface tolerance at concrete curb flange: The HMA Pavement surface shall be placed no higher than a 1/4-inch above the flange of the concrete curb and gutter at all locations other than at curb ramps. If the surface is installed greater than 3/8-inch above the curb flange, the Contractor shall be required to remedy as directed in the Pavement Deficiency Correction section of these specifications.
- C. Surface tolerance of street structures: Manholes, valves and other street structures shall be adjusted to 1/4 to 3/8 inches below the final HMA Pavement surface.
 - 1. Measure the street structure tolerance by placing the center a 6-foot straightedge over the centerline of each frame parallel to the direction of traffic. Make a measurement at each side of the frame and average the two measurements. If the frame is higher than the adjacent pavement, then make the two measurements at each end of the straightedge and average them.
 - 2. Structure below HMA Pavement: Locations where structures are found to be between flush and 3/8-inch below the pavement surface will not require remediation. Structures found to be greater than 3/8-inch below the proposed HMA Pavement surface will require correction as directed in the Pavement Deficiency Correction section of these specifications.
 - 3. Structure above HMA Pavement: Structures found to be greater than a 1/8-inch above the final HMA Pavement surface will require correction as directed in the Pavement Deficiency Correction section of these specifications.

8.3.1.5 Asphalt Smoothness Tolerance:

- A. When directed by the Engineer, immediately after the initial rolling, the Contractor shall test the surface for smoothness with a 10-foot straightedge to locate high or low areas so they may be corrected while the mixture is still hot. When directed by the Engineer, the binder course shall also be straight edged in the manner described for the surface course. The Contractor shall provide competent workers, who are capable of performing the work, incidental to the correction of pavement irregularities. One such worker shall, under the direction of the City Inspector give special attention to the straight-edging of the surface.

- B. After the binder and surface courses have been thoroughly compacted, they shall be tested for smoothness by means of a 10-foot straightedge placed parallel to the centerline of the pavement. Ordinates measured from the face of the straightedge to the binder course shall, at no place, exceed 1/4 inch. Ordinates measured from the face of the straightedge to the surface course shall, at no place, exceed 1/8 inch.
1. Variations exceeding 1/4 inch in the binder course shall be corrected as directed by the Engineer.
 2. Variations in the surface course greater than 1/8 inch but less than 1/4 inch, shall result in a deduction from the amount due the Contractor of 1/6 of the bid price per ton of surface course or an amount equal to 1/2 the bid price per square yard of pavement, for each such variation occurring within any given pass of the paving machine.

8.3.1.6 Asphalt Thickness Tolerance:

- A. All asphalt pavements that are contracted on a square yard basis will be cored to determine the actual depth constructed.
1. If the average depth of the core is between 1/4 and 1/2 inch less than the specified contract depth, the final payment shall be subject to a reduction according to the following formula: Multiply the contract unit bid price by the square of the average core depth, divided by the square of the specified contract depth.
 2. If the average depth of the core is more than 1/2 inch below the specified contract depth, the Contractor shall be required to place, at his expense, an asphalt overlay on the entire pavement, unless otherwise directed by the Engineer. All adjustment of underground street structures and appurtenances and/or removals required to provide for the overlay shall be at the Contractor's expense.
 3. The above "average depths" shall be averaged over a 500-foot street length, or one city block, whichever is the lesser length.
- B. All asphalt pavements contracted on a per ton basis shall be laid and compacted so that the average yield shall be in excess of 115 pounds per inch per square yard of measured pavement area. When the average yield on a portion of the project (500 feet in length or one city block, whichever is less) is more than the average lb./in./sq. yd. + 15% computed from the test samples taken from the compacted pavements, all tonnage over this amount shall be paid for at the rate of 1/2 the unit bid price per ton of asphalt materials.

8.3.1.7 Pavement Surface Deficiency Correction:

- A. Surface tolerance corrections along the concrete curb flange: Contractor shall be required to use infrared heating equipment to remove excess HMA pavement in areas out of tolerance.
- B. Surface tolerance corrections at manholes shall include:
 - 1. The Contractor shall sawcut the HMA pavement that is to be removed in order to re-set the manhole chimney according to the sewer sections of these specifications.
 - 2. The HMA surface shall be milled from the flange to the nearest HMA pavement joint (if the structure is in the centerline, the area to be milled is flange to flange). The length of the milled area shall be equal to the width.
 - 3. The lower courses around the manhole shall be replaced and compacted.
 - 4. Place a tack coat and pave a new surface lift of HMA pavement that matches the existing HMA pavement and the re-set manhole.
 - 5. The seam created at the existing HMA pavement shall be infrared heated to blend and fuse the new HMA pavement to the existing.
- C. Surface tolerance corrections at water valves shall include:
 - 1. The HMA pavement shall be infrared heated so the water valve can be turned up.
 - 2. If the water valve cannot be turned up, the Contractor shall follow the requirements listed under surface tolerance corrections at manholes, except that the water valve shall be re-set according to the Waukesha Water Utility Specifications.

8.3.1.8 The final determination of the corrective measures to be implemented shall be as directed by the Engineer.

8.3.2 PAVEMENT MILLING

8.3.2.1 General:

- A. Designated asphalt streets shall be milled over the entire width (flange to flange) and the depth specified in the Special Provisions.

8.3.2.2 Equipment:

- A. The milling machine shall be a power operated, self-propelled machine, having a cutting drum with lacing patterns that will attain a grooved surface and produce grinding chips of less than 2-inches in size. The milling machine shall be equipped with a pressurized watering system for dust control. The equipment shall be of the type that has successfully performed similar work.

- B. The street cleaning equipment shall be of the type to efficiently remove all loosened material and load into trucks for hauling. A belt loader followed by a power sweeper and manual sweeping is considered the preferred method. Use of front-end loaders or flushing into the City's storm sewer system will not be allowed as a means of clean-up.

8.3.2.3 Construction Methods:

- A. Mill around manholes and utility valves within the limits of the work. Any damage to manholes or valves by the milling operation shall be the responsibility of the Contractor. The Contractor shall also minimize damage to trees from the exhaust of the mill machine by diverting the exhaust to the side and not up into the tree canopy.
- B. The Contractor will be responsible for maintaining safe driving conditions after milling has taken place. This shall include immediately ramping or barricading any structures that are sticking out of the pavement and providing and maintaining signs (i.e. "Bump", "Road Construction Ahead", or "Rough Road") until the overlay has been placed. Temporary asphalt ramps shall be placed at the ends of the milling limits.
- C. Asphalt millings shall be cleaned from the pavement surface immediately after the milling operation to the satisfaction of the Engineer.
- D. After milling and prior to the overlay, the Contractor shall remove any material that has become loose.
- E. The City will retain all asphalt millings. The millings shall be delivered and stockpiled to the location indicated in the Special Provisions.
- F. For large cracks that remain after the milling operation that are 1/2-inch wide and larger (typically the transverse joints and pavement joints), or wherever the Engineer designates, the open cracks shall be properly cleaned, dried, and filled with a suitable crack sealer, then a pavement repair membrane shall be applied according to manufacturer's specifications. The crack sealer used must be compatible with the membrane and applied according to the manufacturer's specifications.

8.3.3 PAVEMENT CRACK SEALING

8.3.3.1 General:

- A. The selection of cracks to be sealed will be at the direction of the Engineer. The criterion used is that a crack must be approximately 1/4-inch or greater in width to be filled.

8.3.3.2 Equipment:

- A. The router shall use star wheel carbide tipped router blades attached to a main cutting head. It shall have in-line wheels and a cutting head capable of following random cracks. It shall have automatic depth control to insure consistent and accurate routing depths.
- B. Two air compressors will be required. They shall be of sufficient size to provide moisture free and oil free compressed air. One compressor shall be used with an air wand to blow out the crack and clean off the road. The second shall be used with the heat lance.
- C. The crack sealer material shall be heated in an oil jacketed double boiler type-melting unit with both agitation and re-circulation systems. It shall have separate temperature thermometers for both the oil bath and melting vat to insure proper temperatures for the sealant. It shall be equipped with a pump to pressure fill cracks with a wand applicator. The temperature of the melted crack sealer material shall not exceed manufacturer's specifications.

8.3.3.3 Construction Methods:

- A. Conduct operations in a manner that will cause the least interference to traffic movements. The minimum number of vehicles needed to perform the work (including employee vehicles) shall be permitted to park at the various work sites.
- B. There shall be no visible signs of moisture on the pavement surface or in the reservoir immediately prior to the time the sealant is applied.
- C. Use the following process for crack sealing:
 - 1. All cracks and joints shall be routed to minimum of a 2:1 ratio (width versus depth).
 - 2. Cracks shall be blown out with compressed air. The road surface shall also be blown off at this time to clear it of any routed debris and cleaned up the surface.
 - 3. Using the second compressor, the cracks shall be blown out using a heat lance. The heat lance shall not be applied in one area long enough to burn or scorch the asphalt.
 - 4. All cracks shall be pressure filled by a wand applicator from the bottom up. They shall be slightly over-filled and squeegeed to create an overband 1-inch wide on each side of the routed reservoir.
 - 5. All sealant filled cracks shall then have a single ply toilet paper applied to prevent any material from tracking. As an alternate to toilet paper, a de-tackifying product such as "Detack" by "CRAFECO" or approved equal may be used to prevent tracking of the crack sealer material.

- D. Immediately repair or refill any part of a sealed crack damaged by traffic.
- E. Clean the pavement surface with a self-propelled power broom, equipped with water for dust suppression. The broom shall be capable of picking up loose material and depositing it off-site. Cleaning shall be done within 24-hours of the roadway being opened to traffic.
- F. Immediately repair or refill any part of a sealed reservoir damaged by the cleaning procedure.

8.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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9 BRIDGES

9.1 GENERAL

9.1.1 SUMMARY

9.1.1.1 This section describes repairs and overlays for concrete bridges.

9.1.2 RELATED SECTIONS (NOT USED)

9.1.3 SUBMITTALS

9.1.3.1 Product Data: Submit product data for polymer overlay materials, protective surface treatment, and pigmented surface treatment.

A. Product data sheets and specifications from the manufacture consists of literature from the manufacturer showing general instructions, application recommendations/methods, product properties, general instructions, or any other applicable information

9.1.3.2 Certified Reports: Submit the following certified reports for polymer overlay materials:

A. Polymer Binder: Submit a certified report of test or analysis from an independent laboratory dated less than 3 years prior to the date of the project letting showing the polymer binder meets the specified requirements.

B. Aggregates: Submit a certified report of test or analysis from an independent laboratory dated less than 6 months prior to the date of the project letting showing the aggregates meet the specified requirements.

9.1.4 TESTING (NOT USED)

9.1.5 WARRANTIES

9.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

9.1.6 MEASUREMENT AND PAYMENT

9.1.6.1 Repairs and overlays will be measured and paid for in accordance with the applicable provisions of Sections 502 and 509 of the Wisconsin Highway Specifications and the following requirements.

9.1.6.2 Cleaning Parapets:

A. Measurement: The City will measure Cleaning Parapets in length by the linear foot of parapet acceptably cleaned.

- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Cleaning Parapets". Payment is full compensation for abrasive blast cleaning; for water cleaning; and for all additional clean-up of the concrete surface and surrounding bridge deck area.

9.1.6.3 Cleaning Railings:

- A. Measurement: The City will measure Cleaning Railings in length by the linear foot of railing acceptably cleaned.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Cleaning Railings". Payment is full compensation for abrasive blast cleaning; for water cleaning; and for all additional clean up of the concrete surface and surrounding bridge deck area.

9.1.6.4 Sawing Pavement Deck Preparation Areas:

- A. Measurement: The City will measure Sawing Pavement Deck Preparation Areas by the linear foot acceptably completed. Over-cuts and cuts made beyond the limits marked in the field will not be measured for payment.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Sawing Pavement Deck Preparation Areas". Payment is full compensation for making all saw cuts.

9.1.6.5 Concrete Masonry Deck Patching:

- A. Measurement: The City will measure the Concrete Masonry Deck Patching by the cubic foot acceptably completed. Wasted concrete will not be measured.
- B. Payment: Payment for measured quantities will be made at the contract unit price per cubic foot for "Concrete Masonry Deck Patching". Payment is full compensation for furnishing, hauling, preparing, placing, finishing, curing, and protecting all materials.

9.1.6.6 Polymer Overlay:

- A. Measurement: The City will measure Polymer Overlay in area by the square foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square foot for "Polymer Overlay". Payment is full compensation for preparing the surface; for tensile bond testing; for creating the transitional area; for providing the overlay; for cleanup; and for sweeping/vacuuming and disposing of excess materials. Concrete Deck Repair will be paid for separately.

9.2 PRODUCTS

9.2.1 CONCRETE MATERIALS

- 9.2.1.1 Concrete materials shall comply with Section 509.2 of the Wisconsin Highway Specifications and the following requirements.
- 9.2.1.2 Furnish Grade E concrete conforming to Section 501 of the Wisconsin Highway Specifications for concrete masonry deck patching.

9.2.2 POLYMER OVERLAY MATERIALS

9.2.2.1 General: Furnish materials specifically designed for use over concrete bridge decks. Furnish polymer liquid binders from the Wisconsin Dept. of Transportation’s approved product list.

9.2.2.2 Polymer Resin:

A. Furnish a polymer resin base and hardener composed of two-component, 100% solids, 100% reactive, thermosetting compound with the following properties:

Property	Requirements	Test Method
Gel Time ^A	15 - 45 minutes @ 73° to 75° F	ASTM C881
Viscosity ^A	7 - 70 poises	ASTM D2393, Brookfield RVT, Spindle No. 3, 20 rpm
Shore D Hardness ^B	60-75	ASTM D2240
Absorption ^B	1% maximum at 24 hr	ASTM D570
Tensile Elongation ^B	30% - 70% @ 7 days	ASTM D638
Tensile Strength ^B	2000 to 5000 psi @ 7 days	ASTM D638
Chloride Permeability ^B	<100 coulombs @ 28 days	AASHTO T277

^A Uncured, mixed polymer binder

^B Cured, mixed polymer binder

1. The required properties of the polymer resin when mixed with aggregate:

Property	Requirement ^C	Test Method
Minimum Compressive Strength	1,000 psi @ 8 hrs 5,000 psi @ 24 hrs	ASTM C579 Method B, Modified ^D
Thermal Compatibility	No Delaminations	ASTM C884
Minimum Pull-off Strength	250 psi @ 24 hrs	ASTM C1583

^C Based on samples cured or aged and tested at 75°F

^D Plastic inserts that will provide 2 inch by 2 inch cubes shall be placed in the oversized brass molds.

9.2.2.3 Aggregates:

A. Furnish natural or synthetic aggregates that are non-polishing, clean, free of surface moisture, fractured or angular in shape; free from silt, clay, asphalt, or other organic materials; and meet the following properties and gradation requirements:

B. Aggregate Properties:

Property	Requirement	Test Method
Moisture Content*	½ of the measured aggregate absorption, %	ASTM C566
Hardness	≥6.5	Mohs Scale
Fractured Faces	100% with at least 1 fractured face & 80% with at least 2 fractured faces of material retained on No.16	ASTM D5821
Absorption	≤1%	ASTM C128

* Sampled and tested by the department prior to placement.

2. Gradation:

Sieve Size	% Passing by Weight
No. 4	100
No. 8	30 – 75
No. 16	0 – 5
No. 30	0 – 1

9.2.3 PROTECTIVE SURFACE TREATMENT

9.2.3.1 Protective surface treatment shall comply with Section 502.2 of the Wisconsin Highway Specifications.

9.2.4 PIGMENTED SURFACE SEALER

9.2.4.1 Pigmented surface sealer shall comply with Section 502.2 of the Wisconsin Highway Specifications.

9.3 EXECUTION

9.3.1 CLEANING DECKS AND APPROACHES

9.3.1.1 Clean concrete decks and approach pavements in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.2 CLEANING PARAPETS AND RAILINGS

9.3.2.1 Blast Cleaning Operation: Blast clean the designated surfaces of the concrete parapet or railing according to SSPC SP-13 and ASTM D4259 for an abrasive blast cleaning to a surface roughness and finish as directed by the Engineer. Before abrasive blast cleaning operations are to begin for the entire bridge parapet or railing, prepare a representative trial area on the concrete surface, and have the method of blast cleaning approved by the Engineer.

9.3.2.2 Water Cleaning Operation: After abrasive blast cleaning operations are completed, clean the prepared parapet or railing surface with water according to ASTM D4258. Remove with this water cleaning all dust and loose material from the parapet or railing surfaces that are to be coated with pigmented surface sealer. Provide an adequate drying time of the concrete surfaces of at least 24 hours before coating with the pigmented surface sealer. Remove all loose concrete, dirt, dust, or blast material that remains on the bridge deck, as directed by the Engineer.

9.3.3 PREPARING DECKS AND APPROACHES

9.3.3.1 Prepare concrete decks and approach pavements in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.4 JOINT REPAIR

9.3.4.1 Repair concrete joints in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.5 CURB REPAIR

9.3.5.1 Repair concrete curbs in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.6 SAWING PAVEMENT DECK PREPARATION AREAS

9.3.6.1 Saw the boundaries of the existing concrete on the bridge deck that has been sounded and marked for deck preparation. These boundaries will be at least 2 inches and not greater than 6 inches outside of the unsound or disintegrated areas of concrete, as directed or marked by the Engineer in the field.

9.3.6.2 Make the saw cuts, a minimum of 1 inch in depth, at the locations marked.

9.3.6.3 Use a diamond blade for sawing that will allow the concrete to be sawed dry. Upon completion of the daily sawing, remove the dust deposits from the deck.

9.3.7 CONCRETE MASONRY DECK PATCHING

- 9.3.7.1 Neat Cement: Immediately before placing the concrete deck patching, coat the prepared surfaces with a neat cement mixture. Ensure the prepared concrete surfaces are moist without any standing water before coating with the neat cement mixture. Brush the neat cement mixture over the prepared concrete surfaces to ensure that all parts receive an even coating, and do not allow excess neat cement to collect in pockets. Apply the neat cement at a rate that ensures the cement does not dry out before being covered with the new concrete.
- 9.3.7.2 Placing Concrete: Place concrete conforming to Section 509 of the Wisconsin Highway Specifications. As determined by the Engineer, consolidate smaller areas by internal vibration, strike them off, and finish the areas with hand floats to produce plane surfaces that conform to the grade and elevation of the adjoining surfaces. Give all deck patching areas a final hand float finish.
- 9.3.7.3 Curing Concrete: Cure the concrete masonry deck patching conforming to Section 502.2.6(1) of the Wisconsin Highway Specifications.

9.3.8 CONCRETE SURFACE REPAIR

- 9.3.8.1 Repair concrete abutments, piers, girders, and other elements in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.9 FULL DEPTH DECK REPAIR

- 9.3.9.1 Perform full depth deck repair in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.10 PLACING CONCRETE OVERLAY

- 9.3.10.1 Place concrete overlays in accordance with Section 509.3 of the Wisconsin Highway Specifications.

9.3.11 PLACING POLYMER OVERLAY

9.3.11.1 General:

- A. Apply two layers of a two-component polymer overlay system to the bridge decks shown on the Plans. The minimum total thickness of the overlay system shall be 1/4 inch.
- B. Field Review: Conduct a field review of the existing deck to identify any possible surface preparation and material compatibility issues.

- C. **Pre-Installation Meeting:** Conduct a pre-installation meeting with the manufacturer's representative and the engineer prior to construction. Discuss the field review findings, verification testing of the surface preparation and establish procedures for maintaining optimum working conditions and coordination of work. Furnish the Engineer a copy of the recommended procedures and apply the overlay system according to the manufacturer's instructions. Supply for the Engineer's use for the duration of the project, a Concrete Surface Profile (CSP) chip set of 10 from the International Concrete Repair Institute (ICRI).
- D. **Manufacturer's Representative:** An experienced manufacturer's representative familiar with the overlay system installation procedures shall be present at all times during surface preparation and overlay placement to provide quality assurance that the work is being performed properly. This requirement may be reduced at the Engineer's discretion.
- E. **Material Storage:** Store and handle materials according to the manufacturer's recommendations. Store resin materials in their original containers in a dry area. Store all aggregates in a dry environment and protect aggregates from contaminants on the job site.

9.3.11.2 Deck Preparation:

- A. Remove all asphaltic patches and unsound or disintegrated areas of the concrete decks as the plans show, or as the engineer directs. Work performed to repair the concrete deck will be paid for under other items. Ensure that products used for deck patching are compatible with the polymer overlay system.
 - 1. **NOTE:** Some polymer systems require concrete patch material to be in place a minimum of 28-days before overlaying - contact polymer manufacturer before completing deck patching/repair.
- B. Determine an acceptable shotblasting machine operation (size of shot, flow of shot, forward speed, and/or number of passes) that provides a surface profile meeting CSP 5 (medium-heavy shotblast) according to the ICRI Technical Guideline No. 310.2. If the Engineer requires additional verification of the surface preparation, test the tensile bond strength according to ASTM C1593. The surface preparation will be considered acceptable if the tensile bond strength is greater than or equal to 250 psi or the failure area at a depth of 1/4 inches or more is greater than 50% of the test area. Continue adjustment of the shotblasting machine and necessary testing until the surface is acceptable to the Engineer or a passing test result is obtained.

- C. Prepare the entire deck using the final accepted adjustments to the shotblasting machine as determined above. Thoroughly blast clean with hand-held equipment any areas inaccessible by the shotblasting equipment. Do not perform surface preparation more than 24 hours prior to the application of the overlay system.
- D. Protect drains, expansion joints, access hatches, or other appurtenances on the deck from damage by the shot and sand blasting operations and from materials adhering and entering. Tape or form all construction joints to provide a clean straight edge.
- E. Prior to shot blasting, remove pavement markings within the treatment area using an approved mechanical or blasting method.
- F. Prepare the vertical concrete surfaces adjacent to the deck a minimum of 2 inches above the overlay according to SSPC-SP 13 (free of contaminants, dust, and loose concrete) by sand blasting, using wire wheels, or other approved method.
- G. Just prior to overlay placement, clean all dust, debris, and concrete fines from the prepared surfaces including the vertical surfaces with compressed air. When using compressed air, the air stream must be free of oil. Any grease, oil, or other foreign matter that rests on or has absorbed into the concrete shall be removed completely. If any prepared surfaces (including the first layer of the polymer overlay) are exposed to rain or dew, lightly sandblast (brush/breeze blast) the exposed surfaces.
- H. The Engineer may consider alternate surface preparation methods per the overlay system manufacture's recommendations. The Engineer will approve the final surface profile and deck cleanliness prior to the contractor placing the polymer overlay.
- I. If shown on the plans, create a transitional area approaching transverse expansion joints and ends of the deck using an approved mechanical or blasting method. Remove 1/4 to 5/16 inch of concrete adjacent to the joint or end of deck and taper a distance of 3 feet.
- J. If shown on the plans, create a transitional area on the approach pavement. Prep and place the first lift 3 feet beyond the end of the deck the same width as the deck. Prep and place the second lift 6 feet beyond the end of the deck the same width as the deck.

9.3.11.3 Application of the Overlay:

- A. Perform the handling and mixing of the polymer resin and hardening agent in a safe manner to achieve the desired results according to the manufacturer's instructions. Do not apply the overlay system if any of the following exists:

1. Ambient air temperature is below 50°F or above 100°F;
 2. Deck temperature is below 50°F;
 3. Moisture content in the deck exceeds 4.5% when measured by an electronic moisture meter or shows visible moisture after 2 hours when measured in accordance with ASTM D4263;
 4. Rain is forecasted during the minimum curing periods listed under C.5;
 5. Materials component temperatures below 65°F or above 99°F;
 6. Concrete age is less than 28 days unless approved by the engineer.
 7. The deck temperature exceeds 100°F.
- B. If the gel time is 10 minutes or less at the predicted high air temperature for the day.
- C. After the deck has been shotblasted or during the overlay curing period, only necessary surface preparation and overlay application equipment will be allowed on the deck. Provide appropriate protective measures to prevent contamination from equipment allowed on the deck during preparation and application operations. Begin overlay placement as soon as possible after surface preparation operations.
- D. The polymer overlay shall consist of a two-course application of polymer and aggregate. Each of the two courses shall consist of a layer of polymer covered with a layer of aggregate in sufficient quantity to completely cover the polymer. Apply the polymer and aggregate according to the manufacturer's requirements. Apply the overlay using equipment designed for this purpose. The application machine shall feature positive displacement volumetric metering and be capable of storing and mixing the polymer resins at the proper mix ratio. Disperse the aggregate using a method that provides a uniform, consistent coverage of aggregate and minimizes aggregate rolling or bouncing into final position. First course applications that do not receive enough aggregate before the polymer gels shall be removed and replaced. A second course applied with insufficient aggregate may be left in place, but will require additional applications before opening to traffic.

- E. After completion of each course, cure the overlay according to the manufacturer’s instructions. Follow the minimum cure times listed below or as prescribed by the manufacturer. Remove the excess aggregate from the surface treatment by sweeping, blowing, or vacuuming without tearing or damaging the surface; the material may be re-used if approved by the engineer and manufacturer. Apply all courses of the overlay system before opening the area to traffic. Do not allow equipment or traffic on the treated area until directed by the Engineer.
- F. After the first layer of coating has cured to the point where the aggregate cannot be pulled out, apply the second layer. Prior to applying the second layer, broom and blow off the first layer with compressed air to remove all loose excess aggregate.
- G. Prior to opening to traffic, clean expansion joints and joint seals of all debris and polymer. A minimum of 3 days following opening to traffic, remove loosened aggregates from the deck, expansion joints, and approach pavement.

9.3.11.4 Application Rates:

- A. Apply the polymer overlay in two separate courses in accordance with the manufacturer’s instructions, but not less than the following rate of application.

Course	Minimum Polymer Rate ^A (GAL/100 SF)	Aggregate ^B (LBS/SY)
1	2.5	10+
2	5.0	14+

^A The minimum total applications rate is 7.5 GAL/100 SF.

^B Application of aggregate shall be of sufficient quantity to completely cover the polymer.

9.3.11.5 Minimum Curing Periods:

- A. As a minimum, cure the coating as follows:

	Average temperature of deck, polymer and aggregate components in °F							
Course	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-99
1	6 hrs	5 hrs	4 hrs	3 hrs	2.5 hrs	2 hrs	1.5 hrs	1 hr
2	8 hrs	6.5 hrs	6.5 hrs	5 hrs	4 hrs	3 hrs	3 hrs	3 hrs

- B. If faster cure times are desired and achievable, submit to the Engineer a certified test report from an independent laboratory showing the material is able to reach a compressive strength of 1000 psi as tested per ASTM C579 Method B within the temperature ranges and cure times for which the product is proposed to be placed. Establish ambient air, material, and substrate temperatures from the manufacturer for field applications. Field applications will not be allowed below the documented temperatures.

9.3.11.6 Repair of Polymer Overlay:

- A. Repair all areas of unbonded, uncured, or damaged polymer overlay for no additional compensation. Submit repair procedures from the manufacturer to the Engineer for approval. Absent a manufacturer's repair procedures and with the approval of the Engineer, complete repairs according to the following: Saw cut the limits of the area to the top of the concrete; remove the overlay by scarifying, grinding, or other approved methods; shot blast or sand blast and air blast the concrete prior to placement of polymer overlay; and place the polymer overlay according to the requirements above.

9.3.12 APPLYING PROTECTIVE SURFACE TREATMENT

- 9.3.12.1 Apply protective surface treatment in accordance with Section 502.3 of the Wisconsin Highway Specifications.

9.3.13 APPLYING PIGMENTED SURFACE SEALER

- 9.3.13.1 Apply pigmented surface sealer in accordance with Section 502.3 of the Wisconsin Highway Specifications.

9.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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10 TRAFFIC SIGNALS

10.1 GENERAL

10.1.1 SUMMARY

10.1.1.1 This section describes:

- A. Furnishing and installing permanent traffic signals.
- B. Furnishing, installing, and removing temporary traffic signals.

10.1.2 RELATED SECTIONS (NOT USED)

10.1.3 SUBMITTALS

10.1.3.1 Product Data: Submit material lists and specifications for all traffic control equipment for approval prior to installation.

- A. For poles and arms: Along with the materials list, submit a certificate of compliance certifying that the poles and arms as furnished conform to the specified structural performance requirements. Ensure that the certificate of compliance is on the manufacturer's letterhead, signed by an authorized company officer, and notarized.

10.1.3.2 Shop Drawings: Submit two copies of the following to the City for approval prior to installation:

- A. Detection wiring diagrams, cable and routing diagrams, pole to pull box wiring diagrams, conductor layout standards and the associated head arrangements and other pertinent details.
- B. Detailed shop drawings of the control cabinet, equipment layout drawings, and wiring diagrams of all equipment installed in the controller cabinet.

10.1.3.3 Qualifications: Submit proof of factory certification for video detection camera installer.

10.1.3.4 Operation and Maintenance Manuals: At the time of delivery, furnish one set of instruction manuals and an itemized price list for each type of equipment, their subassemblies, and their replacement parts. The instruction book shall include the following information:

- A. Table of Contents
- B. Operating procedure
- C. Step-by-step maintenance and troubleshooting information for the entire assembly

- D. Circuit wiring diagrams
- E. Pictorial diagrams of parts locations
- F. Parts numbers
- G. Theory of operation
- H. The instructional manuals shall include itemized parts lists. The itemized parts lists shall include the manufacturer's name and parts number for all components (such as IC, diodes, switches, relays, etc.) used in each piece of equipment. The list shall include cross references to parts numbers of other manufacturers who make the same replacement parts.

10.1.3.5 Warranties: Submit written documentation of the warranties specified in the "Warranties" article, below.

10.1.4 TESTING (NOT USED)

10.1.5 WARRANTIES

10.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements and as follows.

10.1.5.2 Traffic Signal Controller and Cabinet Warranty:

- A. Provide a two-year warranty on traffic signal controller, cabinet, and all add-on accessory items from date of installation and acceptance by City.
- B. If a malfunction in the controller unit, or its auxiliary equipment occurs during the warranty period, the supplier shall, within 24 hours after notification (excluding Saturday and Sunday), furnish a like controller unit module, or auxiliary equipment, for use while the warranted unit is being repaired. The isolation of any malfunction during the warranty period shall be the responsibility of the supplier. After the supplier has repaired and returned the equipment, the City shall then return the spare component to the supplier.
- C. Controller Operation. Consistent with customary trade practices, the manufacturer shall furnish a warranty for all electrical or mechanical equipment described herein. The Contractor shall turn such warranty over to the City for potential dealing with the guarantor.
 - 1. If the Contractor is the guarantor, he specifically waives the requirements of Section 289.14(2), Wisconsin Statutes, and agrees as a condition of the contract that the City may maintain an action against him at any time during the warranty period for recovery of damages which the City may have sustained by reason of the failure of the Contractor to comply with the provisions of the warranty provided to the City.

10.1.5.3 Video Vehicle Detection System Warranty:

- A. Provide a three-year warranty on the video detection system from date of installation and acceptance by City.
- B. During the warranty period, technical support shall be available from the supplier via telephone within 4 hours of the time a call is made by a user, and this support shall be available from factory-certified personnel or factory-certified installers.
- C. During the warranty period, updates to VDP software shall be available from the supplier without charge.

10.1.6 MEASUREMENT AND PAYMENT

10.1.6.1 General:

- A. Traffic signals and related components will be measured and paid for in accordance with Sections 652 through 659 of the Wisconsin Highway Specifications except as modified in this Specification.
- B. Temporary traffic signals and related components will be measured and paid for in accordance with Section 661 of the Wisconsin Highway Specifications except as modified in this Specification.

10.1.6.2 Electrical Service Meter Breaker Pedestal:

- A. Append 656.5(3) of the Wisconsin Highway Specifications with the following:
Payment is full compensation for grading the service trench and replacing topsoil; and for fertilizing, seeding, and mulching to restore the disturbed area of the service trench if necessary.

10.1.6.3 Monotube Arms (length):

- A. Measurement: The City will measure Monotube Arms (length) as each individual arm acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Monotube Arms (length)". Payment is full compensation for furnishing and installing all materials, including all hardware, fittings, mounting devices, shims, and attachments necessary to completely install the arms.

10.1.6.4 Traffic Signal Controller and Cabinet 8-Phase Fully Actuated:

- A. Measurement: The City will measure Traffic Signal Controller and Cabinet 8-Phase Fully Actuated as each individual controller and cabinet acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Traffic Signal Controller and Cabinet 8-Phase Fully Actuated". Payment is full compensation for furnishing and installing the signal controller and conflict monitor together with cabinet, all required control units, all additional harnesses for preemption, switches for flashing operation, and fittings as are necessary to assure that the controller will perform the said functions.

10.1.6.5 Video Vehicle Detection System:

- A. Measurement: The City will measure Video Vehicle Detection System as a lump sum acceptably completed per intersection.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Video Vehicle Detection System". Payment is full compensation for furnishing and installing control units, cameras, cabling, mounting brackets, testing and setting up the system.

10.1.6.6 Emergency Vehicle Preemption System:

- A. Measurement: The City will measure Emergency Vehicle Preemption System as a lump sum acceptably completed per intersection.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Emergency Vehicle Preemption System". Payment is full compensation for furnishing and installing all equipment, cabling, necessary additional items, testing and setting up the system.

10.1.6.7 Audible Pedestrian Push Button System:

- A. Measurement: The City will measure Audible Pedestrian Push Button System as a lump sum acceptably complete per intersection.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Audible Pedestrian Push Button System". Payment is full compensation for furnishing and installing all materials.

10.1.6.8 Temporary Non-Intrusive Vehicle Detection System for Intersections (Location):

- A. Measurement: The City will measure Temporary Vehicular Video Detection System for Intersections (Location) as a single lump sum unit of work, acceptably completed.

- B. Payment: Payment will be made at the contract lump sum price for "Temporary Vehicular Video Detection System for Intersections (Location)". Payment is full compensation for furnishing and installing the temporary non-intrusive vehicle detection system, including cabling, mounting brackets, mounting hardware, terminations, interface panels, testing and set up; for periodic checking and resetting of detection zones; for periodic cleaning for dirt and dust build-up; and for removing all equipment at the completion of the project.

10.2 PRODUCTS

10.2.1 ELECTRICAL CONDUIT

- 10.2.1.1 Electrical conduit shall be in accordance with Section 652 of the Wisconsin Highway Specifications except as modified in this Specification.

10.2.2 PULL BOXES AND JUNCTION BOXES

- 10.2.2.1 Pull boxes and junction boxes shall be in accordance with Section 653 of the Wisconsin Highway Specifications except as modified in this Specification.

10.2.3 CONCRETE BASES

- 10.2.3.1 Concrete bases shall be in accordance with Section 654 of the Wisconsin Highway Specifications except as modified in this Specification.

10.2.4 ELECTRICAL WIRING

- 10.2.4.1 Electrical wiring shall be in accordance with Section 655 of the Wisconsin Highway Specifications except as modified in this Specification.

10.2.5 ELECTRICAL SERVICE PRODUCTS

- 10.2.5.1 Electrical service products shall be in accordance with Section 656 of the Wisconsin Highway Specifications except as modified in this Specification.

10.2.6 POLES

- 10.2.6.1 Poles shall be in accordance with Section 657 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.2.6.2 Description: Furnish monotube poles of the type(s) designated on the Plans.

10.2.6.3 Product Requirements:

- A. Design support structures conforming to the minimum wall thickness the plan details show and to AASHTO design and fabrication standards for structural supports for highway signs, luminaries, and traffic signals. Use a design life of 50 years. Design to withstand a 3 second gust wind speed of 90 mph. Do not use the methods of Appendix C of those AASHTO standards.

- B. Use Category III criteria for Type 9 and Type 10 Poles. Use Category II criteria for Type 12 and Type 13 Poles.
- C. For structures requiring a fatigue analysis, use 45 mph for truck-induced gusts.
- D. After welding and before zinc coating, clean the exterior surface of each steel pole free of all loose rust and mill scale, dirt, oil or grease, and other foreign substances.
- E. Apply a zinc coating conforming to the process specified for steel sign bridges in 641.2.8 of the Wisconsin Highway Specifications. Ensure that the zinc coating is tight, free from rough areas or slag, and presents a uniform appearance.
- F. After completing manufacturing, clean the exterior surfaces of each pole free of all loose scale, dirt, oil or grease, and other foreign substances.
- G. Provide a reinforced hand hole measuring 4 inches by 6 inches as the plans show. Locate the hand hole 18 inches from the bottom of the pole base to the center of the door.
- H. For the hand hole, include an access cover mounted to the pole by two $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " hex-head stainless steel bolts.
- I. Provide a grounding lug complete with mounting hardware, as required, inside the pole as the plans show.
- J. Provide access to the grounding lug from the hand hole. Weld the ground lug directly opposite the hand hole on the inside wall of the pole.
- K. Equip the top of the shaft with a removable, ventilated cap held securely in place by at least 3 $\frac{1}{4}$ " -20 x $\frac{3}{4}$ " hex-head stainless steel set screws.
- L. Ensure that all castings are clean, smooth, and with all details well defined and true to pattern.
- M. Attach base plates firmly to the pole shaft by welding or other approved method.
- N. Anchor bolts are already installed in the existing concrete bases.
- O. Furnish mounting nuts, washers, and other necessary hardware to install the poles. Materials shall conform to the Wisconsin Highway Specifications for each item furnished.

10.2.7 MONOTUBE ARMS

- 10.2.7.1 Arms shall be in accordance with Section 657 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.2.7.2 Description: Furnish monotube arms of the length(s) designated on the Plans.

10.2.7.3 Product Requirements:

- A. Design support structures conforming to the minimum wall thickness the plan details show and to AASHTO design and fabrication standards for structural supports for highway signs, luminaires, and traffic signals. Use a design life of 50 years. Design to withstand a 3 second gust wind speed of 90 mph. Do not use the methods of Appendix C of those AASHTO standards.
- B. Use category III criteria for 15 to 30-foot arms. Use category II criteria for 35 to 55-foot arms.
- C. For structures requiring a fatigue analysis, use 45 mph for truck-induced gusts.
- D. Base the designs on the completed maximum loading configuration the standard detail drawing shows.
- E. Furnish monotube arms conforming to the following:
 - 1. Consist of zinc coated steel round or oval members.
 - 2. Have a mounting device welded to the pole end of the monotube arm that allows the attachment of the arm to a pole as the plans show.
 - 3. Have stiffeners or gussets if required between the arm tube and the arm mounting device to provide adequate strength to resist side loads.
 - 4. Have a clean, uniform natural finish. No paint or other corrosion preventive maintenance coating is required.
- F. After welding and before zinc coating, clean exterior surfaces of each arm free of all loose rust and mill scale, dirt, oil or grease, and other foreign substances.
- G. Apply zinc coating as specified for sign bridge components in 641.2.8 of the Wisconsin Highway Specifications. Ensure that the zinc coating is tight, free from rough areas or slag, and presents a uniform appearance.
- H. After manufacturing is complete, clean the exterior surfaces of each pole free of all loose scale, dirt, oil, or grease, and other foreign substances.

10.2.8 TRAFFIC SIGNAL FACES, 3-12 INCH VERTICAL, 4-12 INCH VERTICAL, AND 5-12 INCH VERTICAL

- 10.2.8.1 Traffic signal faces shall be in accordance with Section 658 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.2.8.2 Append 658.2.2 of the Wisconsin Highway Specifications with the following:

- A. All Light Emitting Diode (LED) traffic signal modules shall meet the Final Approved Version of the LED Circular Signal Supplement Purchase Specification produced by ITE. The manufacturer shall provide the minimum warranty as stated in the ITE Specifications. If the LED fails to function as intended due to workmanship or material defects the LED shall be replaced or repaired within the first 60 months from delivery. Also, if the LED signal modules exhibit luminous intensities less than the minimum values specified within the first 36 months the LED shall be replaced or repaired.
- B. All signal head assemblies shall be equipped with LED, cutaway visors (or tunnel visors, if so specified in the plans) and backplates. The visor and backplate shall be a dull black. Signal head housings shall be yellow.
- C. Vehicular signal indications shall be 12-inch LED modules as indicated on material list. All faces shall give an appearance of an incandescent lamp. The signal face shall be an 18 count Dialight DuraLED signal or approved equal.

10.2.9 LED LUMINAIRES

- 10.2.9.1 Luminaires shall be in accordance with Section 659 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.2.9.2 LED luminaires shall be Cooper model number LDRC-T3-E03-E to match existing City fixtures.
- 10.2.9.3 Photocontrol shorting caps are required for all luminaires.

10.2.10 TRAFFIC SIGNAL CONTROLLER AND CABINET 8-PHASE FULLY ACTUATED

10.2.10.1 General:

- A. Furnish traffic signal controller(s) and cabinet(s) as shown on the Plans and as hereinafter provided.
- B. The controller shall be Eagle Signal Control EPAC M60 Series or latest series and shall provide a functional Ethernet port.
- C. The traffic controllers and cabinets at the intersection shall include any necessary provisions to accommodate fiber optic interconnect.
- D. A ruggedized, outdoor battery powered back-up uninterruptible power supply system (UPS) shall be included in the traffic signal control cabinet. This system shall provide a seamless transition to backup power, offer long run times, are designed to withstand extreme temperatures and environments where heat, cold, dust and debris can affect equipment, and are able to withstand vibrations caused by cars, trains, trucks and buses that can interfere with system operations. Battery heater mats shall be included.

- E. The controller shall be a fully traffic actuated, solid state, digital microprocessor controller, capable of providing the number and sequence of phases, overlaps, and any special logic as described herein and shown on the accompanying plan.
- F. The controller shall be fully programmed and shall be mounted in a control cabinet to operate as a complete and functioning intersection traffic signal control system. The equipment items included shall be, but not necessarily limited to, cabinet, microprocessor controller, monitor, detector amplifiers, power supply, power distribution panel, interior cabinet wiring, and other associated electrical and electronic equipment interior to the control cabinet that is necessary to provide the type of operation described in these specifications.
- G. Dual ring, programmable for both single and dual entry concurrent timing, eight-phase frame or equivalent shall be provided. Volume density and pedestrian timing shall be provided for all phases. MUTCD flashing capability shall be provided. All controls shall be in accordance with the accompanying plans and with NEMA Standards Publication No. TS2-2003.
- H. The intersection controller unit shall be capable of up to 8-phase operation plus four (4) programmable overlaps regardless of whether preemption, coordination or the special programming is used. The intersection cabinet shall be wired for a minimum of twelve and include twelve 3 circuit load switches.

10.2.10.2 Electrical and Operational Aspects:

A. Buffering:

- 1. All logic circuit inputs shall be internally buffered to withstand transients and noise, such as might result from normal usage, without damage to any mechanism components.

B. Timing Features:

- 1. All controller timing parameters shall be fully programmable from the front panel using switches and/or keyboard inputs, and memory storage features shall be nonvolatile under power off conditions for at least 30 days. The locking, nonlocking detection mode and recall switches shall also be accessible on the front panel.

C. Minimum Green Timing:

- 1. The passage timer shall time concurrently with the minimum green timer, so that the duration of the minimum green time is directly adjustable and is independent of the passage time setting.

D. Dual Ring Timing:

1. In the dual ring application, no more than two phases shall be permitted to time concurrently, and no more than one phase per ring. The controller shall provide barrier protection against concurrent timing of two conflicting phases; no phases assigned to one side of the barrier shall be permitted to time concurrently, if a conflict will occur. The controller shall service calls on a single-entry basis, and both rings shall cross the barrier simultaneously in accordance with the following logic:
 - a. Phases timing concurrently shall terminate simultaneously if both have a gap out due to excessive time between actuations.
 - b. Phases timing concurrently shall terminate simultaneously if both have a maximum time out.
 - c. In the event that one phase has not achieved a gap out or maximum time out, the other gapped out phase shall be Permitted to leave the gapped-out condition and retime an extension when an actuation is received.

E. Manual Police Control:

1. If manual control is used, actuation of the manual control shall permit manual advance of the Walk, Pedestrian Clearance, and Green interval terminations only. Manual termination of Yellow or All Red clearance intervals shall not be permitted.

F. Red Revert:

1. An adjustable red revert control shall be provided to assure adequate red display when recycling a phase during call-away or red rest mode operation. A call for service to a different phase shall be preceded by an all-red clearance interval, as programmed.

G. Coordination:

1. The controller shall be capable of operation in progressive coordination systems and mutual coordination and shall contain, but not be limited to, the following external inputs, with all functions brought out:
 - a. Vehicle/Pedestrian Detectors per phase
 - b. Pedestrian Omit per phase
 - c. Phase Omit per phase
 - d. Hold per phase
 - e. Omit Red Clearance per ring

- f. Internal Maximum Inhibit per ring
- g. Maximum II per ring
- h. Red Rest per ring
- i. Stop Timing per ring
- j. Force-Off per ring
- k. Select Minimum Recall per controller
- l. Manual Control per controller
- m. Semi-Mode per controller
- n. External Start per controller

H. Minimum Safe Timings Control:

1. Controllers shall not accept any operator input or stored timing parameters that would result in intervals shorter than the following:
 - a. Yellow clearance - 3.0 seconds
 - b. Minimum walk - 4.0 seconds
 - c. Minimum pedestrian clearance - 6.0 seconds
2. At the beginning of each of the above intervals, the controller shall check the previously stored data against these minimums. If an operator attempts to load an incorrect timing parameter, the controller unit shall output a unique error code on the front panel display. As an alternate to minimum timing control, a coded keyboard entry security feature may be provided.

I. Indicator Lights and Switches:

1. Indicator lights shall be provided to show the status of each signal phase on. Indicator lights shall also be used to show interval status, phase termination information, and presence of vehicular and pedestrian calls for each phase. An indicator light shall also be provided to show the status of the backup battery charging circuit.
2. The controller shall have an on off switch and fuse for AC power.

J. Data Display:

1. The data panel shall be a removable hand-held unit. The panel shall contain a display panel consisting of LED display characters. The face of the display shall be scratch, chemical, and solvent resistant. In the case of writing data or parameters into the controller there shall be a visual indication that the data has been accepted. The number of characters shall be adequate to read or write all data and parameters in decimal format together with a data descriptor in either alpha numeric format, or thumbwheel switch display. A data key shall be provided.

K. Diagnostic Program:

1. A diagnostic program shall be prepared by the manufacturer of the controller unit which will demonstrate the proper operation of all the inputs, outputs, controls and indicators in the controller, and shall have visual conformation on the front panel. The diagnostic program shall be either resident in the controller or furnished as a separate plug in module. A flow chart and listing of the diagnostic routine shall be furnished with the controller unit.

L. Preemption:

1. These specifications detail a preemptor program for use with 2 through 8 phase actuated controller.
2. The preemptor shall be capable of being adaptable to meet the various types of applications such as railroad, fire station, and bridge preempts.
3. The preemptor shall be internal to the controller and shall not alter controller capability or interchangeability under normal operation. The preemptor shall be completely programmable by the user.

4. Preempt Program:

a. Preempt Registration:

- 1) The preempt call input shall initialize preempt registration and start preempt sequence unless a priority call input is activated which would treat the current controller preemptions state as normal operation and reinitiate call registration.

b. Preempt Delay:

- 1) As soon as the preempt call is registered the preempt delay will begin timing unless preempt delay is set zero or preempt delay omit was active during preempt call registration. Delay shall be programmable from 0 to 255 seconds minimum.

- 2) As soon as preempt delay is timed out, current running phases not next to be common in preempt sequence are cleared. If the running phases are green and must be cleared, special programmable values of minimum green, walk and pedestrian intervals will time normal times. Concurrently a special preempt clearance is generated. This clearance is designed for advance track signals and any overlaps that may be green and require yellow clearance.
- c. Entry Clearance Phase(s) Select:
- 1) Two sequential phases or phase pairs shall be available to be run as programmable fixed time intervals as an entry sequence. Two entry options shall be available, each programmable. The entry sequence shall be capable of being omitted entirely.
- d. Dwell Sequence:
- 1) After the entry sequence, the preemptor shall enter the dwell sequence. During the dwell sequence the controller shall cycle between selected phases on a pre-timed or actuated basis. Pedestrian phasing may be normal or omitted entirely. When the dwell sequence is entered, a preempt dwell output shall be generated. The preemptor shall remain in dwell for the length of the dwell extension timer which shall be capable of being held in reset by the preempt call input. Dwell extension shall be omissible by setting the timer to zero.
- e. Exit Sequence:
- 1) After leaving dwell, the controller shall enter one or two programmed exit phases(s) or phase pairs sequences. The sequence will time programmed minimum green and place a vehicle call on all phases not omitted. After timing exit phase minimum green the controller shall time and sequence normally.
- M. Time Base Coordination:
1. These specifications detail a Time Base Coordinator program for use with 2 through 8 phase actuated controller.

2. The units shall allow traffic control equipment to be coordinated without requiring the use of interconnection cables. The units shall coordinate traffic control equipment based on signals from a precise time base which will allow output control signals to be changed at the proper pre-programmed time to achieve the coordinated operation of an intersection with other intersections or the desired operation of an isolated intersection. The coordinators may also use a programmer for a master intersection controller which in turn is interconnected with secondary intersection controllers. The units shall also be capable of providing a command for MUTCD flash, and shall allow a full year program to be initiated and carried out without the necessity of field adjustment for anticipated special events, etc.
3. The time base coordinator shall be internal to the controller and shall not alter controller capability or interchangeability under normal operation. The time base coordinator shall be completely programmable by the user.

10.2.10.3 Monitoring: A conflict monitor meeting the following requirements shall be provided:

A. General:

1. Each cabinet assembly shall be wired to operate with one Malfunction Management Unit (MMU). The MMU shall be a Type 16.
2. This specification sets forth the minimum requirements for a shelf-mountable, sixteen channel, solid-state Malfunction Management Unit (MMU). The MMU shall meet, as a minimum, all applicable sections of the NEMA Standards Publication No. TS2-2003. Where differences occur, this specification shall govern.

B. Monitoring Functions: The following monitoring functions shall be provided in addition to those required by the NEMA Standard Section 4.

1. Dual Indication Monitor:
 - a. Dual Indication monitoring shall detect simultaneous input combinations of active Green (Walk), Yellow, or Red (Don't Walk) field signal inputs on the same channel. In Type 12 mode this monitoring function detects simultaneous input combinations of active Green and Yellow, Green and Red, Yellow and Red, Walk and Yellow, or Walk and Red field signal inputs on the same channel.

- b. When voltages on two inputs of a vehicle channel are sensed as active for more than 450 msec, the MMU shall enter the fault mode, transfer the OUTPUT relay contacts to the Fault position, and indicate the DUAL INDICATION fault. The MMU shall remain in the fault mode until the unit is reset by the RESET button or the EXTERNAL RESET input. When voltages on two inputs of a vehicle channel are sensed as active for less than 200 msec, the MMU shall not transfer the OUTPUT relay contacts to the Fault position.
 - c. When operating with Port 1 communications enabled, Bit #68 (Spare Bit #2) of the Type #129 response frame shall be set to indicate a Dual Indication fault has been detected.
 - d. Dual Indication Monitoring shall be disabled when the RED ENABLE input is not active.
 - e. Dual Indication Programming: Programming shall be provided to enable the Dual Indication monitoring function for the Green and Red, Green and Yellow, and Yellow and Red combinations for each individual channel. In the Type 12 mode, the Walk inputs shall be logically OR'ed with the Green inputs for purposes of Dual Indication programming.
2. Field Check Monitoring: The Field Check Monitor function shall provide two modes of operation, Field Check Fault and Field Check Status. Field Check Monitoring shall be disabled when the RED ENABLE input is not active.
- a. Field Check Monitor: In the Field Check Fault mode, when the field signal input states sensed by the MMU do not correspond with the data provided by the Controller Unit in the Type #0 message for 10 consecutive messages, the MMU shall enter the fault mode, transfer the OUTPUT relay contacts to the Fault position, and indicate the FIELD CHECK FAIL fault. Bit #67 (Spare Bit #1) of the Type #129 response frame shall be set to indicate a Field Check fault has been detected. The MMU shall remain in the fault mode until the unit is reset by the RESET button or the EXTERNAL RESET input.
 - b. Field Check Status: The Field Check Status mode shall work in combination with the other fault monitoring functions of the MMU. When a Conflict, Red Fail, Clearance Fail, or Dual Indication Fail triggers the MMU, the Channel Status Display and Fault Status Display shall correspond to that detected fault. If Field Check errors were detected while the fault was being timed, the inputs on which the Field Check errors were detected shall be reported on the Channel Status display. Bit #67 (Spare Bit #1) of the Type #129 response frame shall also be set to indicate Field Check errors have been detected.

- c. Field Check Programming: Programming shall be provided to enable the Field Check monitoring function for each Green, Yellow, and Red input individually. Programming shall be provided to enable the Field Check monitoring function for channel 2, 4, 6, and 8 Walk input individually when operating in the Type 12 with SDLC mode.
3. Recurrent Pulse Monitoring:
 - a. The Signal Monitor shall detect Conflict, Red Fail, and Dual Indication faults that result from intermittent or flickering field signal inputs. These recurring pulses shall result in a latching fault with the RECURRENT PULSE STATUS indicated along with the resulting Conflict, Red Fail, or Dual Indication status. An option shall be provided to disable the RP detect function for testing purposes.
 - b. When operating with Port 1 communications enabled, Bit #69 (Spare Bit #3) of the Type #129 response frame shall be set to indicate a Recurrent Pulse status has been detected.
4. External Watchdog Monitoring:
 - a. The MMU shall provide the capability to monitor an optional external logic level output from a Controller Unit or other external cabinet circuitry. If the MMU does not receive a change in state on the EXTERNAL WATCHDOG input for 1500 msec (± 100 msec), the MMU shall enter the fault mode, transfer the OUTPUT relay contacts to the Fault position, and indicate the WATCHDOG fault. The MMU shall remain in the fault mode until the unit is reset by the RESET button or the EXTERNAL RESET input. An MMU Power Failure shall reset the WATCHDOG fault state of the monitor. The EXTERNAL WATCHDOG input shall be wired to connector MSB-S.
 - b. When operating with Port 1 communications enabled, Bit #70 (Spare Bit #4) of the Type #129 response frame shall be set to indicate an External Watchdog fault has been detected.
5. Type Fault Monitor:
 - a. The MMU shall verify at power-up that the Type 12 or Type 16 operating mode as determined by the TYPE SELECT input is consistent with the mode set by the last external reset.
 - b. Detection of a Type Fault shall place the MMU into the fault mode, transfer the OUTPUT relay contacts to the Fault position, and indicate the TYPE 12/16 fault. The MMU shall remain in the fault mode until the unit is reset by the RESET button or the EXTERNAL RESET input. An MMU Power Failure shall reset the Type Fault state of the monitor.

6. Flashing Yellow Arrow PPLT Support:

- a. The MMU shall be designed to monitor an intersection with up to four approaches using the four section Flashing Yellow Arrow (FYA) movement outlined by the NCHRP Research Project 3-54 on Protected/Permissive signal displays with Flashing Yellow Arrows. Two cabinet configurations shall be supported for both the MMU Type 16 and Type 12 modes depending on the number of load switches provided and the capabilities of the Controller Unit. In both modes the MMU shall be designed to provide the same fault coverage for the FYA approaches as it does for conventional protected left turn phases including Conflict, Red Fail, Dual Indication, and both Minimum Yellow and Minimum Yellow Plus Red Clearance monitoring.

C. Configuration Options:

1. RYG ONLY Red Fail Option:

- a. The MMU shall provide the capability to exclude the Walk inputs from the Red Fail fault detection algorithm when operating in the Type 12 mode. When the option is selected, the absence of signals on the Green, Yellow, and Red field outputs of a channel will place the MMU unit into the fault mode, transfer the OUTPUT relay contacts to the Fault position, and indicate the RED FAIL fault.

2. LED Signal Threshold Adjust:

- a. The MMU shall provide the capability to sense field inputs signals with the following thresholds:
 - 1) Conflict, Dual Indication Low Threshold Signal Inputs (Green, Yellow, and Red):
 - a) No Detect - less than 15 Vrms
 - b) Detect - greater than 25 Vrms
 - 2) Red Fail High Threshold Signal Inputs (Green, Yellow, and Red):
 - a) No Detect - less than 50 Vrms
 - b) Detect - greater than 70 Vrms

3. CVM LOG Disable Option:

- a. The MMU shall provide a means to disable the logging of CVM fault events.

- D. Display Functions: The following display functions shall be provided in addition to those required by the NEMA TS-2 Standard Section 4. A PC shall not be required to display the following parameters.
1. Field Signal Voltages Display: A mode shall be provided to display the RMS voltage of each field signal input. If the MMU is not in the fault mode, the displayed voltage will be the currently applied RMS voltage. If the MMU is in the fault mode, the displayed voltage will be the applied RMS voltage at the time of the fault.
 2. Cabinet Control Signal Voltages Display: A mode shall be provided to display the RMS voltage of the AC Line and Red Enable, the frequency of the AC Line, and the ambient temperature measured at the MMU. If the MMU is not in the fault mode, the displayed values will be the currently applied values. If the MMU is in the fault mode, the displayed values will be the applied values at the time of the fault.
 3. Field Check Status Display: When the MMU is in the fault mode, a display screen for the front panel display shall be provided to identify all field signal inputs with Field Check status.
 4. Recurrent Pulse Status Display: When the MMU is in the fault mode, a display screen for the front panel display shall be provided to identify all field signal inputs with Recurrent Pulse status.
 5. Configuration Display: A display mode for the front panel display shall be provided that allows the setting and viewing of all MMU configuration parameters. The configuration parameters provided on the program card shall be viewable only. A PC shall not be required to completely program or view the MMU configuration parameters.
 6. Event Logs Display: A display mode for the front panel display shall be provided to review all details of the Previous Fail log, AC Line log, and the Monitor Reset log.
 7. Clock Set Display: A display mode for the front panel display shall be provided to view and set the time and date of the MMU real time clock.
- E. Operating Modes: The MMU shall operate in both the Type 12 mode and Type 16 mode as required by the NEMA Standard.
1. Help System: A context sensitive Help system shall be provided that is activated by a separate Help button. The Main Status display shall respond with text messages relevant to the position in the menu navigation level. When the MMU is in the fault mode the Help system shall respond with the Diagnostic mode described in 3.

2. Setup Wizard: A built-in setup mode shall be provided that automatically configures the Dual Indication enable, Field Check enable, Red Fail enable, and Minimum Yellow Plus Red Clearance enable parameters from user input consisting only of channel assignment and class (vehicle, ped, pp-turn, etc) responses.
3. Diagnostic Wizard: A built-in Diagnostic Wizard shall be provided that displays detailed diagnostic information regarding the fault being analyzed. This mode shall provide a concise view of the signal states involved in the fault, pinpoint faulty signal inputs, and provide guidance on how the technician should isolate the cause of the malfunction. The Diagnostic Wizard shall be automatically invoked when the MMU is in the fault mode and the HELP button is pressed. It shall also be automatically invoked when the MMU is in the Previous Fail (PF) event log display and the HELP button is pressed.
4. TS-1 Type 12 With SDLC Mode: The MMU shall be capable of operating in the Type 12 mode with SDLC communications enabled on Port 1. The Channel Status display shall operate in the Type 12 configuration and provide the field check function for up to four pedestrian Walk inputs.

F. Hardware:

1. Enclosure:
 - a. Size: The MMU shall be compact so as to fit in limited cabinet space. It shall be possible to install on a shelf that is at least 7" deep. Overall dimensions, including mating connectors and harness, shall not exceed 10.5" x 4.5" x 11" (H x W x D).
 - b. Material: The enclosure shall be constructed of sheet aluminum with a minimum thickness of 0.062", and shall be finished with an attractive and durable protective coating. Model, serial number, and program information shall be permanently displayed on the top surface.
2. Electronics:
 - a. Microprocessor Monitor: A microprocessor shall be used for all timing and control functions. Continuing operation of the microprocessor shall be verified by an independent monitor circuit, which shall force the OUTPUT RELAY to the de-energized "fault" state and illuminate the DIAGNOSTIC indicator if a pulse is not received from the microprocessor within a defined period not to exceed 500 ms. Only an MMU Power Failure shall reset the DIAGNOSTIC fault state of the monitor.

- b. RMS Voltage Measurement: High speed sampling techniques shall be used to determine the true RMS value of the AC field inputs. Each AC input shall be sampled at least 32 times per line cycle. The RMS voltage measurement shall be insensitive to phase, frequency, and waveform distortion.
 - c. Sockets: In the interest of reliability, no IC sockets shall be used.
 - d. Battery: All user programmed configuration settings shall be stored in an electrically erasable programmable read-only memory (EEPROM). Designs using a battery to maintain configuration data shall not be acceptable. If a battery is used, it shall provide power only to the real-time clock.
 - e. Field Input Terminals: All 120 VAC field terminal inputs shall provide an input impedance of at least 150K ohms and be terminated with a discrete resistor having a power dissipation rating of 0.5 Watts or greater.
 - f. Component Temperature Range: All electrical components used in the MMU except the front panel Status LCD shall be rated by the component manufacturer to operate over the full NEMA temperature range of -34°C to +74°C.
 - g. Printed Circuit Boards: All printed circuit boards shall meet the requirements of the NEMA Standard plus the following requirements to enhance reliability:
 - 1) All plated-through holes and exposed circuit traces shall be plated with solder.
 - 2) Both sides of the printed circuit board shall be covered with a solder mask material.
 - 3) The circuit reference designation for all components and the polarity of all capacitors and diodes shall be clearly marked adjacent to the component. Pin #1 for all integrated circuit packages shall be designated on both sides of all printed circuit boards.
 - 4) All printed circuit board assemblies shall be coated on both sides with a clear moisture-proof and fungus-proof sealant.
3. Front Panel and Connectors:

- a. MMU Status Display: Four line by 20-character alpha-numeric LCD display shall be provided to report MMU status, time and date, menu navigation, etc. This display shall be separate from the full intersection channel status display.
- b. Full Intersection Channel Status Display: A separate Red, Yellow, and Green indicator shall be provided for the channel status LCD display for each channel to show full intersection status simultaneously. For Type 12 mode operation a separate Red, Yellow, Green and Walk indicator shall be provided for each channel to show full intersection status simultaneously. Individual icons shall also be provided to indicate channels involved in a fault.
- c. LED Display Indicators: The following LED display indicators shall be provided:
 - 1) Power Indicator: The green POWER indicator shall flash at a rate of 2Hz when the AC LINE voltage is below the drop-out level. It shall illuminate steadily when the AC LINE voltage returns above the restore level. It shall extinguish when the AC Line voltage is less than 75 Vrms.
 - 2) Fault Indicator: The red FAULT indicator shall illuminate when the MMU is in the fault mode and the OUTPUT relay has transferred to the Fault position.
 - 3) Port 1 Receive Indicator: The yellow RECEIVE indicator shall illuminate for a 40 msec pulse each time a Port 1 message is correctly received from the Controller Unit.
 - 4) Port 1 Transmit Indicator: The yellow TRANSMIT indicator shall illuminate for a 40 msec pulse each time a Port 1 message is transmitted from the MMU.
 - 5) EIA-232 Receive Indicator: The yellow COMM indicator shall illuminate for a 40 msec pulse each time a message is correctly received on the EIA-232 port.
 - 6) Diagnostic Indicator: The red DIAGNOSTIC indicator shall illuminate when the MMU has detected an internal diagnostic failure.
- d. Controls: All displays, controls, and connectors shall be mounted on the front panel of the MMU.
 - 1) Help Button: A momentary contact button shall be provided the initiates the context sensitive help system described in 1.

e. MS Connectors:

- 1) The MS connectors on the MMU shall have a metallic shell and be attached to the chassis internally. The connectors shall be mounted on the front of the unit in accordance with the following: Connector A shall intermate with a MS 3116 22-55 SZ, and Connector B shall intermate with a MS 3116 16-26 S.
- 2) In the interest of reliability and repair ability, printed circuit board mounted MS connectors shall not be acceptable. Internal MS harness wire shall be a minimum of AWG #22, 19 strands.

- f. EIA-232 Port: The EIA-232 port shall be electrically isolated from the MMU electronics using optical couplers and shall provide a minimum of 2500 Vrms isolation. The connector shall be an AMP 9721A or equivalent 9 pin metal shell D subminiature type with female contacts. Pin assignments shall be as shown in the following table:

<u>Pin</u>	<u>Function</u>
1	DCD*
2	TX DATA
3	RX DATA
4	DTR (Data Terminal Ready)
5	SIGNAL GROUND
6	DSR*
7	DSR*
8	CTS*
9	NC

*Jumper options shall be provided to allow the connection of Pin #4 to be made with Pin #7, and the connection of Pin #8 to be made with Pin #1 and or Pin #6.

4. Monitor Configuration Parameters:

- a. All NEMA standard configuration parameters shall be provided by a program card meeting the requirements of clause 4.3.6 of NEMA TS-2. All configuration parameters for functions and options beyond the requirements of the standard shall be stored in non-volatile memory within the MMU. This memory shall be programmable from the front panel menu driven interface, data downloaded via the EIA-232 port, or loaded from shadow memory located on the program card.

5. Program Card Memory:

- a. The program card supplied with the MMU shall provide non-volatile memory that contains the configuration parameters for the enhanced features of the MMU, such that transferring the program card to a different MMU completely configures that MMU. The non-volatile memory device used on the program card shall not utilize any I/O pins designated as "Reserved" by NEMA TS-2.

G. Event Logging Functions:

1. General:

- a. The MMU shall be capable of storing in non-volatile memory a minimum of 100 events. Each event shall be marked with the time and date of the event. These events shall consist of fault events, AC Line events, reset events, and configuration change events. The capability to assign a four digit identification number and 30 character description to the unit shall be provided. The event logs shall be uploaded to a PC using the serial port of the MMU and Windows based software provided by the manufacturer.
- b. Each event log report shall contain the following information:
 - 1) Monitor ID#: a four digit (0000-9999) ID number and 30 character description assigned to the monitor.
 - 2) Time and Date: time and date of occurrence.
 - 3) Event Number: identifies the record number in the log. Event #1 is the most recent event.

2. Reports:

- a. Monitor Status Report (CS): The Current Status report shall contain the following information:
 - 1) Fault Type: the fault type description.
 - 2) Field Status: the current GYR(W) field status and field RMS voltages if the monitor is not in the fault state, or the latched field status and field RMS voltages and fault channel status at the time of the fault.
 - 3) Cabinet Temperature: the current temperature if the monitor is not in the fault state, or the latched temperature at the time of the fault.
 - 4) C Line Voltage: the current AC Line voltage and frequency if the monitor is not in the fault state, or the AC Line voltage and frequency at the time of the fault.
 - 5) Control Input Status: the current state and RMS voltages of the Red Enable input & Load Switch Flash bit input if the monitor is not in the fault state, or the status latched at the time of the fault.
- b. Previous Fault Log (PF): The Previous Fault log shall contain the following information:

- 1) Fault Type: the fault type description.
 - 2) Field Status: the latched field status with RMS voltages, fault channel status, RP Detect status and Field Check status at the time of the fault.
 - 3) Cabinet Temperature: the latched temperature at the time of the fault.
 - 4) AC Line Voltage: the AC Line voltage & frequency at the time of the fault.
 - 5) Control Input Status: the latched state of the Red Enable input at the time of the fault.
- c. AC Line Event Log (AC): The AC Line log shall contain the following information:
- 1) Event Type: describes the type of AC Line event that occurred.
 - a) Power-up - AC on, monitor performed a cold start
 - b) Interrupt - AC Line < Brownout level
 - c) Restore - AC restored from AC brown-out or AC interruption (AC Off), no cold start
 - 2) AC Line Voltage: the AC Line voltage & frequency at the time of the event.
- d. Monitor Reset Log (MR): The Monitor Reset log shall contain the following information:
- 1) The monitor was reset from a fault by the front panel Reset button, or External Reset input, or a non-latched event clear.
- e. Configuration Change Log (CF): The Configuration Change log shall contain the following information. The log shall also indicate which items have been changed since the last log entry.
- 1) The status of all configuration programming including the contents of the Program Card.
 - 2) Any configuration programming inputs such as 24V Inhibit, Port 1 Disable, Type Select.
 - 3) Configuration Check Value: A unique check value that is based on the configuration of items #a and #b above.

- f. Signal Sequence Log (SSQ): A minimum of five logs shall be provided that graphically display all field signal states and Red Enable for up to 30 seconds prior to the current fault trigger event. The resolution of the display shall be at least 50 milliseconds.

3. Remote Monitor Configuration

- a. Setup Wizard: A setup mode shall be provided by the Windows based software that automatically configures the Dual Indication enable, Field Check enable, Red Fail enable, and Minimum Yellow Plus Red Clearance enable parameters from user input consisting only of channel assignment and class (vehicle, ped, pp-turn, etc) responses.
- b. Upload From File: All configuration parameters for functions and options beyond the requirements of the standard shall be programmable by transferring a file from a PC to the MMU via the front panel EIA-232 port. These parameters shall be stored in nonvolatile memory in the MMU.
- c. Download to File: All configuration parameters for functions and options beyond the requirements of the standard shall be downloadable to a PC by transferring a file from the MMU to a PC via the front panel EIA-232 port.

10.2.10.4 Cabinet and Cabinet Equipment

- A. Each controller shall be furnished completely housed in a door-in-door ground mounted metal cabinet that meets the requirements for a TS2 Type 2 traffic control cabinet assembly. The cabinet assembly shall meet, as a minimum, all applicable sections of the NEMA Standard Publication No. TS2-1992. Where differences occur, this specification shall govern.
- B. Each eight-phase cabinet shall consist of a size P cabinet capable of being base mounted, type three configuration main panel, 8 position (16 loop) detector rack, and auxiliary equipment as defined this specification.
- C. Cabinet Construction:
 - 1. Each cabinet shall be constructed from type 5052-H32 aluminum with a minimum thickness of 0.125 inches.
 - 2. Each cabinet shall be designed and manufactured with materials that will allow rigid mounting, whether intended for pole, base or pedestal mounting. The cabinet must not flex on its mount.

3. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure. Each cabinet door opening must be a minimum of 80 percent of the front surface of the cabinet. A stiffener plate shall be welded across the inside of the main door to prevent flexing.
4. The top of each cabinet shall incorporate a 1-inch slope toward the rear to prevent rain accumulation.
5. Each cabinet shall be supplied with a natural aluminum finish unless otherwise noted. Sufficient care shall be taken in handling to ensure that scratches are minimized. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks, blowholes and other irregularities. All sharp edges shall be ground smooth.
6. All seams shall be sealed with RTV sealant or equivalent material on the interior of the cabinet.
7. All cabinets shall be supplied with two easily removable shelves manufactured from 5052-H32 aluminum. Shelves shall be a minimum of 10 inches deep.
8. The shelf shall have horizontal slots at the rear and vertical slots at the front of the turned down side flange. The shelf shall be installed by first inserting the rear edge of the shelf on the cabinet rear sidewall mounting studs, then lowering the shelf on the front sidewall mounting studs. The shelf shall be held in place by a nylon tie-wrap inserted through holes on the front edge of the shelf and around the front sidewall mounting studs.
9. The front edge of the upper shelf shall have holes punched every 6 inches to accommodate tie wrapping of cables/harnesses.
10. One set of vertical "C" channels shall be mounted on each interior wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring-mounted nuts or studs. All mounting rails shall extend to within 7 inches of the top and bottom of the cabinets. Sidewall rail spacing shall be 7.88 inches center-to-center. Rear wall rail spacing shall be 18.50 inches center-to-center. (Size 5 and 6 cabinets) or 7.88 inches in size 3 cabinets. The rails shall be mounted to the cabinet with bolts (pressed into plates welded to interior of cabinet) to form a modular assembly.
11. The main door and police door-in-door shall close against a weatherproof and dust-proof, closed-cell neoprene gasket seal. The gasket material for the main door shall be a minimum of 0.250 inches thick by 1.00 inch wide. The gasket material for the police door shall be a minimum of 0.250 inches thick by 0.500 inches wide. The gaskets shall be permanently bonded to the cabinet.

12. The lower section of the cabinet door shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient airflow per the rated fan capacity. Louvers must satisfy the NEMA rod entry test for 3R ventilated enclosures. A non-corrosive, vermin- and insect-proof, removable air filter shall be secured to the air entrance. The filter shall fit snugly against the cabinet door wall.
13. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall not exceed 0.125 inches in diameter.
14. The main door hinge shall be a one-piece, continuous piano hinge with a stainless steel pin running the entire length of the door. The hinge shall be attached in such a manner that no rivets or bolts are exposed.
15. The main door of a size 5 or larger cabinet shall include a mechanism capable of holding the door open at approximately 90, 125, and 150 degrees under windy conditions. Manual placement of the mechanism shall not be required by the field technician. The main door of a size 3 cabinet shall include a mechanism capable of holding the door open at approximately 90 and 150 degrees under windy conditions.
16. The main door shall be equipped with a Corbin tumbler lock number 1548-1. Two keys shall be supplied.
17. The police door-in-door shall be provided with a treasury type lock Corbin No. R357SGS or exact equivalent and one key.
18. All cabinet inside and outside surfaces shall be primed with phosphate treatment and primer. After priming, all exterior surfaces shall receive a minimum of 2 coats of rust resistant silver grey enamel and interior surfaces shall be furnished with rust resistant high gloss white enamel.
19. Each cabinet shall be of sufficient size to accommodate all equipment. At a minimum, the minimal cabinet size is as follows:
 - a. Size P Cabinet: 52" H x 44" W x 24" D

D. Terminals and Facilities / Main Panel Design and Construction:

1. The main panel shall be constructed from 5052-H32 brushed aluminum of 0.125 inches minimum thickness and formed so as to minimize any flexing when plug-in components are installed.
2. All position main panels shall be hinged at the bottom to allow easy access to all wiring on the rear of the panel.
3. The main panel shall be fully wired in the following configuration:

- a. Type 3 Configuration: Twelve load switch sockets, six flash transfer relay sockets, one flasher socket and two main panel BIU rack slots.
4. All load switch and flash transfer relay socket reference designators shall be silk-screen labeled on the front and rear of the main panel to match drawing designations. Socket pins shall be marked for reference on the rear.
5. Up to eight load switch sockets may be positioned horizontally or stacked in two rows on the main panel. Main panels requiring more than eight load switch sockets shall be mounted in two horizontal rows.
6. All load switches shall be supported by a bracket extending at least half the length of the load switch.
7. Rack style mounting shall be provided to accommodate the required BIUs per the configuration listed in section 3.3 above. A dual-row, 64-pin female DIN 41612 Type B connector shall be provided for each BIU rack position. Card guides shall be provided for both edges of the BIU. Terminal and facilities BIU mounting shall be an integral part of the main panel. Detector rack BIU mounting shall be an integral part of the detector rack.
8. All BIU rack connectors shall have pre-wired address pins corresponding to the requirements of the TS2 specification. The address pins shall control the BIU mode of operation. BIUs shall be capable of being interchanged with no additional programming.
9. The 12- load switch position main panels shall have all field wires contained on two rows of horizontally mounted terminal blocks. The upper row shall be wired for the pedestrian and overlap field terminations. The lower row shall be reserved for phase one through phase eight vehicle field terminations.
10. All field output circuits shall be terminated on a barrier type terminal block with a minimum rating of 60 amps.
11. All field input/output I/O terminals shall be identified by permanent alphanumeric labels. All labels shall use standard nomenclature per the NEMA TS2 specification.
12. All field flash sequence programming shall be accomplished at the field terminals with the use of a screwdriver only.
13. Field terminal blocks shall be wired to use four positions per vehicle or overlap phase (green, yellow, red, flash). It shall not be necessary to de-bus field terminal blocks for flash programming.
14. It shall also be possible to program which flasher circuit the phase shall be connected to.

15. The main panel shall contain at least one flasher socket (silk screen labeled) capable of operating a 15-amp, 2-pole, NEMA solid state flasher. The flasher shall be supported by a bracket that extends at least half its length.
16. One RC network shall be wired in parallel with each group of three flash-transfer relays and any other relay coils.
17. All logic-level, NEMA-controller and Malfunction Management Unit input and output terminations on the main panel shall be permanently labeled. Cabinet prints shall identify the function of each terminal position.
18. At a minimum, two 20-position terminal blocks shall be provided at the top of the main panel to provide access to the controller unit's programmable and non-programmable I/O. Terminal blocks for DC signal interfacing shall have a number 6-32 x 7/32 inch screw as minimum.
19. All main panel wiring shall conform to the following wire size:
 - a. Green/Walk load switch output - 14 gauge
 - b. Yellow load switch output - 14 gauge
 - c. Red/Don't Walk load switch output - 14 gauge
 - d. MMU (other than AC power) - 22 gauge
 - e. Controller I/O - 22 gauge
 - f. AC Line (power panel to main panel, 1 for each 4 LS) - 10 gauge
 - g. AC Line (main panel) - 14 gauge
 - h. AC Neutral (power panel to main panel) - 10 gauge
 - i. Earth ground (power panel) - 8 gauge
 - j. Logic ground - 22 gauge
 - k. Flash programming, flasher terminal - 14 gauge
 - l. Flash programming, field terminal - 14 gauge
20. All wiring, 14 AWG and smaller, shall conform to MIL-W-16878/1, type B/N, 600V, 19-strand tinned copper. The wire shall have a minimum of 0.010 inches thick PVC insulation with clear nylon jacket and rated to 105 degrees Celsius. All 12 AWG and larger wire shall have UL listed THHN/THWN 90 degrees Celsius, 600V, 0.020 inches thick PVC insulation and clear nylon jacketed.

21. All controller and Malfunction Management Unit cables shall be of sufficient length to allow the units to be placed on either shelf or the outside top of the cabinet in the operating mode. Connecting cables shall be sleeved in a braided nylon mesh. The use of exposed tie-wraps or interwoven cables are unacceptable.
22. All cabinet configurations shall be provided with enough RS-485 Port 1 communication cables to allow full capabilities of that cabinet. Each communication cable connector shall be a 15-pin metal shell D subminiature type. The cable shall be a shielded cable suitable for RS-485 communications.
23. All main panels shall be pre-wired for a Type-16 Malfunction Management Unit.
24. Provide necessary terminal for video detection.
25. All wiring shall be neat in appearance. All cabinet wiring shall be continuous from its point of origin to its termination point. Butt type connections/splices are not acceptable.
26. All control cables shall be protected by a nylon jacket or equivalent protection to prevent any contact with cabinet metal shelves, doors and any other sharp corners.
27. All connecting cables and wire runs shall be secured by mechanical clamps. Stick-on type clamps are not acceptable.
28. The grounding system in the cabinet shall be divided into three separate circuits (AC Neutral, Earth Ground, and Logic Ground). These ground circuits shall be connected together at a single point as outlined in the NEMA TS2 Standard.
29. All pedestrian pushbutton inputs from the field to the controller shall be opto-isolated through the BIU and operate at 12 VAC.
30. All wire (size 16 AWG or smaller) at solder joints shall be hooked or looped around the eyelet or terminal block post prior to soldering to ensure circuit integrity. Lap joint soldering is not acceptable.

E. Power Panel Design and Construction:

1. The power panel shall consist of a separate, wholly enclosed module, securely fastened to the right sidewall of the cabinet. The power panel shall be wired to provide the necessary power to the cabinet, controller, Malfunction Management Unit, cabinet power supply and auxiliary equipment.

F. Auxiliary Cabinet Equipment:

1. The cabinet shall be provided with a thermostatically controlled (adjustable between 80-150 degrees Fahrenheit) ventilation fan in the top of the cabinet plenum. The fan shall be a ball bearing type fan and shall be capable of drawing a minimum of 100 cubic feet of air per minute. The fan unit shall not crack, creep, warp or have bearing failure within a 7-year duty cycle. The maximum noise level shall be less than 40 decibels. The fan unit shall be corrosion resistant.
2. A 25-watt incandescent lamp shall be included. The lamp shall be wired to a door activated switch mounted near the top of the door.
3. Provide a 15-amp circuit breaker for auxiliary equipment, 20-amp circuit breaker for street lights and a non-GFI outlet for additional equipment.
4. Provide all necessary hardware to accommodate fiber optic interconnect and Ethernet communications.
5. Provide a photocell and contactor for street lighting powered from signal cabinet.
6. Provide an Ethernet switch and a fiber/Ethernet modem.
7. Install all additional control units in cabinet per plans. Control units include, but are not limited to, audible pedestrian push button control unit, emergency vehicle preemption control device including card rack, and video detection processor.
8. Provide a sealable print pouch mounted to the door of the cabinet. The pouch shall be of sufficient size to accommodate one complete set of cabinet prints.
9. Provide two sets of complete and accurate cabinet drawings with each cabinet.

G. Vehicle Detection:

1. A vehicle detector amplifier rack shall be provided in each cabinet. Detector racks shall be in the following configuration:
 - a. Shall support up to 16 channels of loop detection and one BIU.
2. Each cabinet shall contain detector interface panels for the purpose of connecting field loops and vehicle detector amplifiers. The panels shall be manufactured from FR4 G10 fiberglass, 0.062 inches thick, with a minimum of 2 oz. of copper for all traces.

3. One 16-position interface panel shall be provided for each 16-channel rack. The interface panel shall be secured to a mounting plate and attached to the left sidewall of the cabinet.
4. Each interface panel shall allow for the connection of eight or sixteen independent field loops. A ground bus terminal shall be provided between each loop pair terminal to provide a termination for the loop lead-in cable ground wire.
5. Lightning protection device mounting holes shall be provided to accommodate an Edco SRA-16C, or Edco SRA-6, or Edco LCA-6, or a varistor lightning protection device. Lightning protection devices shall not be provided.
6. A cable consisting of 20 AWG twisted pair wires shall be provided to enable connection to and from the panel to a detector rack. The twisted pair wires shall be color-coded red and white wires.
7. All termination points shall be identified by a unique number and silk screened on the panel.
8. Each detector rack shall be powered by the cabinet power supply (refer to requirements below).

H. Cabinet Test Switches and Police Panel:

1. A test switch panel shall be mounted on the inside of the main door. The test switch panel shall provide the following:
 - a. AUTO/FLASH SWITCH. When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall not be stop timed when in flash.
 - b. STOP TIME SWITCH. When applied, the controller shall be stop timed in the current interval.
 - c. CONTROL EQUIPMENT POWER ON/OFF. This switch shall control the controller, MMU, and cabinet power supply AC power.
2. The police door switch panel shall contain the following:
 - a. SIGNALS ON/OFF SWITCH. In the OFF position, power shall be removed from signal heads in the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
 - b. FLASH/NORMAL SWITCH. In the flash position, power shall not be removed from the controller and stop time shall be applied.

3. All toggle type switches shall be heavy duty and rated 15 amps minimum. Single- or double-pole switches may be provided, as required.
 4. Any exposed terminals or switch solder points shall be covered with a non-flexible shield to prevent accidental contact.
 5. All switch functions must be permanently and clearly labeled.
 6. All wire routed to the police door-in-door and test switch pushbutton panel shall be adequately protected against damage from repetitive opening and closing of the main door.
 7. All test switch panel wiring shall be connected to the main panel via a multiple pin type connector.
- I. Auxiliary Devices:
1. Load Switches:
 - a. Load switches shall be solid state and shall conform to the requirements of Section 6.2 of the NEMA TS2 Standard.
 - b. Load switches shall be dedicated per phase. The use of load switches for other partial phases is not acceptable.
 2. Flashers:
 - a. The flasher shall be solid state and shall conform to the requirements of section 6.3 of the NEMA TS2 Standard.
 3. Flash Transfer Relays:
 - a. All flash transfer relays shall meet the requirements of Section 6.4 of the NEMA TS2 Standard.
 - b. The coil of the flash transfer relay must be deenergized for flash operation.
 4. Bus Interface Units:
 - a. All Bus Interface Units (BIUs) shall meet the requirements of Section 8 of the NEMA TS2 Standard.
 - b. The full complement of Bus Interface Units shall be supplied with each cabinet to allow for maximum phase and function utilization for which the cabinet is designed. BIU's shall be from the same manufacture as the controller manufacture used in the City.

- c. Each Bus Interface Unit shall include power on, transmit and valid data indicators. All indicators shall be LEDs.
5. Cabinet Power Supply:
- a. The cabinet power supply shall meet the requirements of Section 5.3.5 of the NEMA TS2 Standard.
 - b. The cabinet power supply shall provide LED indicators for the line frequency, 12 VDC, 12 VAC, and 24 VDC outputs.
 - c. The cabinet power supply shall provide (on the front panel) jack plugs for access to the +24 VDC for test purposes.
 - d. One cabinet power supply shall be supplied with each cabinet assembly.

10.2.11 VIDEO VEHICLE DETECTION SYSTEM

10.2.11.1 Description:

- A. Furnish a system that detects vehicles on a roadway using only video images of vehicle traffic. Include all materials necessary for a completely functional vehicle detection system including but not limited to cameras, processors, video monitor, mounting hardware, power cable, and coaxial cable.

10.2.11.2 General Requirements:

- A. System Hardware:
 1. The video detection system (VDS) shall consist of up to four video cameras, a video detection processor (VDP) capable of processing from one to four video sources, either wired or wireless, wireless video transmission receiver, receiver antenna and a pointing device.
 2. The Video Vehicle Detection System shall consist of the Iteris Vantage Edge2 system.
- B. System Software:
 1. The system shall include software that detects vehicles in multiple lanes using only the video image. Detection zones shall be defined using only an on-board video menu and a pointing device to place the zones on a video image. Up to 24 detection zones per camera view shall be available. A separate computer shall not be required to program the detection zones.

10.2.11.3 Functional Capabilities:

- A. System Configuration:

1. The VDS will be deployed at locations where site conditions and roadway geometry vary. The VDS system may also be deployed at locations where existing cabinets or equipment exist. Existing site configurations will dictate the availability of cabinet space and VDS usage.
2. The proposed VDS shall be available in various configurations to allow maximum deployment flexibility. Each configuration shall have identical user interface for system setup and configuration. The communications protocol to each configuration shall be identical and shall be hardware platform independent. The proposed VDS shall have multiple configurations available for deployment.

Table 1 - VDS Configuration

Description	No. Video Inputs	No. Video Outputs	Mounting Configuration	Power Supply Requirements
Single-Channel Rack Mounted	1	1	Rack Mount (Type 170 or NEMA TS-1, TS-2 Racks)	12/24 VDC Power From Rack
Dual-Channel Rack Mounted	2	1	Rack Mount (Type 170 or NEMA TS-1, TS-2 Racks)	12/24 VDC Power From Rack
Quad-Channel Rack Mounted	4	1	Rack Mount (Type 170 or NEMA TS-1, TS-2 Racks)	12/24 VDC Power From Rack

- a. An option to have wireless video transmission between the camera sensor and VDP shall also be available from the VDS manufacturer.
- b. Wired camera systems shall be able to transmit NTSC or PAL video signals, with minimal degradation, up to 1000 feet under ideal conditions.
- c. Wireless camera systems shall be able to transmit an NTSC video signal, with minimal signal degradation, up to 500 feet under normal conditions and up to 900 feet under ideal electromagnetic interference conditions. Adjacent sources of electromagnetic radiation, or the absence of a direct line of sight between transmitter and receiver antennas, may result in video signal degradation.

B. System Interfaces:

1. The following interfaces shall be provided for each of the configurations identified in Table 1, above.

- a. Video Input: Each video input shall accept RS170 (NTSC) or CCIR (PAL) signals from an external video source (camera sensor or VCR). The interface connector shall be BNC type and shall be located on the front of the video processing unit. The video input shall have the capability to select 75-ohm or high impedance (Hi-Z) termination.
- b. Video Lock LED: A LED indicator shall be provided to indicate the presence of the video signal. The LED shall illuminate upon valid video synchronization and turn off when the presence of a valid video signal is removed.
- c. Video Output: One video output shall be provided. The video output shall be RS170 or CCIR compliant and shall pass through the input video signal. For multi-channel video input configurations, a momentary push-button shall be provided on the front panel to toggle through each input video channel. In the absence of a valid video signal, the channel shall be skipped and the next valid video signal shall be switched. The video output shall have the capability to show text and graphical overlays to aid in system setup. The overlays shall display real-time actuation of detection zones upon vehicle detection or presence. Overlays shall be able to be turned off by the user. Control of the overlays and video switching shall also be provided through the serial communications port. The video output interface connector shall be BNC type.
- d. Serial Communications: A serial communications port shall be provided on the front panel. The serial port shall be compliant with EIA232 electrical interfaces and shall use a DB9 type connector. The serial communications interface shall allow the user to remotely configure the system and/or to extract calculated vehicle/roadway information. The interface protocol shall be documented or interface software shall be provided. The interface protocol shall support multi-drop or point-to-multipoint communications. Each VDS shall have the capability to be addressable.
- e. Contact Closure Output: Open collector contact closure outputs shall be provided. Four (4) open collector outputs shall be provided for the single, dual or quad channel rack-mount configuration. Additionally, the VDPs shall allow the use of extension modules to provide up to 24 open collector contact closures per camera input. Each open collector output shall be capable of sinking 30 mA at 24 VDC. The open collector output will be used for vehicle detection indicators as well as discrete outputs for alarm conditions.

- f. Detection LEDs: LEDs shall be provided on the front panel. The LEDs shall illuminate when a contact closure output occurs. Rack-mounted video processors shall have a minimum of four (4) LEDs. Rack-mounted extension modules shall have two (2) or four (4) LEDs to indicate detection.
- g. Mouse Port: A USB mouse shall be provided on the front panel of the rack mount video processing unit. The mouse port shall not require special mouse software drivers. The mouse port shall be used as part of system setup and configuration. A mouse shall be provided with each video processor.

C. General System Functions:

1. Detection zones shall be programmed via an on-board menu displayed on a video monitor and a pointing device connected to the VDP. The menu shall facilitate placement of detection zones and setting of zone parameters or to view system parameters. A separate computer shall not be required for programming detection zones or to view system operation.
2. The VDP shall store up to three different detection zone patterns. The VDP can switch to any one of the three different detection patterns within 1 second of user request via menu selection with the pointing device.
3. The VDP shall detect vehicles in real time as they travel across each detection zone.
4. The VDP shall have an EIA232 port for communications with an external computer. The VDP EIA232 port shall be multi-drop capable.
5. The VDP shall accept new detection patterns from an external computer through the EIA232 port when the external computer uses the correct communications protocol for downloading detection patterns. A Microsoft Windows-based software designed for local or remote connection and providing video capture, real-time detection indication and detection zone modification capability shall be provided with the system.
6. The VDP system shall have the capability to automatically switch to any one of the stored configurations based on the time of day which shall be programmable by the user.
7. The VDP shall send its detection patterns to an external computer through the EIA232 port when requested when the external computer uses the correct communications protocol for uploading detection patterns.

8. The VDP shall default to a safe condition, such as a constant call on each active detection channel, in the event of unacceptable interference with the video signal.
9. The system shall be capable of automatically detecting a low-visibility condition such as fog and respond by placing all defined detection zones in a constant call mode. A user-selected output shall be active during the low-visibility condition that can be used to modify the controller operation if connected to the appropriate controller input modifier(s). The system shall automatically revert to normal detection mode when the low-visibility condition no longer exists.

D. Vehicle Detection:

1. Up to 24 detection zones per camera input shall be supported and each detection zone can be sized to suit the site and the desired vehicle detection region.
2. The VDP shall provide up to 24 open collector output channels per camera input using one or more extension modules.
3. A single detection zone shall be able to replace multiple inductive loops and the detection zones shall be OR'ed as the default or may be AND'ed together to indicate vehicle presence on a single phase of traffic movement.
4. Placement of detection zones shall be done by using only a pointing device, and a graphical interface built into the VDP and displayed on a video monitor, to draw the detection zones on the video image from each video camera. No separate computer shall be required to program the detection zones.
5. Up to 3 detection zone patterns shall be saved for each camera within the VDP memory. The VDP's memory shall be non-volatile to prevent data loss during power outages.
6. The selection of the detection zone pattern for current use shall be done through a menu. It shall be possible to activate a detection zone pattern from VDP memory and have that detection zone pattern displayed within 1 second of activation.
7. The VDP system shall have the capability to automatically switch to any one of the stored configurations based on the time of day which shall be programmable by the user.
8. When a vehicle is detected within a detection zone, the corners of the detection zone shall activate on the video overlay display to confirm the detection of the vehicle.

9. Detection shall be at least 98% accurate in good weather conditions, with slight degradation possible under adverse weather conditions (e.g. rain, snow, or fog) which reduce visibility. Detection accuracy is dependent upon site geometry, camera placement, camera quality and detection zone location, and these accuracy levels do not include allowances for occlusion or poor video due to camera location or quality.
10. The VDP shall provide dynamic zone reconfiguration (DZR). DZR enables normal operation of existing detection zones when one zone is being added or modified during the setup process. The VDP shall output a constant call on any detector channel corresponding to a zone being modified.
11. Detection zone setup shall not require site specific information such as latitude and longitude to be entered into the system.
12. The VDP shall process the video input from each camera at 30 frames per second. Multiple camera processors shall process all video inputs simultaneously.
13. The VDP shall output a constant call for each enabled detector output channel if a loss of video signal occurs. The VDP shall output a constant call during the background learning period.
14. Detection zone outputs shall be configurable to allow the selection of presence, pulse, extend, and delay outputs. Timing parameters of pulse, extend, and delay outputs shall be user definable between 0.1 to 25.0 seconds.
15. Up to six detection zones per camera view shall have the capability to count the number of vehicles detected. The count value shall be internally stored for later retrieval through the EIA232 port. The zone shall also have the capability to calculate and store average speed and lane occupancy at bin intervals of 10 seconds, 20 seconds, 1 minute, 5 minutes, 15 minutes, 30 minutes and 60 minutes.

10.2.11.4 Hardware:

A. General:

1. The VDP and extension module (EM) shall be specifically designed to mount in a standard detector rack, using the edge connector to obtain power and provide contact closure outputs. No adapters shall be required to mount the VDP or EM in a standard detector rack. Detector rack rewiring shall not be required.

2. The EM shall be available to avoid the need of rewiring the detector rack, by enabling the user to plug an extension module into the appropriate slot in the detector rack. The extension module shall be connected to the VDP by a 8 wire cable with modular connectors, and shall output contact closures in accordance with user selectable channel assignments. The EM is available in 2, 4, or 24 channel configurations.

B. Input Power:

1. The VDP and EM shall be powered by 12/24 volts DC. VDP power consumption shall not exceed 7 watts. The EM power consumption shall not exceed 2.5 watts.

C. Detection Outputs:

1. The VDP and EM shall include detector output pin out compatibility with industry standard detector racks. The 24-channel EM shall provide output through a 37-pin “D” connector on the front panel.

D. Video Inputs:

1. VDPs shall include one, two or four BNC video input connections suitable for composite video inputs. The video input shall include a switch selectable 75-ohm or high impedance termination to allow camera video to be routed to other devices, as well as input to the VDP for vehicle detection.

E. Video Outputs:

1. The front of the VDP shall include one BNC video output providing real time video output that can be routed to other devices.

F. Mechanical and Environmental:

1. The VDP shall operate satisfactorily in a temperature range from -34 °C to +74 °C and a humidity range from 0%RH to 95%RH, non-condensing as set forth in NEMA specifications.
2. The front panel of the VDP shall have detector test switches to allow the user to place calls on each channel. The test switch shall be able to place either a constant call or a momentary call depending on the position of the switch.
3. The front face of the VDP shall contain indications, such as LED displays, to enable the user to view real time detections for each channel of detection when the system is operational.

4. The VDP shall include an EIA232 port for serial communications with a remote computer. This port shall be a 9-pin "D" subminiature connector on the front of the VDP.
5. The VDP shall utilize non-volatile memory technology to enable the loading of modified or enhanced software through the EIA232 port and without modifying the VDP hardware.

G. Video Detection Camera:

1. Video detection cameras used for traffic detection shall be furnished by the video detection processor (VDP) supplier and shall be qualified by the supplier to ensure proper system operation.
2. The camera shall produce a useable video image of the bodies of vehicles under all roadway lighting conditions, regardless of time of day. The minimum range of scene luminance over which the camera shall produce a useable video image shall be the minimum range from nighttime to daytime, but not less than the range 1.0 lux to 10,000 lux.
3. The imager luminance signal to noise ratio (S/N) shall be more than 50 dB.
4. The camera shall be digital signal processor (DSP) based and shall use a CCD sensing element and shall output color video with resolution of not less than 470 TV lines. The CCD imager shall have a minimum effective area of 768(h) x 494(v) pixels.
5. The camera shall include an electronic shutter control based upon average scene luminance and shall be equipped with an auto-iris lens that operates in tandem with the electronic shutter.
6. The camera shall utilize automatic white balance.
7. The camera shall include a variable focal length lens with variable focus that can be adjusted, without opening up the camera housing, to suit the site geometry by means of a portable interface device designed for that purpose and manufactured by the detection system supplier.
8. The horizontal field of view shall be adjustable from 5.4 to 50.7 degrees. This camera configuration may be used for the majority of detection approaches in order to minimize the setup time and spares required by the user. The lens shall be a 10x zoom lens with a focal length of 3.8mm to 38.0 mm.
9. The lens shall also have an auto-focus feature with a manual override to facilitate ease of setup.

10. The camera shall incorporate the use of preset positioning that store zoom and focus positioning information. The camera shall have the capability to recall the previously stored preset upon application of power.
11. The camera electronics shall include automatic gain control (AGC) to produce a satisfactory image at night.
12. The camera shall be housed in a weather-tight sealed enclosure. The enclosure shall be made of 6061 anodized aluminum. The housing shall be field rotatable to allow proper alignment between the camera and the traveled road surface.
13. The camera enclosure shall be equipped with a sunshield. The sunshield shall include a provision for water diversion to prevent water from flowing in the camera's field of view. The camera enclosure with sunshield shall be less than 6" diameter, less than 18" long, and shall weigh less than 6 pounds when the camera and lens are mounted inside the enclosure.
14. The enclosure shall be design so that the pan, tilt and rotation of the camera assembly can be accomplished independently without affecting the other settings.
15. The camera enclosure shall include a proportionally controlled heater, where the output power of the heater varies with temperature, to assure proper operation of the lens functions at low temperatures and prevent moisture condensation on the optical faceplate of the enclosure.
16. The glass face on the front of the enclosure shall have an anti-reflective coating to minimize light and image reflections.
17. The glass face shall also employ a special coating to minimize the buildup of environmental debris such as dirt and water.
18. When mounted outdoors in the enclosure, the camera shall operate satisfactorily in a temperature range from -34 °C to +60 °C and a humidity range from 0% RH to 100% RH. Measurement of satisfactory video shall be based upon VDP system operation.
19. The camera shall be powered by 120-240 VAC 50/60 Hz. Power consumption shall be 45 watts or less under all conditions. An optional DC power configuration shall be available for 12 VDC operation.

20. Recommended camera placement height shall be 33 feet (or 10 meters) above the roadway, and over the traveled way on which vehicles are to be detected. For optimum detection the camera should be centered above the traveled roadway. The camera shall view approaching vehicles at a distance not to exceed 350 feet for reliable detection (height to distance ratio of 10:100). Camera placement and field of view (FOV) shall be unobstructed and as noted in the installation documentation provided by the supplier.
21. The camera enclosure shall be equipped with separate, weather-tight connections for power and video cables at the rear of the enclosure. These connections may also allow diagnostic testing and viewing of video at the camera while the camera is installed on a mast arm or pole using a lens adjustment module (LAM) supplied by the VDP supplier. Video and power shall not reside within the same connector.
22. The video signal shall be fully isolated from the camera enclosure and power cabling.

H. Video Monitor:

1. The monitor shall be a flat screen color video monitor with a minimum 9" diagonal picture display. It shall support EIA standards RS-170 composite video signal (1.0 v p-p, 75 OHM).
2. It shall have a resolution of 900 lines at center. Video bandwidth shall be >11 MHz. Loop through connectors shall be provided, and both input and output connectors shall be BNCs.
3. The monitor power source shall be 120 VAC +/- 10%, 60 Hz. Power consumption shall not be greater than 18 W. Ambient operating temperature shall be +50 to +122 degrees Fahrenheit.
4. Located on the front panel, the controls shall be on/off, contrast, bright, vertical hold, and horizontal hold. Rear panel shall have controls for vertical size, vertical linearity and scan switch.
5. Dimensions shall not exceed 9" (W), 10" (H), and 7" (D). Weight shall not exceed 10 pounds.

I. Coaxial Cable:

1. The coaxial cable to be used between the camera and the VDP in the traffic cabinet shall be Belden 8281. This cable shall be suitable for installation in conduit or overhead with appropriate span wire. BNC plug connectors should be used at both the camera and cabinet ends. The coaxial cable, BNC connector, and crimping tool shall be approved by the supplier of the video detection system, and the manufacturer's instructions must be followed to ensure proper connection.

J. Power Cable:

1. The power cabling shall be 16 AWG three conductor cable with a minimum outside diameter of 0.325 inch and a maximum diameter of 0.490 inch. The cabling shall comply with the National Electric Code, as well as local electrical codes. Cameras may acquire power from the luminaire if necessary.

10.2.12 EMERGENCY VEHICLE PREEMPTION SYSTEM

10.2.12.1 Description:

- A. Furnish an Emergency Vehicle Preemption (EVP) System as shown on the plans and as hereinafter provided.

10.2.12.2 Product Requirements:

- A. The Emergency Vehicle Preemption System shall include GTT Opticom discriminator Model 454, Model 711 detectors, Model 138 detector cable, and LED confirmation lights.

10.2.13 AUDIBLE PEDESTRIAN PUSH BUTTON SYSTEM

10.2.13.1 Description:

- A. Furnish vandal resistant Audible Pedestrian Signal and push button assemblies that provide a vibro-tactile ADA compliant 2" push button with a raised directional arrow and custom message sounds during the walk cycle. During the "ped clearance" and "don't walk" intervals locating sounds shall be emitted from inside the unit via a weatherproof speaker. The unit shall use existing 2-pair push button wires and interface with a single control unit located in the traffic control cabinet.

10.2.13.2 Audible Pedestrian Signal Push Button:

- A. Sunlight visible "Red LED" lights when the button is pushed and remains on until the walk phase goes into effect.
- B. Audible "Tick" sound is heard each time the button is pushed, as well as tactile feedback given.

- C. Extended push button can turn on boost volumes, and/or mute all sounds except those on actuated crosswalk.
- D. All audible sounds automatically adjust in volume in relation to ambient noise level.
- E. Audio Amplifier Power Output: 15 W, 8 ohm, weatherproof.
- F. Provide separate volume controls for locator tone, walk message, Clearance and extended button volumes.
- G. Volume Control Automatic Adjustment Range: 35 dB max.
- H. Microphone For Ambient Noise approximate frequency range: 170 Hz to 2.3 kHz.
- I. Jumper Selectable Options: Chirp, Cuckoo, Walk Message, Rest In Walk, Location Message, Extended Push of Activation and Locating Tone.
- J. Audible Locating Tone: 880 Hz plus harmonic, 0.1-second duration, 1-second interval. Operates during ped clearance and don't walk interval. All tones shall meet MUTCD requirements.
- K. Option standard locating tone, custom sound or verbal count down during PED Clearance and multiple voice message languages. Provide custom walk message, direction of travel and/or emergency vehicle warning message.
- L. All sounds are synchronized. Sound alternate in front of the pedestrian and behind the pedestrian during the walking and/or ped clearance phase ("Ping Pong" feature).
- M. Temperature Range: -40° F to 165° F.
- N. Wind sensor to prevent runaway volume during windy conditions.
- O. System can self-test and fault report to a remote site for real-time monitoring and system maintenance. Conflict Detect: WALK indication is ignored in the event of a WALK/DON'T WALK conflict.
- P. Pedestrian Push Button Interface accepts 12 to 48 AC/DC. Capable of global configuration changes and/or single unit changes.
- Q. Dimensions: Length: 14.09", Width: 5.4", Depth: 2.2".
- R. Frame: cast aluminum, powder coated yellow.
- S. Face Plate: aluminum, powder coated, painted black background.
- T. Arrow Push Button: aluminum, powder coated. Direction of arrow can adjust to one of four directions.

- U. Push Button: ADA compliant, cast aluminum, nickel plated, powder coated. Vibrator Power shall be 15 VDC pulsed. Operates during walk interval only. Speaker: 8 ohm, 15 W MAX, weather proof.
- V. Comparable to Polara “EZ Communicator Navigator 2-Wire Pedestrian Push Button Station” or approved equal.

10.2.13.3 Central Control Unit:

- A. The control unit is the power supply and signaling interface between the existing intersection traffic controller and the pedestrian push button unit. The pedestrian control unit shall control up to 12 push button units and 4 pedestrian phases. The pedestrian control unit shall be housed inside the existing traffic controller cabinet and powered by the AC supply mains (115 VAC). The interface cable shall be included and considered incidental to the contract.
- B. Pedestrian Walk/Don’t Walk Inputs; Optically Isolated 80 – 150 Volts AC/DC 5mA Maximum.
- C. General Purpose Outputs and Pedestrian Outputs; Optically Isolated 36 Volts AC/DC Peak, .3A Solid State Fused Contact Closure.
- D. Fault Output; Normally Open and Closed Relay Contacts 125 Volts AC/DC 1A Maximum.
- E. 4 Phase Pedestrian Push Button Power Output; Nominal 22 Volts DC, Short Circuit Protected – Auto Recovering.
- F. General Purpose Inputs; 10 – 36 Volts AC/DC Peak 10mA Maximum, Optically Isolated.
- G. Comparable to Polara “EZ Communicator Navigator 2-Wire Central Control Unit” or approved equal.

10.2.13.4 TEMPORARY TRAFFIC SIGNAL PRODUCTS

10.2.13.5 General: Temporary traffic signal products shall comply with the requirements of Section 661 of the Wisconsin Highway Specifications except as modified in this Specification.

10.2.13.6 Temporary Non-Intrusive Vehicle Detection System for Intersections:

- A. This specification sets forth the minimum requirements for a system that detects vehicles on a roadway and provides detection outputs to a traffic signal controller. The materials shall also include all brackets, mounting hardware, cable, terminations, interface panels, and all other incidentals for the installation of the non-intrusive vehicle detection equipment. This equipment shall meet the NEMA environmental, power and surge ratings as set forth in NEMA TS2 specifications.
- B. All detection equipment, components, and terminations supplied under this item shall be fully compatible with the temporary traffic signal controller supplied for the project. The system architecture shall fully support Ethernet networking of system components. All required interface equipment needed for transmitting and receiving data shall be provided with the NIVDS.
- C. The NIVDS shall provide flexible detection zone placement anywhere and at any orientation. Preferred detector configurations shall be detection zones placed across lanes of traffic for optimal count accuracy, detection zones placed parallel to lanes of traffic for optimal presence detection accuracy of moving or stopped vehicles. Detection zones shall be able to be overlapped for optimal road coverage.

10.3 EXECUTION

10.3.1 INSTALLATION, GENERAL

- 10.3.1.1 Install traffic signal components in accordance with shop drawings, manufacturer's recommendations, and the applicable provisions of Sections 651 through 658 of the Wisconsin Highway Specifications.
- 10.3.1.2 The Contractor shall obtain the necessary electrical permits from the City of Waukesha Building Department prior to beginning the work. The Contractor is responsible for all application fees and for any fines, penalties, damage done to property, etc., billed by the City of Waukesha.
- 10.3.1.3 The Contractor is responsible for requesting the electrical service installation or relocation from the power company and the City will pay the installation costs.
- 10.3.1.4 The Contractor shall stake the proposed locations of traffic signal items 10 days prior to starting work so that the locations of the proposed facilities can be approved by the City of Waukesha. Any field changes regarding the location of the signal poles, pull boxes, etc. shall be approved by the City of Waukesha.
- 10.3.1.5 The Contractor shall request a signal inspection of the completed signal installation. This request shall be made to the City at least three working days prior to the time of the requested inspection.

10.3.2 ELECTRICAL CONDUIT INSTALLATION

- 10.3.2.1 Install electrical conduit in accordance with Section 652 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.3.2.2 Append 652.3.1.2 of the Wisconsin Highway Specifications with the following:
 - A. The Contractor shall directional bore, not trench, in areas of trees, shrubbery, and under driveways, sidewalks and streets unless otherwise noted. Boring limits in areas of trees and shrubs depend on the diameter of the tree or shrub trunk. For example, directional boring is required if a conduit will be installed within 12 inches of the face of the trunk of a 2-inch diameter tree, or installed within 15 feet of the face of the trunk of a 20-inch diameter tree. Trenching or excavation for pull boxes, signal bases and controller cabinets within the root zone of a tree shall not be permitted. The minimum depth of bored conduit within the root zone, as described above, shall be 30 inches.

10.3.3 PULL BOX AND JUNCTION BOX INSTALLATION

- 10.3.3.1 Install pull boxes and junction boxes in accordance with Section 653 of the Wisconsin Highway Specifications except as modified in this Specification.

10.3.4 CONCRETE BASE INSTALLATION

- 10.3.4.1 Install concrete bases in accordance with Section 654 of the Wisconsin Highway Specifications except as modified in this Specification.

10.3.5 ELECTRICAL WIRING INSTALLATION

- 10.3.5.1 Install electrical wiring in accordance with Section 655 of the Wisconsin Highway Specifications except as modified in this Specification.

10.3.6 ELECTRICAL SERVICE PRODUCT INSTALLATION

- 10.3.6.1 Install electrical service products in accordance with Section 656 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.3.6.2 Append 656.3.4 of the Wisconsin Highway Specifications with the following:
 - A. Electrical utility company service installation or relocation and energy cost will be billed to and paid for by the maintaining authority.
 - B. Install the cabinet base and meter breaker pedestal first, so the electrical utility company can install the service lateral. Finish grade the service trench, replace topsoil that is lost or contaminated with other materials.

10.3.7 POLE AND ARM INSTALLATION

- 10.3.7.1 Install poles and arms in accordance with Section 657 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.3.7.2 Install poles as specified in the plan details and using appropriate Contractor-furnished hardware. Secure pole to anchor assembly and document tensioning procedures conforming to 641.3.1.2 of the Wisconsin Highway Specifications.
- 10.3.7.3 After completing erection using normal pole shaft raking techniques, ensure the centerline of the shaft appears vertical.

10.3.8 TRAFFIC SIGNAL FACE INSTALLATION

- 10.3.8.1 Install traffic signal faces in accordance with Section 658 of the Wisconsin Highway Specifications.

10.3.9 LUMINAIRE INSTALLATION

- 10.3.9.1 Install luminaires in accordance with the requirements of Section 11 – Street Lighting and Communications.

10.3.10 TRAFFIC SIGNAL CONTROLLER AND CABINET INSTALLATION

- 10.3.10.1 Install signal controller and cabinet in accordance with the approved shop drawings and the manufacturer's recommendations.
- 10.3.10.2 Before installation, equipment will be examined and tests will be performed by the City of Waukesha to insure that proper and sufficient equipment is furnished as is required to complete the signal plan operation and sequence in compliance with the intent of the contract specifications.
- 10.3.10.3 All testing and equipment examination shall be in the presence of the Contractor's representative furnishing the equipment. The Contractor's representative will be notified of any needed modifications or corrections to be accomplished by the Contractor.
- 10.3.10.4 The cabinet shall not be installed until it is in proper working order and approved by City of Waukesha personnel or their designee.
- 10.3.10.5 After the Contractor has mounted the cabinet on the cabinet foundation, he shall connect all the field wiring inside the controller cabinet and test the signal circuits for correct operation. The Contractor shall connect and test the signal circuits outside the controller cabinet as directed by the Engineer. Connecting and testing signal circuits shall be considered part of this item of work.

10.3.10.6 During the installation and testing of the controller, the Contractor shall provide, at his own expense, a competent representative to oversee, direct and manage the installation and testing of the controller. In the final stages of the installation and testing, the manufacturer's representative shall be available at the job site for consultation until such time as the controller operation is tested and accepted.

10.3.11 VIDEO VEHICLE DETECTION SYSTEM INSTALLATION

10.3.11.1 Install video vehicle detection system in accordance with the approved shop drawings and the manufacturer's recommendations.

10.3.11.2 The video detection camera shall be installed by factory-certified installers as recommended by the supplier and documented in installation materials provided by the supplier.

10.3.11.3 Maintenance and Support:

- A. The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the video detection system. These parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale for said parts.
- B. The supplier shall maintain an ongoing program of technical support for the video detection system. This technical support shall be available via telephone, or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale for on-site technical support services.
- C. Installation and training support shall be provided by a factory-authorized representative and shall be a minimum IMSA-Level II Traffic Signal Technician certified.
- D. All product documentation shall be written in the English language.

10.3.12 EMERGENCY VEHICLE PREEMPTION SYSTEM INSTALLATION

10.3.12.1 Install emergency vehicle preemption system in accordance with the approved shop drawings and the manufacturer's recommendations.

10.3.12.2 Detectors shall be mounted on the mast arms and signal poles as shown on the Plans.

10.3.12.3 The traffic signal mast arms and poles shall be drilled, and tapped to accommodate the mounting of the detector units as shown in the Plans. The installation method shall be approved by the City traffic engineer.

10.3.12.4 In the event, at installation, a noticeable obstruction is present in line with the detector, the Contractor shall be obligated to advise the Engineer before installation.

- 10.3.12.5 Unless otherwise directed by the City, the detector shield tube shall be installed with the drain hole at the bottom.
- 10.3.12.6 There shall be NO detector cable splices from the detector assembly to the controller terminations.
- 10.3.12.7 The EVP detector cables shall be routed to the controller. Each lead shall be appropriately marked as to which street or avenue it is associated. The Contractor shall perform all terminations inside the cabinet.
- 10.3.12.8 The EVP as specified and shown in the Plans shall be complete in place, tested, and in full operation.

10.3.13 AUDIBLE PEDESTRIAN PUSH BUTTON SYSTEM INSTALLATION

- 10.3.13.1 Install audible pedestrian push button system in accordance with the approved shop drawings and the manufacturer's recommendations.

10.3.14 TEMPORARY TRAFFIC SIGNALS

- 10.3.14.1 General: Temporary traffic signal products shall be constructed in accordance with of Section 661 of the Wisconsin Highway Specifications except as modified in this Specification.
- 10.3.14.2 Temporary Non-Intrusive Vehicle Detection System for Intersections:
 - A. The temporary NIVDS shall be installed by factory-certified installers and as recommended by the supplier and documented in installation materials provided by the supplier.
 - B. In the event, at installation or turn on date, a noticeable obstruction is present in line with the detection zone(s), the Contractor shall be obligated to advise the Engineer before setting the zone.
 - C. The non-intrusive vehicle detection system, as shown in the traffic signal construction plans, shall be complete, in place, tested, and in full operation during each stage of construction.
 - D. Maintain all temporary vehicle detection zones as the plans show or as the Engineer directs. The temporary vehicle detection zones shall be set near the vicinity and with approximate distance from the stop bar as shown on the plans. Check temporary vehicle detection zones every other week and at the opening of each stage of temporary traffic signal operation to ensure that they are working properly and aimed properly. Periodic adjustment of the detection zones and/or moving of the temporary vehicle detection sensors may be required due to changes in traffic control, staging, or other construction operations.

- E. Ensure the non-intrusive vehicle detection system stays in clean working order.
Periodic cleaning of the equipment may be required due to dirt and dust build-up.
- F. Remove temporary equipment when no longer needed for the project.

10.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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11 STREET LIGHTING AND COMMUNICATIONS

11.1 GENERAL

11.1.1 SUMMARY

11.1.1.1 This section describes:

- A. Furnishing and installing street lighting.
- B. Providing temporary street lighting.
- C. Removing, salvaging, and re-installing existing street lighting.
- D. Furnishing and installing communications duct and pull boxes.

11.1.2 RELATED SECTIONS (NOT USED)

11.1.3 SUBMITTALS

- 11.1.3.1 Product Data: Submit product data for conduit, duct, pull boxes, wiring, transformer bases, and service entrance products.
- 11.1.3.2 Shop Drawings: Submit shop drawings for street light controllers.
- 11.1.3.3 Operation and Maintenance Manuals: Submit operation and maintenance manuals for street light controllers.
- 11.1.3.4 Temporary Street Lighting Layout: Submit proposed temporary street lighting layout, including temporary power source or sources, prior to installing system.

11.1.4 TESTING

- 11.1.4.1 Upon completion, new or re-installed street lighting system shall be energized and operated for 48 hours prior to acceptance. Consecutive burning hours are not required.

11.1.5 WARRANTIES

- 11.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

11.1.6 MEASUREMENT AND PAYMENT

11.1.6.1 Conduit (size and type):

- A. Measurement: The City will measure Conduit (size and type) by the linear foot acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Conduit (size and type)". Payment is full compensation for furnishing and placing the conduit; for all conduit bodies, fittings, and caps; for installing new conduit into existing bases, pull boxes, and conduit; and for excavating and backfilling. The cost of crushed aggregate base course backfill will be paid for separately.

11.1.6.2 Pull Box (size and type):

- A. Measurement: The City will measure Pull Box (size and type) by the number of pull boxes acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Pull Box (size and type)". Payment is full compensation for furnishing and installing all materials, including pipe, frame, covers, and coarse aggregate; and for excavating and backfilling.

11.1.6.3 Concrete Base (type):

- A. Measurement: The City will measure Concrete Base (type) by the number of bases acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Concrete Base (type)". Payment is full compensation for finishing and installing concrete, anchor bolts, nuts, washers, and grounding; and for excavating and backfilling, including hydro-excavation where required.

11.1.6.4 (size and type) Wire:

- A. Measurement: The City will measure (size and type) Wire by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(size and type) Wire". Payment is full compensation for furnishing, installing, and connecting wiring.

11.1.6.5 Transformer Base - Breakaway (size):

- A. Measurement: The City will measure Transformer Base - Breakaway (size) by the number of bases acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Transformer Base - Breakaway (size)". Payment is full compensation for finishing and installing transformer base and all accessories.

11.1.6.6 Install City-Furnished Street Lighting Unit:

- A. Measurement: The City will measure Install City-Furnished Street Lighting Unit by the number of lighting units acceptably installed.

- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Install City-Furnished Lighting Unit". Payment is full compensation for picking up the pole, fixture, GFCI, and weather resistant in-use cover (if required) from the City Garage and transporting to the project, assembling the GFCI, wiring in the pole to fixture and receptacle, standing the pole on the base, installing the fixture, and splicing at the base.

11.1.6.7 Meter Pedestal - Main Lug 480 Volt (location):

- A. Measurement: The City will measure Meter Pedestal - Main Lug 480 Volt (location) as a single lump sum acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Meter Pedestal - Main Lug 480 Volt (location)". Payment is full compensation for furnishing and installing the meter pedestal; and for excavating and backfilling.

11.1.6.8 Street Light Controller (location):

- A. Measurement: The City will measure Street Light Controller (location) as a single lump sum acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Street Light Controller (location)". Payment is full compensation for furnishing and installing photocontrol, contactor, circuit breakers, fusing, distribution blocks, enclosure, bus bars, selector switch, grounding, and electrical components.

11.1.6.9 Temporary Street Lighting:

- A. Measurement: The City will measure Temporary Street Lighting as a single lump sum acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract lump sum price for "Temporary Street Lighting". Payment is full compensation for designing the proposed temporary system including the power source; for furnishing and installing wood poles, mast arms, luminaires, luminaire wiring/fusing, insulators, and down guy; for hydro-excavation if necessary and backfill; for maintaining the temporary system; and for removing and disposing of temporary system when no longer needed.

11.1.6.10 Removing, Salvage, and Re-Installation of Existing Facilities:

- A. Measurement: The City will measure the various items of removal, salvage, and re-installation by the number of items acceptably completed.

- B. Remove and Salvage Existing Street Light Unit: Payment for measured quantities will be made at the contract unit price each. Payment is full compensation for the removal of the fixture from the pole, removal of the pole from the base, transport of each pole and fixture to the City Garage, and removal and dispose of all conductors not to remain.
- C. Remove and Reinstall Street Light Unit: Payment for measured quantities will be made at the contract unit price each. Payment is full compensation for the removal of the fixture from the pole, removal of the pole from the base, salvage of all mounting nuts and washers, storage off site, transport to and from, re-installation of street light pole, arm, and fixture utilizing existing hardware and wiring, and splice to new conductors at base.
- D. Remove and Dispose of Existing Concrete Base: Payment for measured quantities will be made at the contract unit price each. Payment is full compensation for the removal of the base, transport, and disposal.
- E. Remove and Dispose of Existing Pull Box: Payment for measured quantities will be made at the contract unit price each. Payment is full compensation for the removal of the pull box, transport, and disposal.
- F. Remove and Dispose of Existing Street Light Controller: Payment for measured quantities will be made at the contract unit price each. Payment is full compensation for removal and dispose of existing street light controller as specified.

11.1.6.11 (size and type) Communication Duct:

- A. Measurement: The City will measure (size and type) Communication Duct by the linear foot acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "(size and type) Communication Duct". Payment is full compensation for furnishing and placing the duct; for all duct bodies, fittings, and caps; for installing new duct into existing pull boxes and duct; and for excavating and backfilling. The cost of crushed aggregate base course backfill will be paid for separately.

11.1.6.12 Communication Pull Box (size and type):

- A. Measurement: The City will measure Communication Pull Box (size and type) by the number of pull boxes acceptably completed.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Communication Pull Box (size and type)". Payment is full compensation for furnishing and installing all materials, including boxes, covers, and coarse aggregate; and for excavating and backfilling.

11.2 PRODUCTS

11.2.1 STREET LIGHTING PRODUCTS

11.2.1.1 Electrical Conduit:

- A. Electrical conduit shall be in accordance with Section 652 of the Wisconsin Highway Specifications except as modified in this Specification.
- B. Conduit shall be black or black with a red stripe.

11.2.1.2 Pull Boxes:

- A. Pull boxes shall be in accordance with Section 653 of the Wisconsin Highway Specifications except as modified in this Specification.
- B. Pull boxes shall be PVC pipe. PVC pipe shall comply with the applicable requirements of Section 612.2.6 of the Wisconsin Highway Specifications.
- C. The coarse aggregate shall be Size No. 2, modified to be no smaller than 3/4-inch, complying with the requirements of Section 501.2.5.4.5 of the Wisconsin Highway Specifications.

11.2.1.3 Concrete Bases:

- A. Concrete bases shall be in accordance with Section 654 of the Wisconsin Highway Specifications except as modified in this Specification.
- B. The Type L base shall be WisDOT Type L24.

11.2.1.4 Electrical Wiring:

- A. Electrical wiring shall be in accordance with Section 655 of the Wisconsin Highway Specifications except as modified in this Specification.
- B. The tracer shall be 10 AWG, stranded, and shall be green.
- C. Insulation type shall be XLP.
- D. Circuit Identification:
 - 1. Ungrounded conductors shall have a cable jacket of black, red, or blue.
 - 2. Grounded conductors shall have a cable jacket of white only.
 - 3. Grounding conductors shall have a cable jacket of green only.

11.2.1.5 Electrical Service Products:

- A. Electrical service products shall be in accordance with Section 656 of the Wisconsin Highway Specifications except as modified in this Specification.

- B. Meter Pedestal - Main Lug 480 Volt shall be an underground meter pedestal, rated at 480/240-volt single phase, and be attached to the new street light controller. Use only Listed equipment.

11.2.1.6 Transformer Bases:

- A. Transformer bases shall be in accordance with Section 657 of the Wisconsin Highway Specifications.

11.2.1.7 Poles, Arms, and Light Fixtures:

- A. Poles, arms, and light fixtures will be furnished by the City for installation by the Contractor, unless otherwise indicated.

11.2.1.8 Street Light Controllers:

- A. General: The new controller shall be pad mounted, with an underground pedestal 480-volt single phase service mounted to the specified controller. The Contractor is responsible for all coordination and paperwork with We Energies, for the removal of the existing service, and the installation of the new service. The electrical meter shall be Time-of-Day per existing City standards.
- B. Contactor: Provide an electrically held multi-pole contactor with coil capable of operating at the nominal voltage specified integral. Provide Square D, Type S series (open type) or approved equivalent by General Electric or Cutler-Hammer.
- C. Photocell: Provide a button type photocell that is rated for 240V, 1800W with 30-60 second delay between “on-off” operation.
- D. Circuit Breakers and Fuses: The circuit breakers shall be capable of surface mounting with line and load lugs by Square D, F-Frame type or approved equivalent by Cutler-Hammer or General Electric. Provide appropriate AIC ratings. Provide a 1 pole, 15 amp, control breaker for the control circuit. All breakers shall be from the same manufacturer.
- E. Bus Bars: Provide aluminum or copper ground and insulated neutral bus bars with wire range capabilities as indicated on the Plans.
- F. Hand-Off-Auto Switch: Provide a 3-position manual return selector switch in a NEMA 1 enclosure with legend plate as manufactured by Square D Type K, or equal by Cutler-Hammer or General Electric.

- G. Enclosure: Provide a NEMA 4X enclosure made from 0.125-inch Type 5052-H32 aluminum. Provide a double flanged doorframe. Provide stainless steel for all exterior hardware. Provide a 3/4-inch diameter stainless steel door handle with three-point latching system and hasp. Provide a natural aluminum mounting panel at back (interior) of enclosure. Do not provide louvers. Cabinet shall be secured by a Contractor-furnished weatherproof padlock. The enclosure shall have an aluminum mill finish. Provide an enclosure manufactured by APX Enclosures, Cleveland Manufacturing, Southern Manufacturing, or approved equivalent.
- H. Power Distribution Blocks: Provide aluminum power distribution blocks with lug wire ranges on the main and branches as indicated on the plans with clear plastic covers as manufactured by Square D Type LB or approved equivalent by Cutler-Hammer or General Electric.
- I. Fabrication:
1. Use a UL Listed Panel Builder to assemble the lighting control cabinet. The control cabinet shall have service entrance rating and be rated at 10 KVA SCCR or the minimum required by the Authority Having Jurisdiction and We Energies. Assemble the lighting control cabinet with all of its electrical components, wiring, and parts in a neat and orderly fashion and as shown on the Plans. Pretest the cabinet prior to shipment to the site.
 2. Mount all equipment to panel in enclosure. Train the cables in straight horizontal and vertical directions and parallel next to and adjacent to other cables whenever possible. Secure all wiring using screw attachment type straps; adhesive type shall not be allowed.
 3. Install photocell in the overhang of the control cabinet facing down and apply silicon caulk to maintain integrity of the enclosure.
 4. Cabinet and components shall be designed as Service Equipment. No service disconnect exterior of the Lighting Control Cabinet shall be allowed.
 5. Lighting Control Cabinet shall be 480/240 volt single phase, 100 amps.
- J. Acceptable Product: Pieper Electric, Automation Controls Division, Panel Shop No. 518083, or approved equal.

11.2.2 TEMPORARY STREET LIGHTING PRODUCTS

- 11.2.2.1 Poles: Poles shall be wood, Class V or larger with a 35-foot minimum overall length. The poles shall be northern pine in accordance with ANSI O5.1 (specifications and dimensions of wood poles). Pressure treatment shall be 5% pentachlorophenol with a minimum of 8 pounds per cubic foot net retention of the oil-borne preservative.

- 11.2.2.2 Guy Wires: The down guys shall be galvanized and meet the requirements as specified under Wood Poles.
- 11.2.2.3 Luminaires: Luminaires shall be 250W high pressure sodium or LED equivalent, with a type M-C-3 distribution. Luminaires shall be in accordance with Section 659 of the Wisconsin Highway Specifications.
- 11.2.2.4 Mast Arms: Mast arms shall be 6 feet long with a 2-foot rise suitable for attachment to a wood pole.
- 11.2.2.5 Wiring: The wiring shall consist of 3#14 with a 5A KTK fuse/fuse-holder located in the phase conductor near the pole. The wire shall be in accordance with Section 655 of the Wisconsin Highway Specifications.

11.2.3 COMMUNICATION PRODUCTS

11.2.3.1 Duct:

- A. Duct shall be smooth wall, continuous HDPE complying with the requirements of ASTM D3035, ASTM F2160, or UL 651A, wall thickness of Sch. 40, orange in color.

11.2.3.2 Pull Boxes:

- A. Pull boxes shall be manufactured of polymer concrete consisting of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two. Boxes shall comply with SCTE 77 for a design loading of 22,500 pounds.
- B. Pull boxes shall be the size indicated on the Plans. Boxes shall be designed for flush burial and shall have an open bottom. Box color shall be gray or green.
- C. Cover shall be UL listed, Tier 22, one-piece cover with stainless steel hex bolts. Cover shall be stamped "COMMUNICATIONS".
- D. The coarse aggregate shall be Size No. 2, modified to be no smaller than 3/4-inch, complying with the requirements of Section 501.2.5.4.5 of the Wisconsin Highway Specifications.

11.3 EXECUTION

11.3.1 INSTALLATION, GENERAL

- 11.3.1.1 Install street lighting and communication system components in accordance with shop drawings, manufacturer's recommendations, and the applicable provisions of Sections 651 through 657 and 659 of the Wisconsin Highway Specifications.

- 11.3.1.2 Notify the City three working days prior to the start of work so that the locations of proposed facilities can be staked by the City. Any field changes regarding the location of bases, pull boxes, conduit, etc. shall be approved by the City before digging.
- 11.3.1.3 Trenching or excavation of conduit, pull boxes, and street light bases within the root zone of a tree, as determined by the City Forester, will not be permitted.
- 11.3.1.4 Have all conduit runs and bases inspected prior to being backfilled. Contact the City of Waukesha, Department of Public Works, Engineering Division, to schedule all inspections.
- 11.3.1.5 When the work requires removal of the existing lighting system, contact the City of Waukesha, Department of Public Works, Engineering Division, to arrange to have power shut off to the existing street light system. For all removals of concrete bases, conduit, pull boxes, and wire, the Contractor is responsible for all disposals. Existing conduit may be left in place and abandoned if it does not conflict with any new facilities.

11.3.2 STREET LIGHTING INSTALLATION

11.3.2.1 Electrical Conduit:

- A. Conduit shall be installed in trenches excavated with vertical sides and a width suitable for the diameter of the conduit. The top of the conduit shall be 24 inches below the finished sidewalk grade or 30 inches below the finished surface of the proposed road.
- B. Trenches shall be filled with crushed aggregate base course. All backfill material shall be placed in 6-inch layers and thoroughly compacted.
- C. Conductors shall be installed after conduit is installed. All empty conduits shall have a #10 green tracer wire installed.

11.3.2.2 Pull Boxes:

- A. Install pull boxes as shown on the details.
- B. Install flush with grade as indicated on the Plans.

11.3.2.3 Concrete Bases:

- A. Hydro-excavation may be necessary to complete the bases due to the proximity of water lines, gas lines, other utilities, and trees.

11.3.2.4 Electrical Wiring:

- A. All wire shall extend past access points as follows:

1. 1 foot past the top of the inspection cover on a light pole.
2. To be looped with a minimum of 3 feet beyond the frame of a pull box.

B. Splices:

1. Splices of ungrounded or grounded conductors shall not be allowed in pull boxes, unless shown as on the Plans or directed by the City.
2. Splices of grounding conductors shall be made in pull boxes. A suitable sized split type bolt, copper only, may be used.
3. Splices in street light poles shall use a IlSCO PBTS series insulated one side mechanical tap or equivalent (mechanical tap shall have allen type screws). Split type bolts will not be allowed, except for the grounding conductors.
4. Break away fuse holders shall be installed on the ungrounded wire for light fixtures and receptacles (when required). Fuse shall be a midget 5 amp.

11.3.2.5 Electrical Service Products:

- A. Contractor shall verify with We Energies and Authority Having Jurisdiction that the equipment is proper for its use and installation.

11.3.3 TEMPORARY STREET LIGHTING

- 11.3.3.1 At a minimum, there shall be one street light at each intersection and spacing of no greater than 300-feet. If the existing street light circuits are not utilized by the Contractor, the Contractor is responsible for coordinating with We Energies and paying for a temporary power source.
- 11.3.3.2 Coordinate the installation of the temporary street lights with the removal of the existing street lights. Following the installation of the temporary lighting system, remove and salvage the existing street light poles and fixtures. The street lights shall be delivered to the Waukesha Municipal Garage, 300 Sentry Drive, Waukesha. If the existing street lights are to be re-installed, also schedule pick up of the poles and fixtures and bringing them back to the project to be installed.
- 11.3.3.3 The temporary lighting shall be maintained until the existing street lights have been re-installed and are operational, or until the new street lighting system has been installed and is operational.
- 11.3.3.4 Down guys shall be installed on poles that are at the end of an aerial cable run or where aerial cable tension would cause the pole to lean.
- 11.3.3.5 The mast arms shall be mounted to the wood pole within 1-foot of the top using a thru-bolt for attachment at the top and lag screws for attachment at the bottom.

- 11.3.3.6 The depth of the pole in the ground shall not be less than 5-feet or as directed by the Engineer. Install poles in accordance with the specification for Wood Poles.
- 11.3.3.7 Hydro-excavation may be needed to provide holes into which the wood poles will be installed due to the proximity to water lines, gas lines, other utilities and trees, this shall be included with the cost for Temporary Street Lighting. Provide wiring for the luminaire for a minimum length 1-foot longer than the mast arm.
- 11.3.3.8 Temporary lighting may utilize the existing power source.
- 11.3.3.9 Have the temporary lighting functional prior to the removal of the existing street lighting and maintain the temporary lighting until the new street lighting is operational.
- 11.3.3.10 The temporary lighting shall be installed in such a way that the temporary lighting does not conflict with other parts of the project. If conflict does occur, it is the responsibility of the Contractor to make adjustments at no cost to the City.

11.3.4 REMOVAL, SALVAGE, AND RE-INSTALLATION OF EXISTING FACILITIES

- 11.3.4.1 The City will direct the Contractor as to which street light poles and fixtures are to be removed and salvaged, removed and reinstalled, or replaced.
- 11.3.4.2 Where removal of existing street light controller is indicated, disconnect from We Energies power, remove and dispose of all pole mount equipment, remove and dispose of the wood utility pole, fill in the hole left by the wood utility pole with crushed stone, and remove and dispose of all conductors from the existing service to the first pull box. If a ground mount cabinet, remove all equipment and concrete pad, dispose of properly, and fill any holes with crushed stone.

11.3.5 COMMUNICATION DUCT INSTALLATION

11.3.5.1 Duct:

- A. Duct shall be installed in trenches excavated with vertical sides and a width suitable for the diameter of the conduit. The top of the duct shall be 24 inches below the finished sidewalk grade or 30 inches below the finished surface of the proposed road.
- B. Trenches shall be filled with crushed aggregate base course. All backfill material shall be placed in 6-inch layers and thoroughly compacted.
- C. Fiber cable will be installed by others at a later date and is not part of this project. Install a #10 green tracer wire in all empty ducts.

11.3.5.2 Pull Boxes:

- A. Install pull boxes as shown on the details.

- B. Duct installed into pull boxes shall extend a minimum of 3-inches but no more than 6-inches.
- C. Tracer wire shall have a 4-foot loop installed in each pull box for locating services. Strip a 3-inch section of the insulation from the tracer wire in the middle of the loop.
- D. Install flush with grade as indicated on the Plans.

11.4 SCHEDULES AND CHARTS (NOT USED)

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12 PAVEMENT MARKINGS

12.1 GENERAL

12.1.1 SUMMARY

12.1.1.1 This section describes furnishing and applying pavement markings.

12.1.2 RELATED SECTIONS (NOT USED)

12.1.3 SUBMITTALS

12.1.3.1 Product Data: Submit a list of the specific products proposed for use on this project.

12.1.3.2 Qualifications: Submit evidence of installer training by manufacturer in proper placement and application of pavement markings.

12.1.4 TESTING (NOT USED)

12.1.5 WARRANTIES

12.1.5.1 The work included in this section shall be warranted as specified in Section 01 – General Requirements.

12.1.6 MEASUREMENT AND PAYMENT

12.1.6.1 Pavement markings will be measured and paid for in accordance with Section 646 of the Wisconsin Highway Specifications except as modified in this Specification.

12.1.6.2 Removal of existing pavement markings in conflict with proposed pavement markings will not be paid for separately and is considered incidental to the pavement marking being installed for this project.

12.2 PRODUCTS

12.2.1 PAVEMENT MARKINGS

12.2.1.1 Pavement marking materials shall comply with Section 646 of the Wisconsin Highway Specifications. Provide the material type and color indicated in the Special Provisions or on the Plans.

12.3 EXECUTION

12.3.1 PAVEMENT MARKING APPLICATION

12.3.1.1 Apply pavement markings in accordance with Section 646 of the Wisconsin Highway Specifications except as modified in this Specification.

- 12.3.1.2 Layout of pavement markings according to the Plans is the responsibility of the Contractor. Pavement markings shall be the designated width and length. Prior to applying pavement markings as laid out by the Contractor, they shall be approved by the Engineer.
- 12.3.1.3 The double yellow centerline shall be two 4-inch solid lane lines with a 4-inch gap. Each line is paid for separately.
- 12.3.1.4 The crosswalk shall be two parallel white lines, both 6-inches wide, with a minimum 6-foot separation. Each line is paid for separately.
- 12.3.1.5 The stop line shall be a solid white line, 18-inches in width, and shall be placed 4-feet in advance and parallel to the nearest crosswalk line and no more than 30-feet from the edge of intersecting roadway.
- 12.3.1.6 Dashed lane lines shall consist of 4-inch solid lines 10 feet in length with a 30-foot skip length.
- 12.3.1.7 Other pavement markings shall be as shown and described on the Plans or Special Provisions.
- 12.3.1.8 If the street has been opened to traffic, the Contractor shall submit a traffic control plan for the installation of pavement markings. If additional traffic control devices are required for this work, they will not be paid for separately.

12.3.2 REMOVING PAVEMENT MARKINGS

- 12.3.2.1 Where existing pavement markings are designated to be removed, comply with Section 646.3.4 of the Wisconsin Highway Specifications.

12.4 SCHEDULES AND CHARTS (NOT USED)

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13 SIGNS

13.1 GENERAL

13.1.1 SUMMARY

13.1.1.1 This section describes furnishing and installing signs.

13.1.2 RELATED SECTIONS (NOT USED)

13.1.3 SUBMITTALS

13.1.3.1 Shop Drawings: Submit shop drawings for all signs. Show type of sign, materials, dimensions, colors, text, graphics, method of attachment, and type of supports.

13.1.4 TESTING (NOT USED)

13.1.5 WARRANTIES

13.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

13.1.6 MEASUREMENT AND PAYMENT

13.1.6.1 Sign, Reflective Type II:

A. Measurement:

1. General: The City will measure Sign, Reflective Type II either per each sign or by the square foot as the Contract indicates.
2. By Each: The City will measure Sign, Reflective Type II by each sign acceptably completed.
3. By the Square Foot: The City will measure Sign, Reflective Type II by the square foot acceptably completed. Two-sided street name signs will be measured as the square footage on one side of the sign. No additional payment will be made for sign message/sheathing on the other side of sign.

B. Payment: Payment for measured quantities will be made at the applicable contract unit price for "Sign, Reflective Type II". Payment is full compensation for furnishing and installing sign (attaching to post).

13.1.6.2 Sign Post, 2-3/8-Inch Round:

A. Measurement: The City will measure Sign Post, 2-3/8-Inch Round by the number of posts of the length required acceptably completed.

- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Sign Post, 2-3/8-Inch Round". Payment is full compensation for furnishing and installing post. For posts located in concrete, the cost of the PVC sleeve and/or forming a "box out" is incidental to the sign post.

13.1.6.3 Moving and Removing Signs:

- A. Measurement: The City will measure "Moving Signs", "Moving Small Sign Supports", "Removing Signs", and "Removing Small Sign Supports" by the number of signs or sign supports (posts) acceptably moved or removed, as applicable.
- B. Payment: Payment for measured quantities will be made at the contract unit price each for "Moving Signs", "Moving Small Sign Supports", "Removing Signs", and "Removing Small Sign Supports", as applicable. Payment is full compensation for the specified work under the bid item.

13.2 PRODUCTS

13.2.1 SIGNS

- 13.2.1.1 Signs shall comply with the requirements of Section 637 of the Wisconsin Highway Specifications for Type II Reflective Signs, reflective grade as required for sign type.
- 13.2.1.2 Sign layout and message shall comply with the Wisconsin Manual on Uniform Traffic Control Devices and the Wisconsin Department of Transportation Sign Plate Manual.

13.2.2 SIGN POSTS

- 13.2.2.1 Metal posts shall be 2-3/8-Inch (outside diameter) by 0.095-inch wall thickness round posts manufactured from steel having the following tensile properties:
 - A. Tensile Strength (min.): 50,000 psi.
 - B. Yield Strength (min.): 36,000 psi.
 - C. Elongation (min.): 5.0 percent in 2 inches.
- 13.2.2.2 The metal posts shall be of the length as determined by the area of signs to be mounted as shown on the Plans and in accordance with WisDOT Sign Plate A4-3. Minimum post length shall be 13 feet. Mounting holes shall be sized and spaced for mounting signs. All metal posts shall be free from defects that ill impair their strength or appearance.
- 13.2.2.3 Each post shall have a post anchoring system that will prevent sign turning.
- 13.2.2.4 The metal posts shall be hot-dipped galvanized after all forming, cutting, punching, and drilling have been completed. Galvanizing shall be in accordance with the requirements of AASHTO M111.

13.3 EXECUTION

13.3.1 SIGN INSTALLATION

- 13.3.1.1 Install signs in accordance with Section 637 of the Wisconsin Highway Specifications and the following requirements.
- 13.3.1.2 Install metal posts for supporting roadside signs at the locations shown on the Plans or as directed by the Engineer.
- 13.3.1.3 Erect metal posts in a true vertical position.
- 13.3.1.4 Install a 6-inch diameter or larger PVC sleeve in concrete for all metal posts that are located in concrete. The sleeve shall be large enough to accept the post anchor. If needed, block out the area as a square based on the anchor size.
- 13.3.1.5 Satisfactorily repair and restore other work damaged by sign installation work.

13.3.2 MOVING AND REMOVING SIGNS

- 13.3.2.1 The items Moving Signs, Moving Small Sign Supports, Removing Signs, and Removing Small Sign Supports shall conform to Section 638 of the Wisconsin Highway Specifications.
- 13.3.2.2 All signs removed on the project shall be salvaged and delivered to the City of Waukesha. The Contractor shall coordinate with City for delivery of salvaged signs and posts from the site to the Waukesha Municipal Garage. Contact the Municipal Garage (262-524-3615) to coordinate this work.

13.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

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14 SITE IMPROVEMENTS AND RESTORATION

14.1 GENERAL

14.1.1 SUMMARY

14.1.1.1 This section describes:

- A. Restoring disturbed turf areas of the project site.

14.1.2 RELATED SECTIONS

14.1.2.1 Section 3 – Existing Conditions, Subsurface Investigation, and Demolitions: For stripping of existing topsoil.

14.1.3 SUBMITTALS

14.1.3.1 Product Data: Submit product data for topsoil, fertilizer, seed, sod, mulch, and erosion mat.

14.1.4 TESTING (NOT USED)

14.1.5 WARRANTIES

14.1.5.1 The work included in this section shall be warranted as specified in Section 1 – General Requirements.

14.1.6 MEASUREMENT AND PAYMENT

14.1.6.1 Topsoil:

- A. Measurement: The City will measure Topsoil by the square yard acceptably placed to the depth specified. Measurement will be the number of square yards of area topsoiled within the limits of construction designated on the plans or in the contract or as ordered by the Engineer.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Topsoil". Payment is full compensation for furnishing, excavating, loading, hauling, and placing topsoil.

14.1.6.2 Topsoil, Fertilizer, Seed, and Mulch:

- A. Measurement: The City will measure Topsoil, Fertilizer, Seed, and Mulch by the square yard acceptably completed. Measurement will be the number of square yards of restoration work completed within the limits of construction designated on the plans or in the contract or as ordered by the Engineer.

- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Topsoil, Fertilizer, Seed, and Mulch". Payment is full compensation for furnishing, excavating, loading, hauling, and placing topsoil; for furnishing and applying fertilizer; for furnishing seed, preparing the seed bed, and sowing the seed; for furnishing, applying, and anchoring mulch; and for maintaining and watering the seeded area as specified.

14.1.6.3 Topsoil, Fertilizer, Seed, and Erosion Mat:

- A. Measurement: The City will measure Topsoil, Fertilizer, Seed, and Erosion Mat by the square yard acceptably completed. Measurement will be the number of square yards of restoration work completed within the limits of construction designated on the plans or in the contract or as ordered by the Engineer.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Topsoil, Fertilizer, Seed, and Erosion Mat". Payment is full compensation for furnishing, excavating, loading, hauling, and placing topsoil; for furnishing and applying fertilizer; for furnishing seed, preparing the seed bed, and sowing the seed; for furnishing and installing erosion mat; and for maintaining and watering the seeded area as specified.

14.1.6.4 Topsoil and Sod:

- A. Measurement: The City will measure Topsoil and Sod by the square yard acceptably completed. Measurement will be the number of square yards of restoration work completed within the limits of construction designated on the plans or in the contract or as ordered by the Engineer.
- B. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Topsoil and Sod". Payment is full compensation for furnishing, excavating, loading, hauling, and placing topsoil; for furnishing and applying fertilizer; for furnishing and installing sod; and for maintaining and watering the sodded area as specified.

14.2 PRODUCTS

14.2.1 TOPSOIL

- 14.2.1.1 Topsoil shall consist of the natural loam, sandy loam, silt loam, silty clay loam or clay loam humus-bearing soils adapted to the sustenance of plant life, and such topsoil shall be neither excessively acid nor excessively alkaline. Topsoil shall be free of stone, gravel, and debris.

14.2.2 FERTILIZER

- 14.2.2.1 Starter fertilizer shall consist of 6% nitrogen, 24% phosphoric acid, and 24% potash.

14.2.3 SEED

- 14.2.3.1 Seed shall meet to the requirements of Section 630 of the Wisconsin Highway Specifications. Unless otherwise indicated, furnish Seed Mixture No. 40.

14.2.4 SOD

- 14.2.4.1 Sod shall meet the requirements of Section 631 of the Wisconsin Highway Specifications.

14.2.5 MULCH

- 14.2.5.1 Mulch shall meet the requirements of Section 627 of the Wisconsin Highway Specifications.

14.2.6 EROSION MAT

- 14.2.6.1 Erosion mat shall meet the requirements of Section 628 of the Wisconsin Highway Specifications. Unless otherwise indicated, furnish Urban Class I, Type B mat.

14.3 EXECUTION

14.3.1 TOPSOILING

- 14.3.1.1 All areas designated to be covered with topsoil shall be undercut or underfilled to such a degree so that when covered to the required depth with such topsoil the finished work will be in accordance with the required lines, grades, slopes and cross sections.
- 14.3.1.2 After the areas upon which the topsoil is to be placed have been prepared and finished to the required lines, grades, slopes and cross section, the topsoil shall be placed and spread thereon to a uniform depth as shown on the plans or required in the contract, or if none is so shown, to a depth of 4 inches.
- 14.3.1.3 Harrowing or discing or both will be required as necessary to assist in breaking down clods and lumps and to provide a uniform texture to this soil.
- 14.3.1.4 In the event the heavier clay-bearing loams are used on light sand soils as topsoil, the harrowing and discing shall extend to such a depth as to incorporate the heavier soils with the sand to result in a more or less homogeneous mixture of the two soil types.
- 14.3.1.5 Rocks, twigs, large clods that will not break down, and other foreign material shall be removed and the entire surface shall be dressed to present a uniform appearance. Rolling will not be required.

14.3.2 FERTILIZING

- 14.3.2.1 Apply starter fertilizer at the rate of 3.5 pounds per 1,000 square feet to the areas to be seeded or sodded.

14.3.3 SEEDING

14.3.3.1 General:

- A. Seeding when not protected with a mulch cover, shall be done at such time of the year, except during midsummer, when the climatic conditions of temperature and moisture are adapted to work of this nature.
- B. Seeding, when performed in conjunction with straw mulch may be done at any time during the growing season, including midsummer, when soil conditions are suitable.
- C. Seeding shall be done with the selected seed mixture sown at the rate of at least 3 pounds of seed per 1000 square feet of area.

14.3.3.2 Preparation of Seed Bed:

- A. Grading, shouldering, topsoiling and fertilizing items when part of the work under the contract shall be completed before seeding, except that when equipment designed for the purpose is used, the fertilizer and seed mixture may be placed in one operation.
- B. The areas to be seeded shall be disced, harrowed and dragged or hand-worked into a reasonably even and loose seed bed immediately in advance of the seeding.

14.3.3.3 Sowing:

- A. The selected seed mixture shall be sown by means of equipment adapted to the purpose, or may be scattered uniformly over the areas to be seeded, and lightly raked or dragged to cover the seed with approximately 1/4 inch of soil. After seeding, the areas shall be lightly rolled or compacted by means of suitable equipment, preferably of the cultipacker type when such equipment can be operated, or by means of light hand tampers.
- B. Scattering seed by hand shall be done only with satisfactory hand seeders and only at such times when the air is sufficiently quiet to prevent seeds from blowing away.

14.3.4 SODDING

- 14.3.4.1 Place sod in accordance with Section 631 of the Wisconsin Highway Specifications.

14.3.5 MULCHING

- 14.3.5.1 Mulch all seeded areas at a uniform rate of 1/2 to 3 ton per acre (loose depth 1/2 to 1-1/2 inch), except where use of erosion mat is designated. Anchor mulch using Method A, B, or C of Section 627 of the Wisconsin Highway Specifications.

14.3.6 EROSION MAT INSTALLATION

- 14.3.6.1 Install erosion mat in accordance with the Plans, manufacturer's recommendations, and Section 628 of the Wisconsin Highway Specifications.

14.3.7 SPECIAL REQUIREMENTS FOR REPLACEMENT WORK WITHIN TERRACE AREAS

- 14.3.7.1 At curb ramp locations, high areas shall be undercut and low areas filled to such a degree so that when covered with 4-inches of topsoil, the finished work will be in accordance with the required cross-section – no “humps” are to be left between the concrete curb and gutter and the walk.
- 14.3.7.2 Use caution when working around street trees in the terrace area. Before restoring the terrace area the Landscaper shall meet with the City Forester. Any damage to existing trees will be the responsibility of the Contractor.
- 14.3.7.3 Use caution when working around other improvements in the terrace area. Any damage to these improvements will be the responsibility of the Contractor.
- 14.3.7.4 Compact the topsoil along the new concrete work with a vibratory compactor. After compaction, low spots shall be filled in and the area raked prior to seeding or sodding (as designated).
- 14.3.7.5 Restorations shall be installed within two weeks after installation of concrete curb and gutter or sidewalk.

14.3.8 MAINTENANCE

- 14.3.8.1 Maintain the seeded and sodded areas and repair any areas damaged by erosion, traffic, or other causes.
- 14.3.8.2 Furnish and apply water to seeded and sodded areas. Keep all seeded and sodded areas thoroughly moist by watering or sprinkling if rainfall is not sufficient to achieve sod rooting to the earth bed. Water or sprinkle seed and sod for 30 days after placement. Water is to be applied in such a manner as to preclude erosion or washing out sodded areas.
- 14.3.8.3 In the Spring of the year following construction (but no later than June 20), the Contractor shall re-topsoil and re-seed or re-sod all areas that have either settled or have failed as determined by the Engineer.

14.4 SCHEDULES AND CHARTS (NOT USED)

END OF SECTION

City of Waukesha
Department of Public Works

Design and Construction Manual

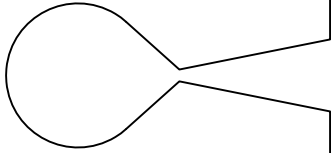
Division 4
Standard Details

STANDARD DETAILS

DETAIL NUMBER	DETAIL NAME
00-0005	CONSTRUCTION PARKING PERMIT
01-0050	TREE PROTECTION
02-0001	EROSION CONTROL
02-0002	EROSION CONTROL INFORMATION SHEET
02-0100	TEMPORARY SEDIMENT TRAP
02-0502	STORM INLET PROTECTION
02-0505	TEMP OUTLET
05-0001	SANITARY MANHOLE
05-0002	STANDARD 60-INCH SANITARY MANHOLE
05-0003	STANDARD STORM MANHOLE
05-0005	STANDARD DROP MANHOLE
05-0008	PIPE TRENCH
05-0010	OPEN TRENCH METHOD
05-0011	PIPE BEDDING
05-0100	DETECTOR WIRE AND LOCATOR BOX
05-0156	STANDARD SERVICE CONNECTION
05-0400	RIPRAP AND GEOTEXTILE FABRIC AT APRON ENDWALLS
05-0507	DOUBLE INLET
05-0600	CONCRETE FLARED END
05-0601	TRASH RACK FOR END SECTION
05-0850	PIPE ENCASEMENT
05-1160-SA	R-1660 PLATEN LID WITH T-SEAL
05-1660	R-1660 LID LTRD 'STORM SEWER'
05-1661	R-1661 FRAME
05-1661A	R-1661-A HIGH FRAME
05-2467	TYPE 'D' GRATE
05-3067	FRAME
05-3290A	GUTTER INLET
05-3290B	CURB BOX
05-3290C	TYPE 'C' GRATE
07-0020	CUL-DE-SAC
07-0050	TYPICAL 16' WIDE CROSS SECTION CONCRETE ALLEY
07-0051	TYPICAL 32' WIDE CROSS SECTION CONCRETE ALLEY
07-0100	TYPICAL 20' WIDE CROSS SECTION CONCRETE ALLEY
07-0110	CONCRETE PAVEMENT REPLACEMENT
07-0250	CURB DEPRESSION
07-0251	CURB DEPRESSION
07-0252	CURB TAPER
07-0285	JOINT FILLER
07-0300	CONCRETE SIDEWALK
07-0301	TREE CURB
07-0302	STRAIGHT CURB

STANDARD DETAILS

DETAIL NUMBER	DETAIL NAME
07-0310	STANDARD BUS PAD
07-0320	STANDARD DRIVE APPROACH
07-0325	CURB JOINT
07-0330	30" COMBINATION CURB AND GUTTER TYPE 'A'
07-0331	30-INCH TYPE 'A' HMA
07-0332	30" COMB CURB & GUTTER
07-0333	30-INCH COMBO CURB & GUTTER TYPE 'B' (INVERTED PAN)
07-0340	18-INCH TYPE 'A'
07-0341	18-INCH TYPE 'B'
07-0350	CONCRETE WALKWAY WITH STEPS
07-0600	SLOPED CONCRETE BERM
08-0100	ASPHALT PAVEMENT SECTION
08-0215	MULTI-USE TRAIL SECTION
11-0002	STREET LIGHT BASE MOUNTING
11-0025	PULL BOX
14-0003	EROSION MATTING
14-0005	PLANTINGS
14-0020	STEEL PLATE BEAM GUARDRAIL
14-0100	CHAIN LINK FENCE
14-0200	PIPE BOLLARD
14-0210	CONCRETE PIER
14-0400	PRECAST CONCRETE WHEEL STOP



City of Waukesha

Dept of Public Works - Engineering
Construction Parking Permit

TEMPORARY

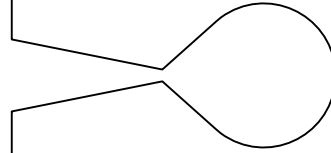
Address:

License No.

Expiration Date:

0001

Front



TEMPORARY

Vehicles must be moved every 72 hours per Municipal Ord 12.07(1).

Permits must be displayed on the rearview mirror - face out - through windshield.

Permits must be removed from mirror while driving.

(Display other side out)

Back

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

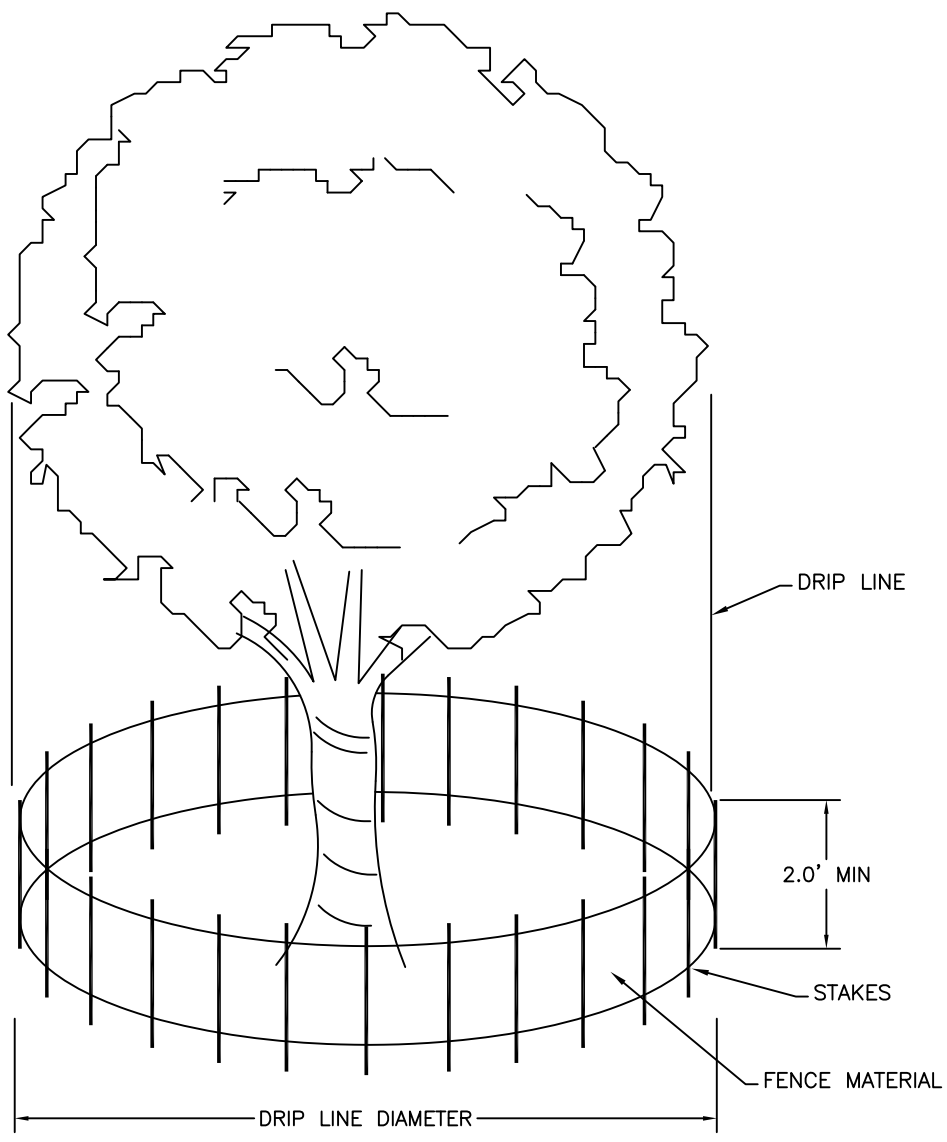
STANDARD CONSTRUCTION DETAILS TEMPORARY CONSTRUCTION PARKING PERMIT

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.750000
PLOT DATE : 11/30/2017 8:43 AM

DETAIL NUMBER: **00-0005**
PROJECT NO:



NOTES:

1. SILTFENCE MATERIAL MAY BE USED TO BUILD FENCE
2. DRIVE STAKES FIRMLY INTO GROUND – AT LEAST 12”

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
TREE PROTECTION

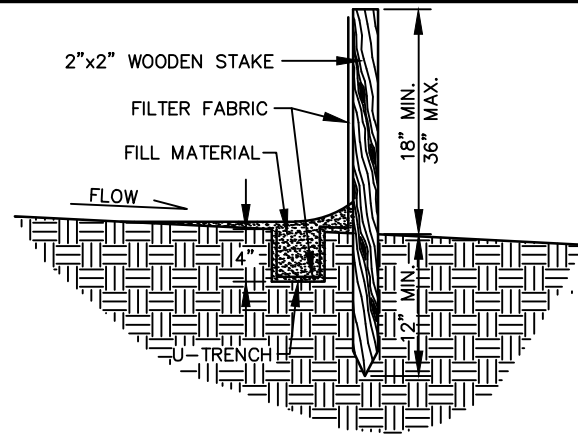
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : **1" = 20' XREF**
PLOT DATE : 11/15/2017 11:58 AM

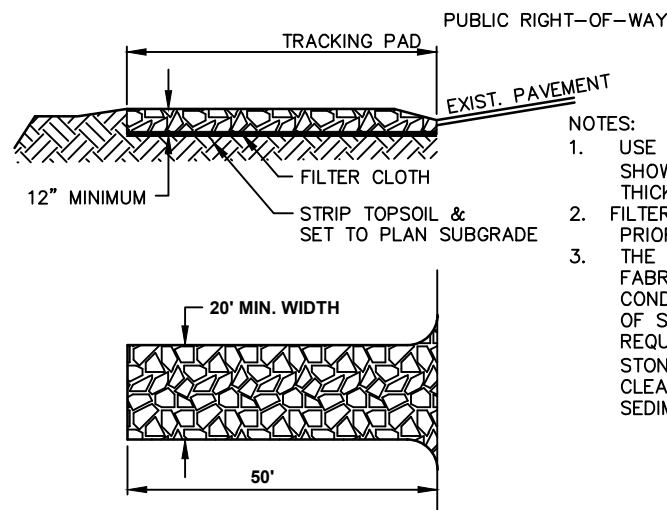
DETAIL NUMBER: **01-0050**
PROJECT NO:

EROSION CONTROL DETAILS



- NOTES:
- SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY AND/OR WITHIN 24 HOURS OF CONSTRUCTING DITCHES, DIVERSIONS, OR OTHER CHANNELS
 - SILT FENCE FABRIC SHALL HAVE THE FOLLOWING PROPERTIES:
 - GRAB STRENGTH: 100 LBS. (ASTM D-1682)
 - MULLEN BURST: 200 PSI MIN. (ASTM D-3786)
 - EQUIVALENT OPENING SIZE:
 - BETWEEN 50 AND 140 FOR SOILS WITH MORE THAN 15 PERCENT BY WEIGHT PASSING A NO. 200 SIEVE.
 - BETWEEN 20 AND 50 FOR SOILS WITH LESS THAN 15 PERCENT BY WEIGHT PASSING A NO. 200 SIEVE.
 - WATER FLOW RATE OF 10 GAL./MIN./SQ. FT. AT 50 MM CONSTANT HEAD (ASTM D-4491)
 - ULTRA VIOLET RADIATION STABILITY OF 90%
 - IF SUPPORT NETTING IS REQUIRED, NETTING SHALL BE AN INDUSTRIAL POLYPROPYLENE WITH A 3/4 INCH SPACING OR EQUIVALENT. A HEAVY DUTY NYLON TOP SUPPORT CORD OR EQUIVALENT IS REQUIRED.
 - INSTALLATION PROCEDURE AS FOLLOWS:
 - EXCAVATE A U-TRENCH UPSLOPE FROM THE LINE OF STAKES.
 - INSTALL SILT FENCE IN TRENCH. CARE SHOULD BE TAKEN TO AVOID TEARING FABRIC. TORN FABRIC SHALL BE REMOVED AND A NEW SEGMENT OF SILT FENCE SHALL BE PLACED. STAKES SHALL BE DRIVEN A MINIMUM OF 12" DEEP. SILT FENCE SHALL BE A MINIMUM OF 18" AND A MAXIMUM OF 36" IN HEIGHT.
 - FIT LOWER 8" OF FILTER FABRIC INTO U-TRENCH. BACKFILL AND COMPACT U-TRENCH.
 - THE ENDS OF TWO SECTIONS OF SILT FENCE MUST BE WRAPPED TOGETHER AROUND A STAKE AND THEN DRIVEN INTO THE GROUND.
 - SILT FENCE SHALL BE INSPECTED WITHIN 24 HOURS AFTER EACH RAINFALL OR DAILY DURING PERIODS OF PROLONGED RAIN. REPAIR OR REPLACEMENT SHALL BE MADE IMMEDIATELY.
 - SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT OR WHEN DEPOSITS REACH ONE HALF THE HEIGHT OF THE BARRIER. SILT FENCE SHALL BE REMOVED ONLY WHEN THE THREAT OF EROSION HAS PASSED AND PERMANENT VEGETATION HAS BEEN ESTABLISHED.

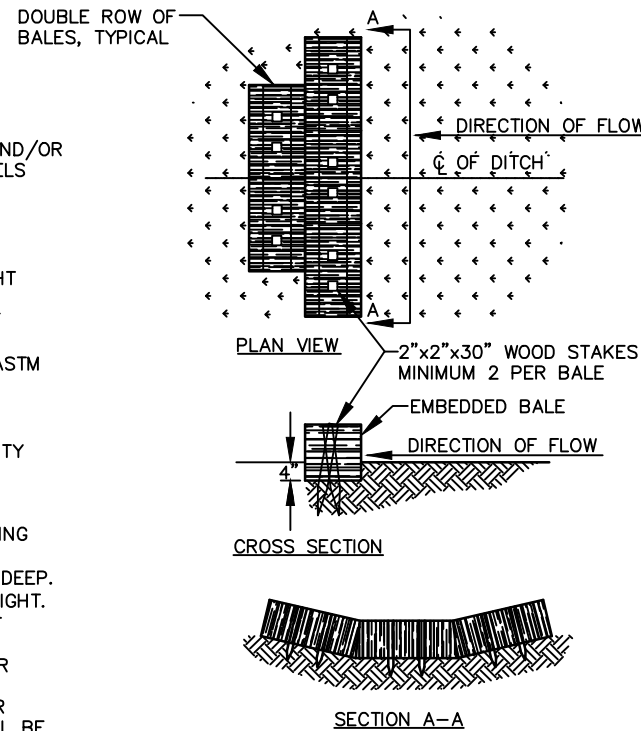
SILT FENCE DETAIL



- NOTES:
- USE 3-INCH CLEAN STONE. MINIMUM 50' LENGTH OR AS SHOWN ON PLAN. MINIMUM 20' WIDTH. MINIMUM 12" THICK.
 - FILTER CLOTH SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
 - THE FABRIC SHALL BE WISDOT TYPE R GEOTEXTILE FABRIC. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND/OR REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

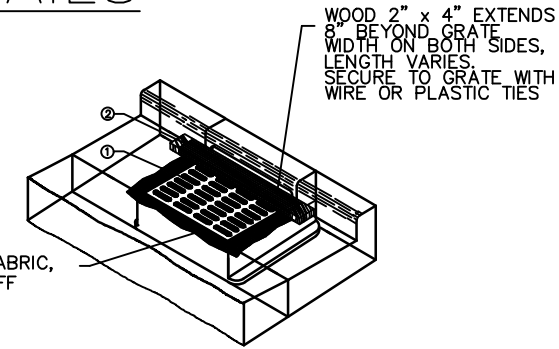
STONE TRACKING PAD DETAIL

NOT TO SCALE

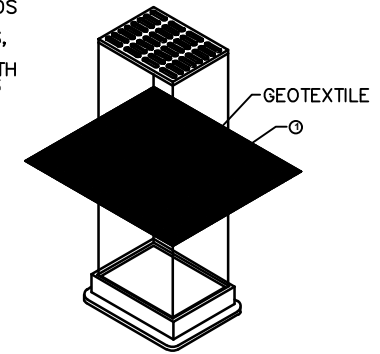


- NOTES:
- INSTALL BALES BY DIGGING A 4" DEEP TRENCH WIDE ENOUGH FOR BALE. EMBED BALE IN TRENCH AND SECURE WITH STAKES.
 - BALES SHALL BE INSPECTED WITHIN 24 HOURS AFTER EACH RAINFALL OR DAILY DURING PERIODS OF PROLONGED RAIN. REPAIR OR REPLACEMENT SHALL BE MADE IMMEDIATELY.
 - SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT OR WHEN DEPOSITS REACH ONE HALF THE HEIGHT OF THE BARRIER. BALES SHALL BE REMOVED ONLY WHEN THE THREAT OF EROSION HAS PASSED AND PERMANENT VEGETATION HAS BEEN ESTABLISHED.

EROSION BALES DETAIL



INLET PROTECTION WITH CURB BOX



INLET PROTECTION WITHOUT CURB BOX
(CAN BE INSTALLED IN ANY INLET WITHOUT A CURB BOX)

- FINISHED SIZE, INCLUDING FLAP POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.
- FOR INLET PROTECTION WITH A CURB BOX, AN ADDITIONAL 18" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.
- FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2X4.

- NOTES:
- TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.
 - THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND HOLDS OR OTHER METHOD TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.
 - WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

INLET PROTECTION

GENERAL PROJECT INFORMATION

PROJECT LOCATION AND NARRATIVE

THIS EROSION CONTROL PROJECT AND SITE IS CURRENTLY A XXXXXXXX. IT IS LOCATED IN PART OF THE XX 1/4 OF THE XX 1/4 OF SECTION X, TOWNSHIP X NORTH, RANGE XX EAST, XXXXXXXX, XXXX COUNTY, WISCONSIN. THE CURRENT OWNER IS XXXXXXXXXXXXXXXXXXXX.

RESPONSIBLE PARTIES

THE CONTRACTOR AND OWNER ARE REQUIRED TO APPLY FOR A GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM WPDES PERMIT NO. WI-5067831-3 AT LEAST 14 DAYS PRIOR TO THE START OF THE WORK.

CONTRACTOR AND OWNER SHALL IDENTIFY A PERSON KNOWLEDGEABLE AND EXPERIENCED IN THE APPLICATION OF EROSION PREVENTION AND SEDIMENT CONTROL BMPs WHO WILL OVERSEE THE IMPLEMENTATION OF THE WRAPP.

X X X
OWNER: CONTACT PERSON: PHONE:

X X X
PLAN PREPARER: CONTACT PERSON: PHONE:

X X X
CONTRACTOR CONTACT PERSON: PHONE:

X X X
PERSON RESPONSIBLE CONTACT PERSON: PHONE:
FOR INSPECTIONS

WISCONSIN DNR X X
STATE REGULATING ENTITY CONTACT PERSON: PHONE:

X X X
LOCAL REGULATING ENTITY CONTACT PERSON: PHONE:

PROJECT AREAS

TOTAL PROJECT AREA = X.XXX ACRES
TOTAL PROJECT SIZE (DISTURBED AREA) = X.XX ACRES
MINIMUM AREA REQUIRING WRAPP PERMIT = 1.0 ACRE

EXISTING AREA OF IMPERVIOUS SURFACE = X.XX ACRES
POST-CONSTRUCTION AREA OF IMPERVIOUS SURFACE = X.XX ACRES

STORMWATER MANAGEMENT

SURFACE WATER MANAGEMENT MEASURES USED TO MEET PERMIT REQUIREMENTS:

- WET DETENTION POND
- SITE EVALUATION
- VEGETATED SWALES
- RAIN GARDENS
- BIORETENTION FOR INFILTRATION
- INFILTRATION BASIN

INFILTRATION VOLUME PROVIDED = 0 CF
TOTAL SUSPENDED SOLIDS (TSS) REDUCTION = NOT CALCULATED

RECEIVING WATERS

SURFACE WATERS AND WETLANDS THAT WILL RECEIVE STORMWATER RUNOFF FROM THE SITE AND ARE WITHIN ONE (1) MILE OF THE SITE ARE INDICATED. IN ADDITION, IMPAIRED WATERS (STATE'S 303d LIST) WITHIN ONE (1) MILE OF THE SITE AND COULD BE RECEIVING RUNOFF FROM THE SITE ARE LISTED BELOW:

NAME OF WATER BODY	TYPE OF IMPAIRMENT
XXXXXX	NONE

CONSTRUCTION ACTIVITY NOTES

ALL CONSTRUCTION ACTIVITIES SHALL MEET THE REQUIREMENTS OF THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM.

EROSION PREVENTION

THE CONTRACTOR SHALL USE PHASED CONSTRUCTION WHENEVER POSSIBLE OR PRACTICAL TO MINIMIZE DISTURBED AREAS.

ALL DISTURBED SOIL AREAS MUST BE STABILIZED AS SOON AS POSSIBLE TO LIMIT SOIL EROSION, AND SHALL BE STABILIZED NO LATER THAN 7 (SEVEN) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA OF THE SITE HAS BEEN TEMPORARILY OR PERMANENTLY COMPLETED.

THE FOLLOWING EROSION PREVENTION ITEMS SHALL BE INSTALLED WITHIN 24 HOURS AFTER INSTALLATION OF NOTED CONVEYANCE:

- 1). ENERGY DISSIPATION (RIPRAP) AT APRON ENDWALLS.
- 2). STABILIZATION OF TEMPORARY OR PERMANENT DRAINAGE SWALES WITHIN 200 FEET OF THE PROPERTY LINES, OR CONNECTION TO SURFACE STORMWATER DRAINAGE INCLUDING INLETS.

CONSTRUCTION SEQUENCE, SCHEDULE AND PHASING

ALL SILT FENCE AND CONSTRUCTION ENTRANCE/EXIT(S) AND OTHER NECESSARY EROSION CONTROL BMPs SHALL BE IN PLACE PRIOR TO THE START OF ANY CONSTRUCTION-RELATED ACTIVITIES.

REMOVE TOPSOIL NECESSARY AND STOCKPILE IN DESIGNATED AREA(S). STOCKPILES SHALL BE STABILIZED BY TEMPORARY SEEDING AND MULCHING IF THEY ARE TO REMAIN FOR MORE THAN 10 (TEN) DAYS.

DISTURBED SOIL OUTSIDE OF THE DAY-TO-DAY CONSTRUCTION AREAS SHALL BE STABILIZED BY MULCHING, TEMPORARY SEEDING, COVERING WITH TARPS OR EQUIVALENT CONTROL MEASURES.

COMPLETE TANK (UST) REMOVALS, EQUIPMENT AND ASSOCIATED PIPING AND SOILS.

REMOVE CONCRETE AND ASPHALT PAVING, AND REMOVE AS SPECIFIED.

WITHIN 7 DAYS OF COMPLETION OF THE REQUIRED FACILITIES AND PAVEMENT, THE ENTIRE SITE SHALL BE GRADED AS DESCRIBED IN THE WORK PLAN AND SPECIFICATIONS. CONTRACTOR SHALL STABILIZE THE SITE FOR THE FUTURE DEVELOPMENT BY OTHERS.

CONTRACTOR SHALL REMOVE ALL INLET PROTECTION ONLY AFTER THE SITE IS STABILIZED, OR AS DIRECTED BY THE ENGINEER.

DEWATERING AND BASIN DRAINING

DEWATER SEDIMENT-LADEN SURFACE WATER TO TEMPORARY SEDIMENTATION BASINS WHEN REQUIRED. USE APPROVED ALTERNATE BMPs TO PREVENT TRANSPORTATION OF SEDIMENTS WHEN DISCHARGING TO SURFACE WATERS. DISCHARGE FROM TEMPORARY OR PERMANENT SEDIMENTATION BASIN MUST BE VISUALLY CHECKED TO ENSURE ADEQUATE TREATMENT IS OBTAINED IN THE BASIN.

USE APPROPRIATE ENERGY DISSIPATION MEASURES ON ALL DISCHARGES.

DEWATERING PRACTICES CANNOT CAUSE NUISANCE CONDITIONS, EROSION OR FLOODING IN RECEIVING CHANNELS OR INUNDATION OF WETLANDS RESULTING IN ADVERSE IMPACTS.

RECORD RETENTION

THE WRAPP, ALL CHANGES TO IT, AND INSPECTIONS AND MAINTENANCE RECORDS ARE THE RESPONSIBILITY OF THE PERMITEE AND MUST BE KEPT AT THE SITE DURING CONSTRUCTION.

ALL OWNER(S) SHALL RETAIN THE FOLLOWING FOR THREE (3) YEARS AFTER SUBMITTAL OF THE NOTICE OF TERMINATION:

- 1). WRAPP
- 2). ANY OTHER PERMITS REQUIRED FOR THE PROJECT.
- 3). INSPECTION AND MAINTENANCE LOGS/REPORTS.
- 4). ALL PERMANENT OPERATION AND MAINTENANCE AGREEMENTS FOR SURFACE WATER FACILITIES.
- 5). ALL DESIGN CALCULATIONS FOR TEMPORARY AND PERMANENT STORM WATER MANAGEMENT.

INSPECTIONS AND MAINTENANCE

CONTRACTOR IS SOLELY RESPONSIBLE FOR INSTALLATION, MAINTENANCE AND REMOVAL OF ALL EROSION CONTROL DEVICES AND SHALL COMPLY WITH ALL REQUIREMENTS SHOWN ON THE PLANS, IN THE PROJECT SPECIFICATIONS, AND AS MANDATED BY LOCAL, STATE AND FEDERAL REGULATIONS.

INSPECT THE EROSION CONTROL MEASURES WITHIN 24 HOURS AFTER EACH RAIN OF 0.5 INCHES OR MORE AND AT LEAST ONCE EACH WEEK. MAKE NEEDED REPAIRS AND DOCUMENT THE FINDINGS OF THE INSPECTIONS IN A SITE EROSION CONTROL LOG WITH THE DATE OF INSPECTION, THE NAME OF THE PERSON CONDUCTING THE INSPECTION, AND A DESCRIPTION OF THE PRESENT PHASE OF THE CONSTRUCTION AT THE SITE.

ANY SEDIMENT REACHING A PUBLIC OR PRIVATE ROAD SHALL BE REMOVED BY STREET CLEANING (NOT FLUSHING) BEFORE END OF WORK EACH DAY.

FOR MORE EROSION CONTROL REQUIREMENTS, REFER TO STANDARD SPECIFICATION SECTION 02.

CONTRACTOR TO OBTAIN APPLICABLE PERMITS.

IF DEWATERING IS NEEDED, CONTRACTOR SHALL PROVIDE FOR SEDIMENT REMOVAL AND SHALL OBTAIN ALL APPLICABLE DNR PERMITTING.

BUILT-UP SEDIMENT SHALL BE REMOVED FROM SILT FENCE WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF THE FENCE.

THE CONTRACTOR SHALL ROUTINELY INSPECT THE CONSTRUCTION SITE ONCE EVERY SEVEN (7) DAYS DURING ACTIVE CONSTRUCTION, AND WITHIN 24 HOURS OF A RAINFALL EVENT GREATER THAN 0.5 INCHES IN A 24-HOUR PERIOD.

ALL INSPECTIONS MUST BE RECORDED AND RECORDS MUST BE RETAINED WITH THE ECIIP ON SITE. COPIES SHALL BE MADE AVAILABLE TO THE ENGINEER OR UPON REQUEST.

IF TEMPORARY SEDIMENT BASINS ARE REQUIRED, THEY SHALL BE DRAINED AND CLEANED OF EXCESS SEDIMENT WHEN THE DEPTH OF THE SEDIMENT IN THE BASIN IS EQUAL TO THE ORIGINAL STORAGE VOLUME INTENDED. FOR THIS SITE, IT SHALL BE WHEN THE FOREBAY ACCUMULATES TWO (2) FEET OF SEDIMENT AND WHEN THE MAIN POND ACQUIRES SIX (6) INCHES OF SEDIMENT. DRAINAGE AND REMOVAL SHALL BE COMPLETED WITHIN 72 HOURS OF DISCOVERY.

ALL NON-FUNCTIONAL BMPs SHALL BE REPAIRED, REPLACED OR SUPPLEMENTED WITH ADDITIONAL BMPs WITHIN A 24-HOUR PERIOD OF DISCOVERY, OR AS SOON AS FIELD CONDITIONS ALLOW.

POLLUTION PREVENTION

ALL SOLID WASTE GENERATED BY / COLLECTED FROM THE CONSTRUCTION SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE STATE, FEDERAL AND LOCAL REGULATIONS.

ALL HAZARDOUS MATERIALS (OILS, GASOLINE, FUEL, PAINT, ETC.) MUST BE PROPERLY AND SECURELY STORED AND CONTAINED TO PREVENT SPILLS, LEAKS OR OTHER DISCHARGE.

VEHICLE OR EQUIPMENT WASHING OR TEMPORARY MAINTENANCE AREAS MUST BE LIMITED TO A DEFINED AREA OF THE SITE. RUNOFF CONTAINING ANY HAZARDOUS WASTES MUST BE PROPERLY AND LAWFULLY COLLECTED AND DISPOSED OF. NO ENGINE DEGREASING IS ALLOWED ON THE SITE.

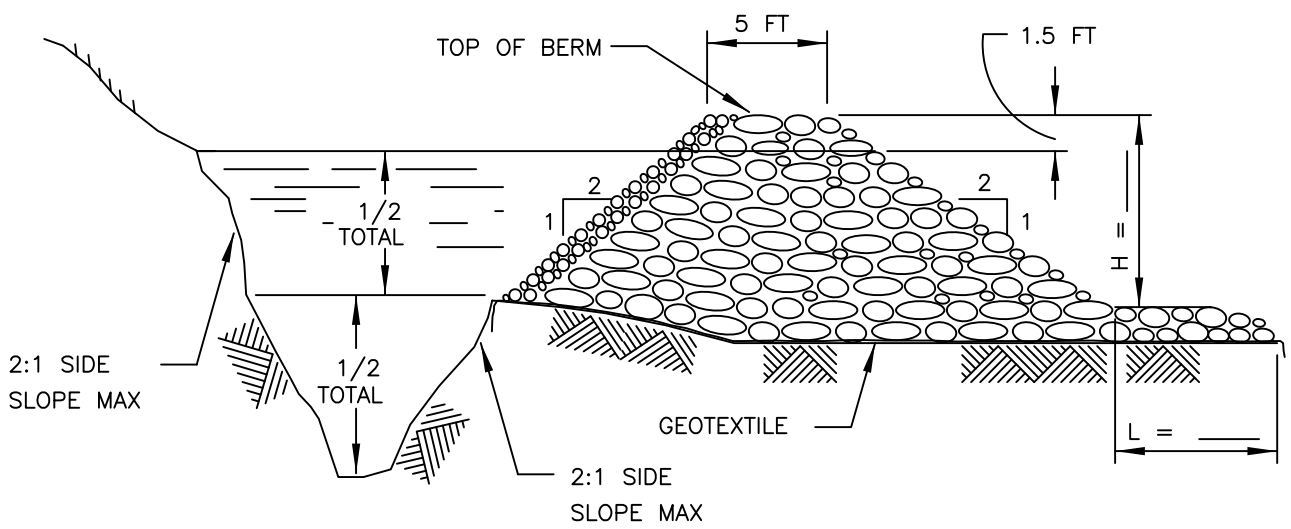
THE CONTRACTOR IS SOLELY RESPONSIBLE FOR MONITORING AIR POLLUTION AND ENSURING THAT IT DOES NOT EXCEED LEVELS SET BY LOCAL, STATE OR FEDERAL LEVELS. THIS INCLUDES DUST BEING CREATED BY WORK BEING PERFORMED ON THE SITE. DUST CONTROL MEASURES ARE CONSIDERED INCIDENTAL TO THE CONTRACT FOR WHICH WORK IS BEING PERFORMED. ADDITIONAL DUST CONTROL MEASURES OR OTHER AIR POLLUTION CONTROL MEASURES MAY BE REQUIRED BY THE ENGINEER.

FINAL STABILIZATION

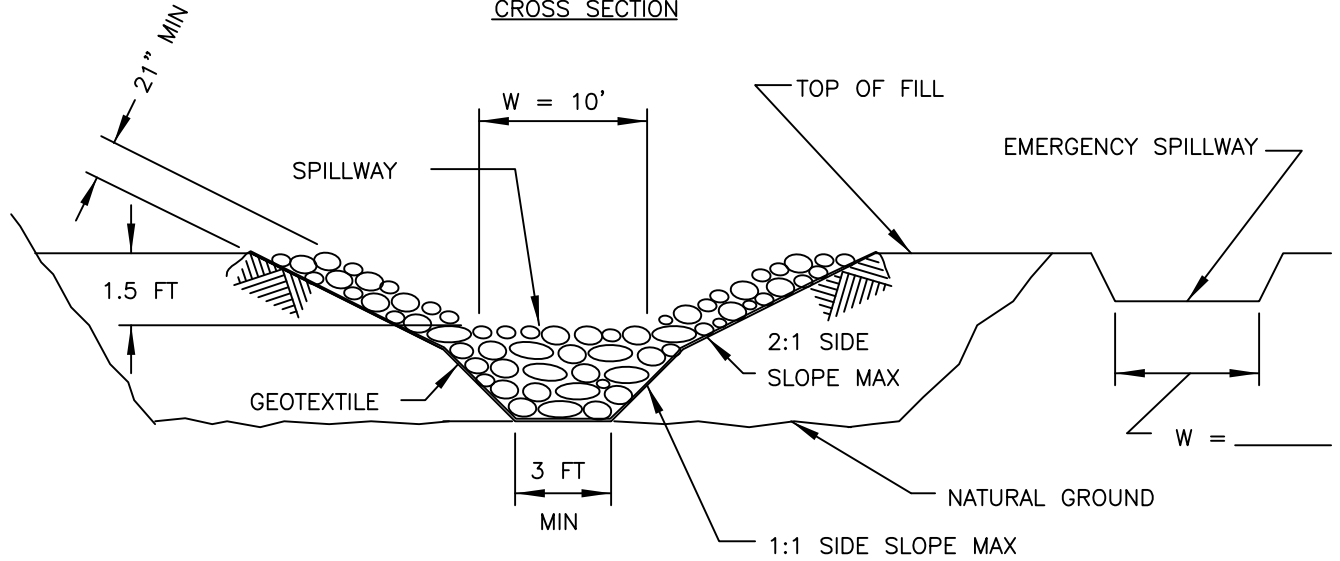
THE CONTRACTOR MUST ENSURE FINAL STABILIZATION OF THE SITE. THE PERMITEES SHALL SUBMIT A NOTICE OF TERMINATION WITHIN 30 DAYS AFTER FINAL STABILIZATION IS COMPLETE.

ALL TEMPORARY EROSION CONTROL MEASURES AND BMPs MUST BE REMOVED AS PART OF THE FINAL SITE STABILIZATION.

THE GENERAL PERMIT FURTHER DEFINES FINAL STABILIZATION AND ITS REQUIREMENTS.



CROSS SECTION



STONE SECTION

NOTES:

- IF THE SEDIMENT POOL IS FORMED OR ENLARGED THE SIDE SLOPE WILL BE 2:1 OR FLATTER.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

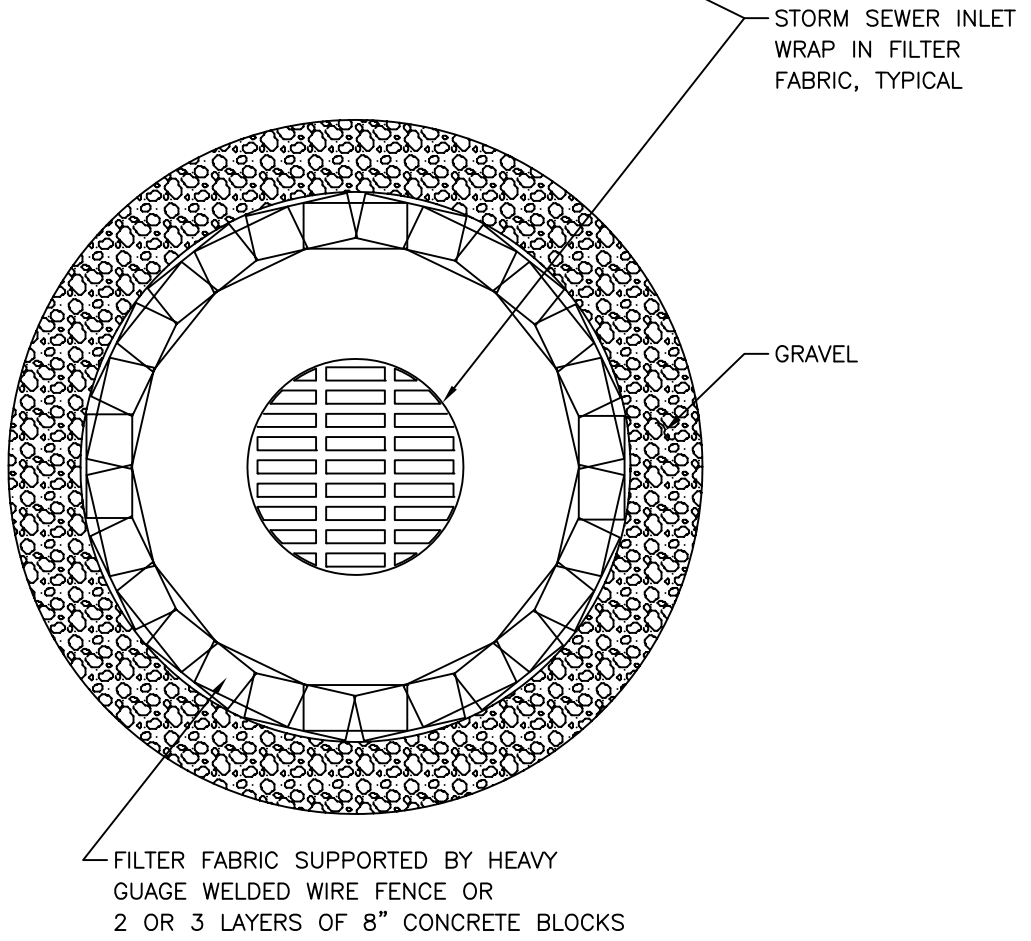
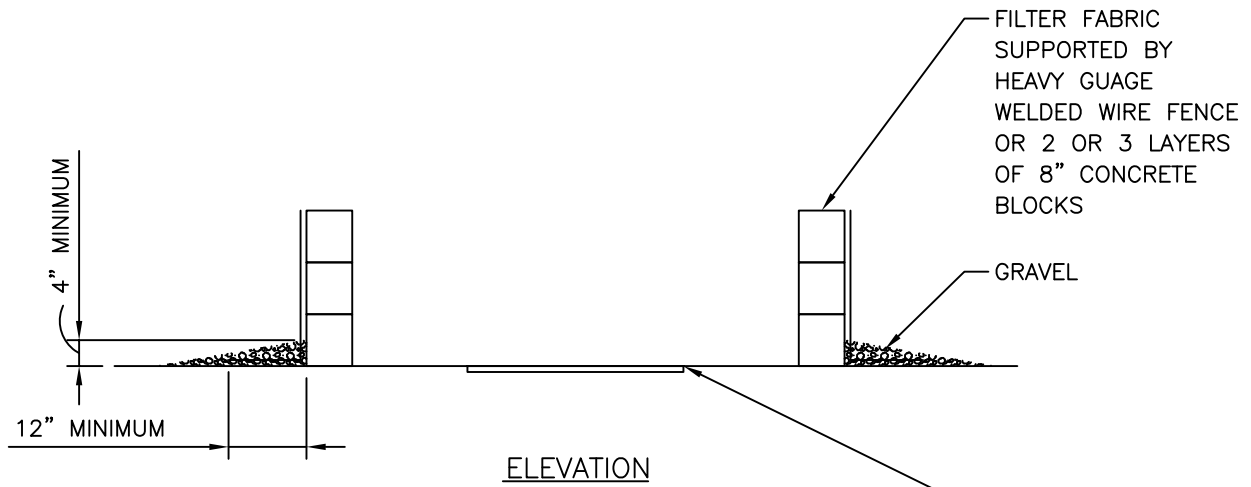
STANDARD CONSTRUCTION DETAILS
--TEMPORARY SEDIMENT TRAP DETAIL--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/29/2017 12:48 PM

DETAIL NUMBER: **02-0100**
PROJECT NO: _____



NOTE:
 FILTER FABRIC SHALL BE AT LEAST
 18" HIGH BUT LESS THAN 36" HIGH.

CITY OF WAUKESHA
 DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
 --STORM INLET PROTECTION--

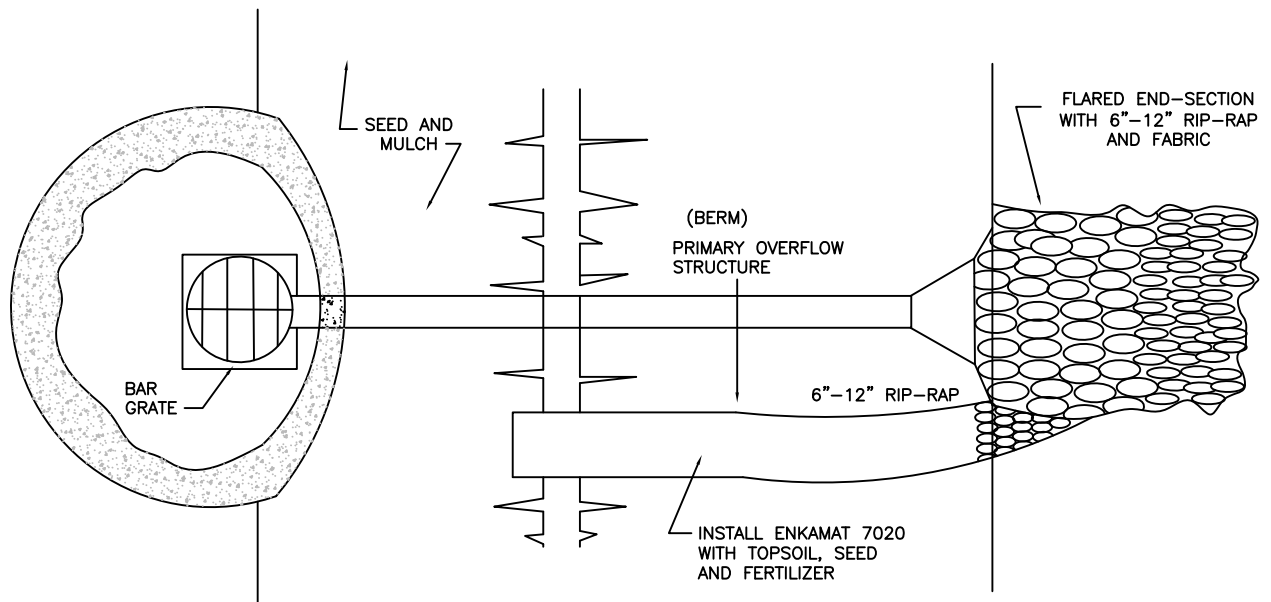
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 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

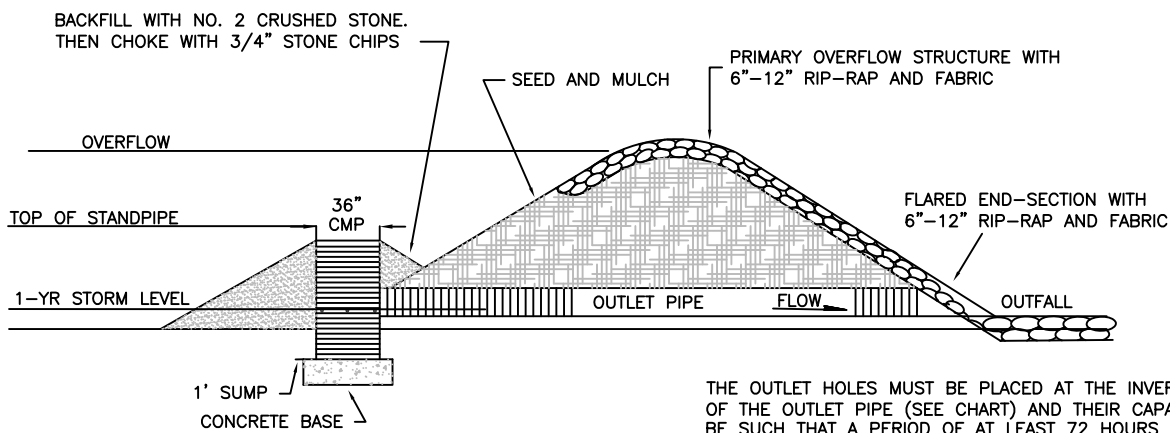
PLOT SCALE : 1" = 1'
 PLOT DATE : 11/29/2017 12:52 PM

DETAIL NUMBER: **02-0502**
 PROJECT NO: _____

FILE NAME : 0:\PROJECTS\Standard Specifications\Final\02-0502-STORM FIELD INLET PROTECTION.dwg



NOTE: EXTREME CARE MUST BE EXERCISED TO ENSURE THAT THE OUTLET HOLES IN THE STANDPIPE DO NOT BECOME CLOGGED WITH SEDIMENT.



THE OUTLET HOLES MUST BE PLACED AT THE INVERT ELEVATION OF THE OUTLET PIPE (SEE CHART) AND THEIR CAPACITY MUST BE SUCH THAT A PERIOD OF AT LEAST 72 HOURS WILL BE REQUIRED TO OUTLET A 1-YEAR STORM VOLUME. THE BASIN MUST BE OVER-EXCAVATED AT LEAST TWO FEET DEEP BELOW THE ELEVATION OF THE OUTLET HOLES TO PROVIDE SEDIMENT SETTLING AND STORAGE VOLUME UNTIL THE ENTIRE SITE IS FULLY STABILIZED. THE OUTLET HOLES' SIZE AND ELEVATION ARE DESCRIBED IN THE TABLE BELOW.

AFTER UPSLOPE AREAS ARE FULLY STABILIZED, THE STANDPIPES SHALL BE REMOVED AND ANY ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE PONDS AND DISPOSED OF IN UPLAND AREAS AWAY FROM FLOODPLAINS AND WETLANDS. THE OUTLET PIPE WITHIN THE BERM MUST REMAIN IN PLACE.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

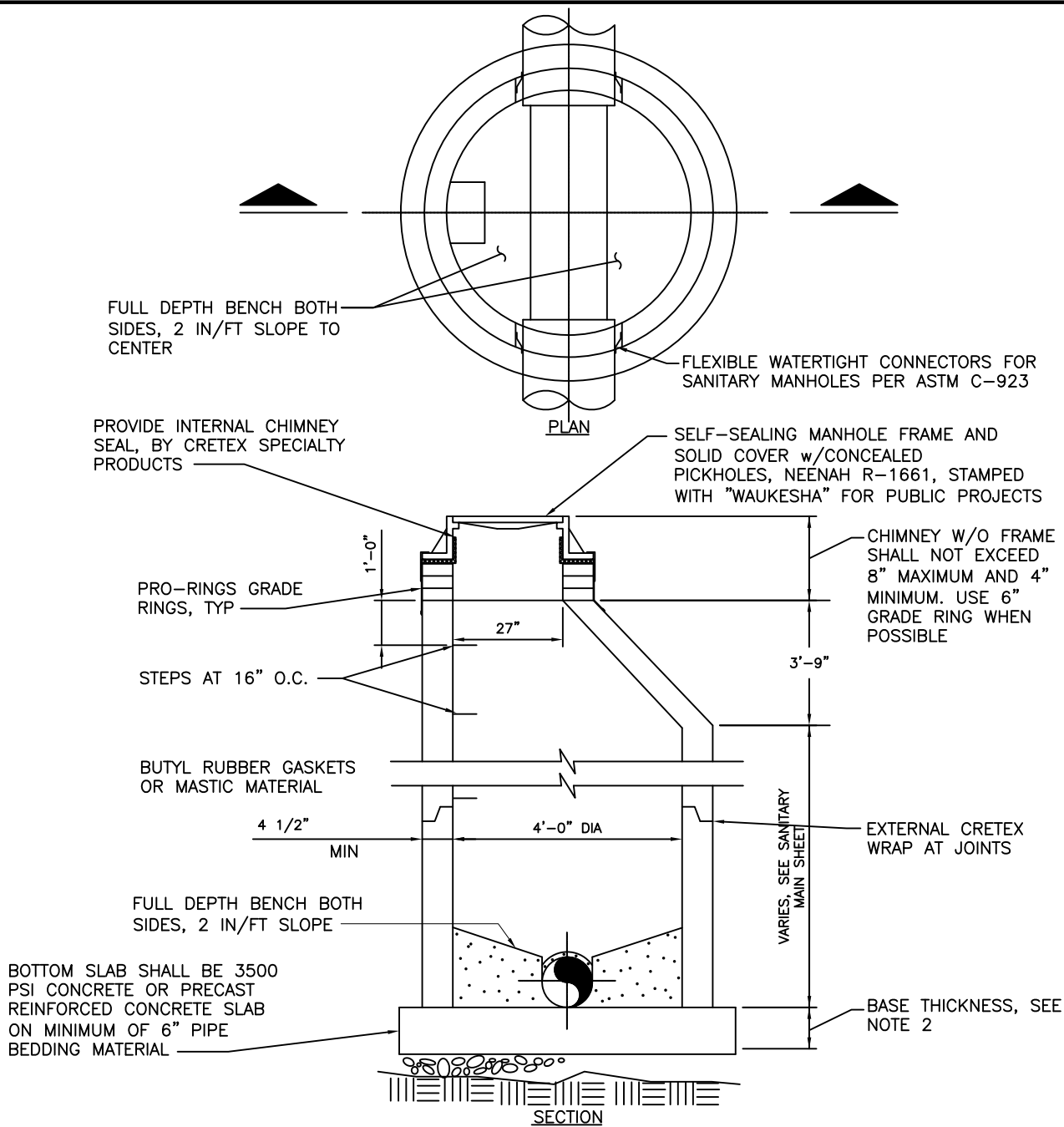
STANDARD CONSTRUCTION DETAILS
-- TEMP OUTLET --

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1:30_XREF
PLOT DATE : 11/29/2017 12:54 PM

DETAIL NUMBER: **02-0505**
PROJECT NO: _____



NOTES:

1. MANHOLE SECTIONS, BASES AND TOP SLABS SHALL BE PRECAST REINFORCED CONCRETE CONSTRUCTED IN ACCORDANCE WITH ASTM C-478.
2. THE BASE THICKNESS SHALL BE 8-INCHES FOR DEPTHS 10 FEET OR LESS AND 12-INCHES FOR DEPTHS OVER 10 FEET.
3. JOINTS BETWEEN MANHOLE SECTIONS SHALL BE TONGUE AND GROOVE WITH COMPRESSION TYPE RUBBER GASKET CONFORMING TO ASTM C443 OR/AND APPROVED BITUMASTIC MATERIAL.
4. THE INVERT CHANNEL SHALL BE TROWELED SMOOTH, DENSE SURFACE AND A SEMICIRCLE SHAPE CONFORMING TO THE INSIDE OF THE ADJACENT SEWER SECTIONS.
5. ALL PIPE SHALL BE GROUTED IN-PLACE INTO NEW MANHOLE WALLS. PROVIDE A WATERTIGHT, FLEXIBLE SEAL BETWEEN PIPE AND MANHOLE. CONNECTORS SHALL BE MANUFACTURED BY A-LOK PRODUCTS, INC OR EQUAL AND SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. MANHOLE CASTINGS SHALL BE NEENAH R-1661 FRAME AND SELF-SEALING SOLID COVER WITH CONCEALED PICK-HOLES WITH THE "CITY OF WAUKESHA" & "DPW" ON PUBLIC MANHOLES.
7. ALL ANNULAR SPACES SHALL BE FILLED WITH A MASTIC OR CEMENTITIOUS FILLER.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

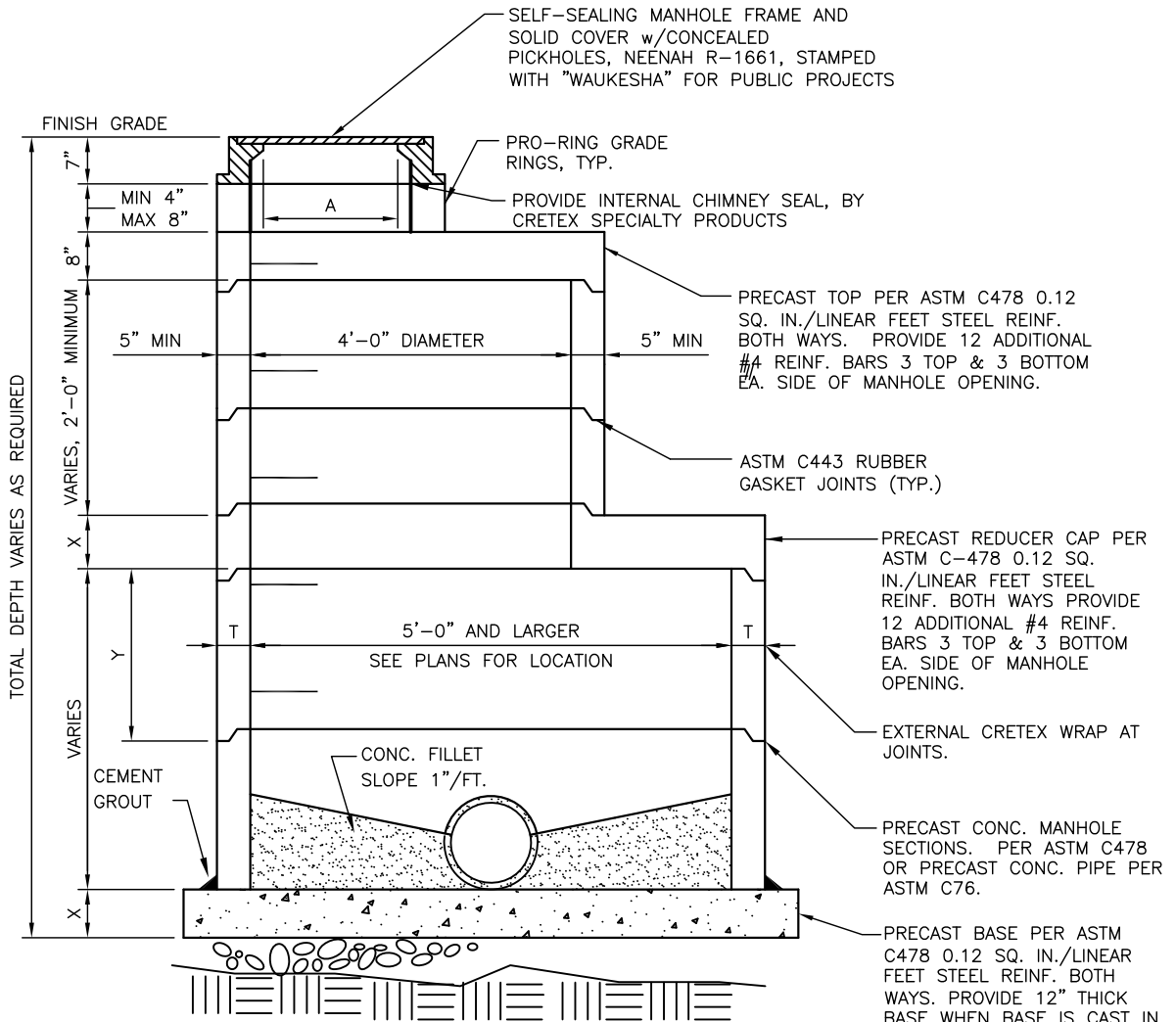
STANDARD CONSTRUCTION DETAILS
--SANITARY MANHOLE--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.715063
PLOT DATE : 11/21/2017 7:38 AM

DETAIL NUMBER: **05-0001**
PROJECT NO:



MANHOLE DIAMETER	T	X	Y
60"	8"	8"	3', 4', 5' & 8'
72"	7"	8"	3', 4', 5' & 8'
84"	7"	8"	3', 4', 5' & 8'
96"	9"	12"	8'
102"	9 1/2"	12"	2', 3', 5' & 8'
108"	9"	12"	8'
120"	10"	12"	6'
>120"	SPECIAL DESIGN		

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

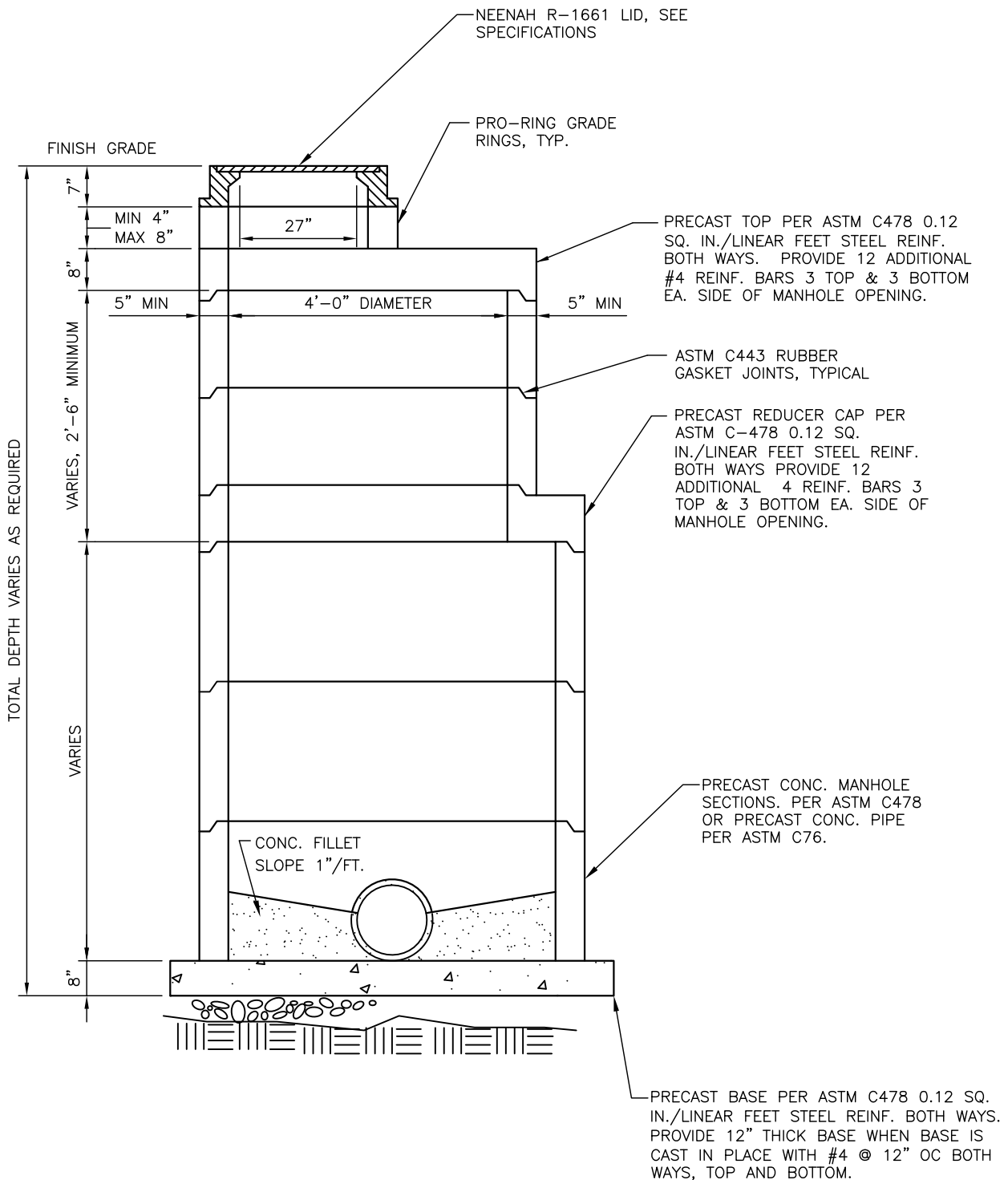
STANDARD CONSTRUCTION DETAILS
STANDARD 60-INCH SANITARY MANHOLE

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.800000
PLOT DATE : 11/21/2017 7: 48 AM

DETAIL NUMBER: **05-0002**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
STANDARD STORM MANHOLE

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.850000
PLOT DATE : 11/21/2017 7:59 AM

DETAIL NUMBER: **05-0003**
PROJECT NO:

PRO-RING ADJUSTING RINGS BETWEEN FRAME AND MH SECTION. A MIN. OF 4" AND A MAX. OF 8" ADJUSTMENT IS REQUIRED.

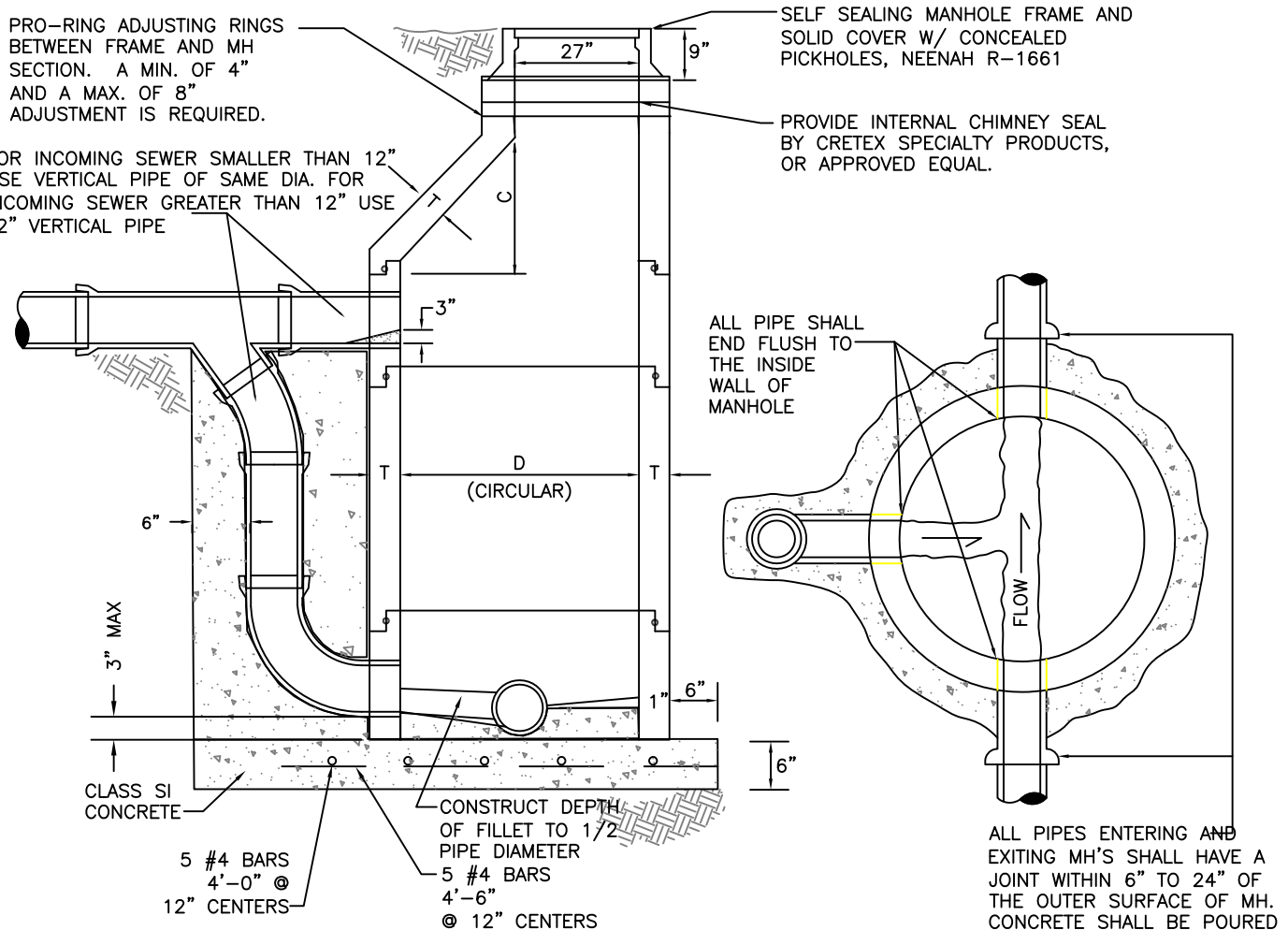
FOR INCOMING SEWER SMALLER THAN 12" USE VERTICAL PIPE OF SAME DIA. FOR INCOMING SEWER GREATER THAN 12" USE 12" VERTICAL PIPE

SELF SEALING MANHOLE FRAME AND SOLID COVER W/ CONCEALED PICKHOLES, NEENAH R-1661

PROVIDE INTERNAL CHIMNEY SEAL BY CRETEX SPECIALTY PRODUCTS, OR APPROVED EQUAL.

ALL PIPE SHALL END FLUSH TO THE INSIDE WALL OF MANHOLE

ALL PIPES ENTERING AND EXITING MH'S SHALL HAVE A JOINT WITHIN 6" TO 24" OF THE OUTER SURFACE OF MH. CONCRETE SHALL BE POURED TO, BUT NOT BEYOND, THE FIRST PIPE JOINT.



ALTERANTE MATERIAL FOR WALLS	D	C	T
PRECAST SECTIONS	4'-0"	3'-0"	5"
	5'-0"	3'-0"	6"
POURED WALLS *	4'-0"	3'-0"	6"
	5'-0"	3'-0"	6"

* CLASS SI CONCRETE, VIBRATED, WITH FORMS RIGID AND TRUE TO VERTICAL ALIGNMENT.

DIAMETER OF MAIN SEWER	D
18" AND UNDER	4'-0"
21" TO 42" INCLUSIVE	5'-0"

NOTES:

1. ALL PRECAST MANHOLE JOINTS SHALL BE SEALED WITH AN O-RING RUBBER GASKET. MEETING ASTM C443.
2. PIPE CONNECTIONS ON MANHOLE WORK ARE INCIDENTAL, IF WITHIN 2' OF STRUCTURE.
3. PRECAST MANHOLE SECTIONS WITH A-LOCKS & PRECAST FILLETS SHALL NOT BE ALLOWED.
4. STEPS SHALL NOT BE INSTALLED IN MANHOLE.
5. USE TYPE B LID IN PAVED AREAS IN LIEU OF SELF SEALING LID.
6. MANHOLES IN PAVED AREAS SHALL HAVE REBARS PLAVED AROUND CASTING.
7. MATCH 0.8 POINTS ON PIPE ENTERING SANITARY MANHOLE.
8. PROVIDE BASE MATERIAL UNDER CONCRETE AS SPECIFIED IN SECTION 02607.

NOTE:

THIS STANDARD APPLIES TO INCOMING SEWERS OF 18" DIAMETER OR LESS.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

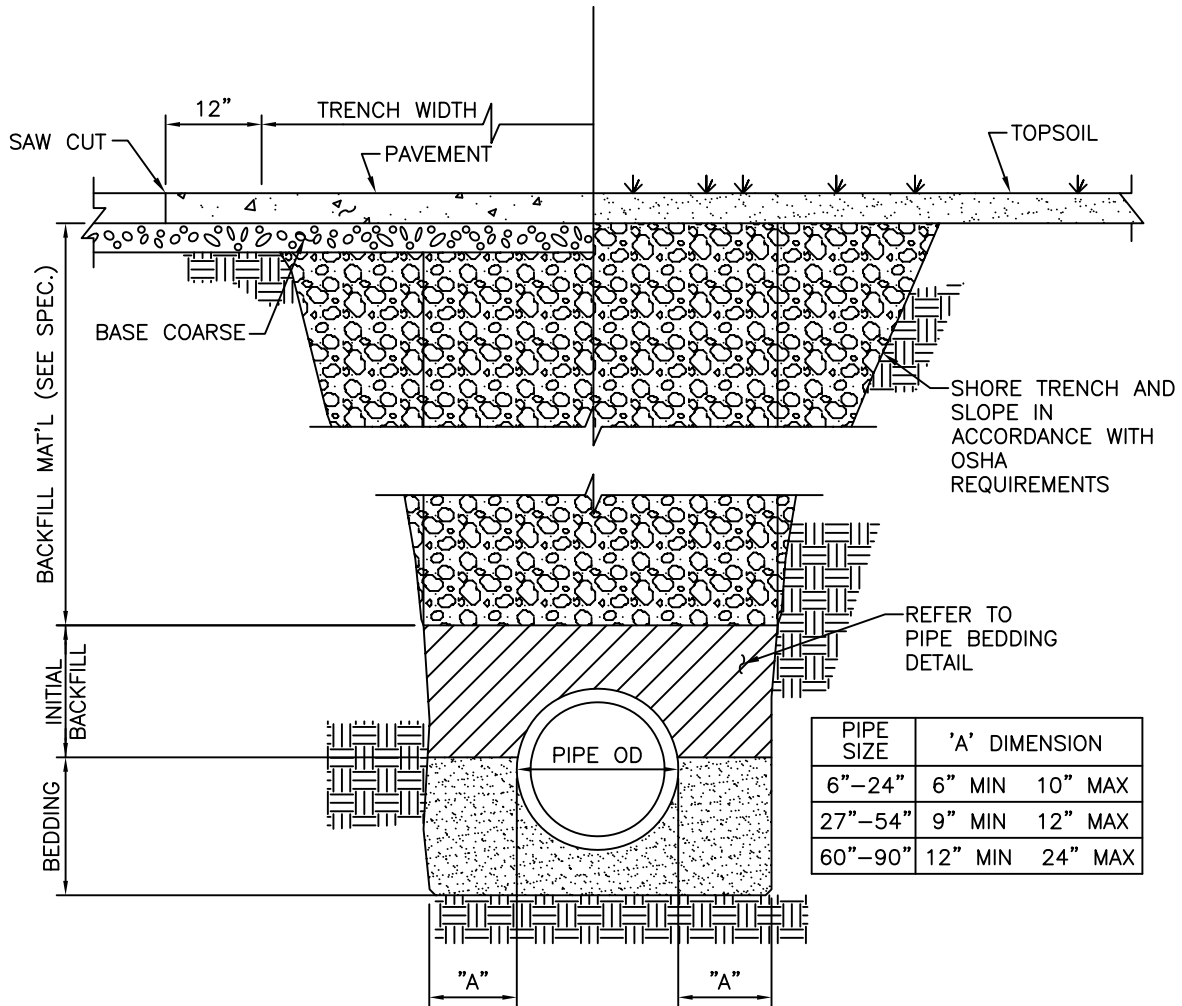
STANDARD CONSTRUCTION DETAILS
STANDARD DROP MANHOLE

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.70000
PLOT DATE : 11/27/2017 7:33 AM

DETAIL NUMBER: **05-0005**
PROJECT NO:



PIPE SIZE	'A' DIMENSION
6"-24"	6" MIN 10" MAX
27"-54"	9" MIN 12" MAX
60"-90"	12" MIN 24" MAX

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

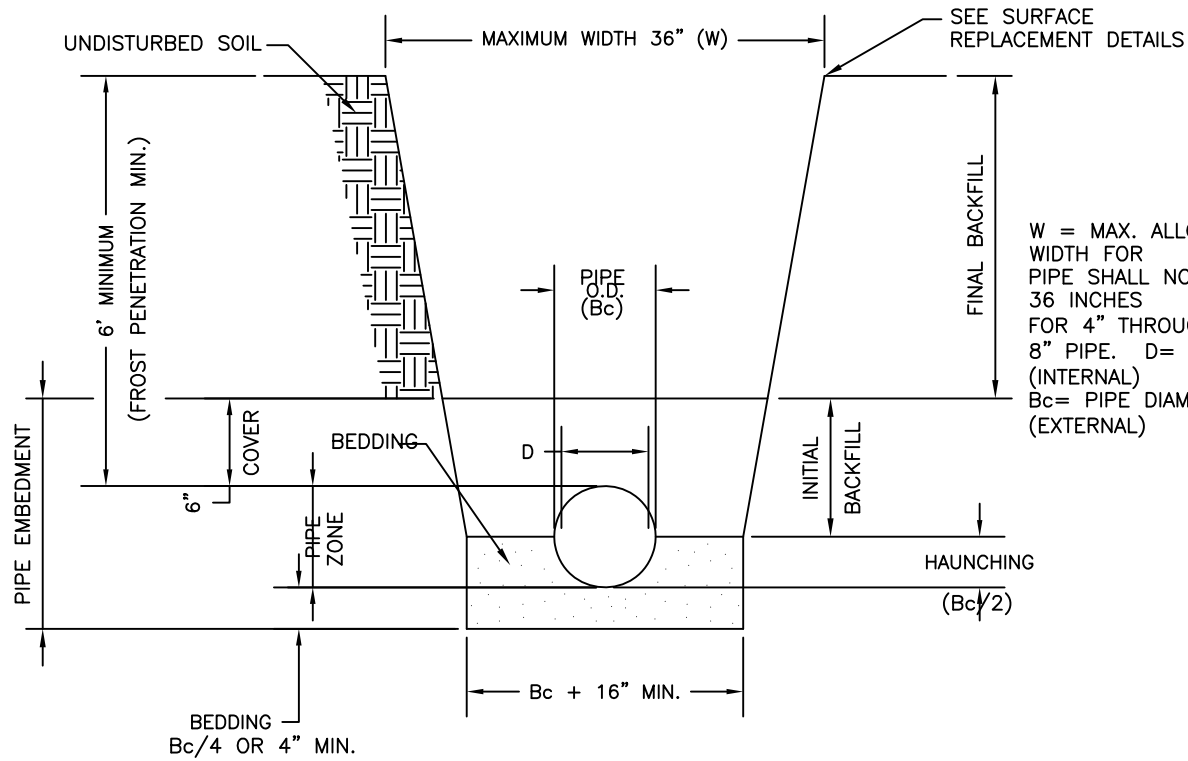
STANDARD CONSTRUCTION DETAIL
--PIPE TRENCH DETAIL--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.75:1
PLOT DATE : 11/21/2017 12:03 P

DETAIL NUMBER: **05-0008**
PROJECT NO:



W = MAX. ALLOWABLE TRENCH WIDTH FOR PIPE SHALL NOT TO EXCEED 36 INCHES FOR 4" THROUGH 8" PIPE. D= PIPE DIAMETER (INTERNAL)
 Bc= PIPE DIAMETER (EXTERNAL)

CITY OF WAUKESHA
 DEPARTMENT OF PUBLIC WORKS

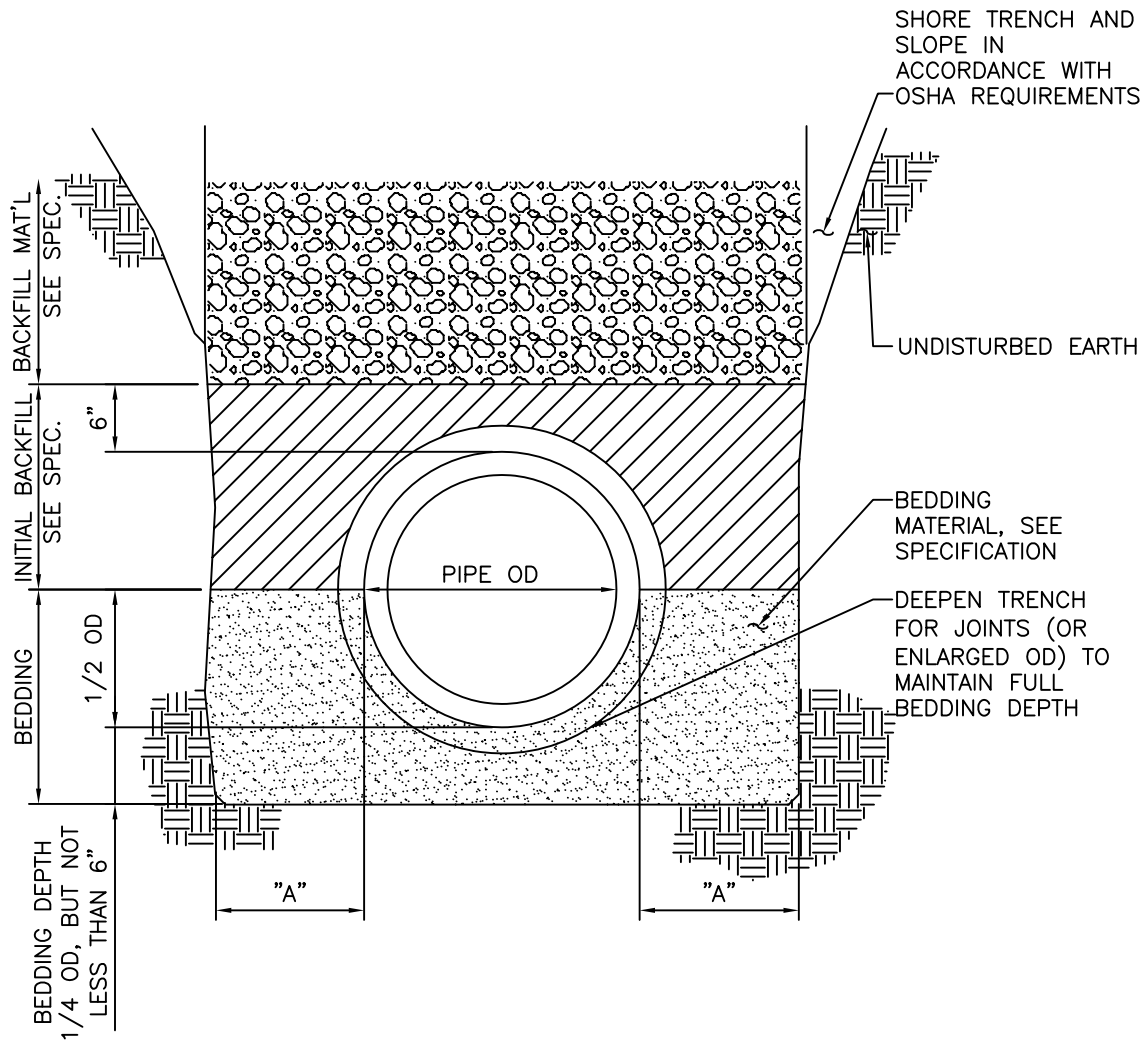
STANDARD CONSTRUCTION DETAILS
 OPEN TRENCH METHOD

APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.060000
 PLOT DATE : 11/27/2017 7:35 AM

DETAIL NUMBER: **05-0010**
 PROJECT NO:



NOTES:

1. REFER TO PIPE TRENCH DETAIL.
2. TRANSITION OF BEDDING TYPES SHALL ONLY BE MADE AT PIPE JOINTS.
3. COMPACTION SHALL NOT BE DONE IN LAYERS MORE THAN 12" THICK.
4. BACKFILL SHALL BE COMPACTED TO NOT LESS THAN 90% STANDARD PROCTOR.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

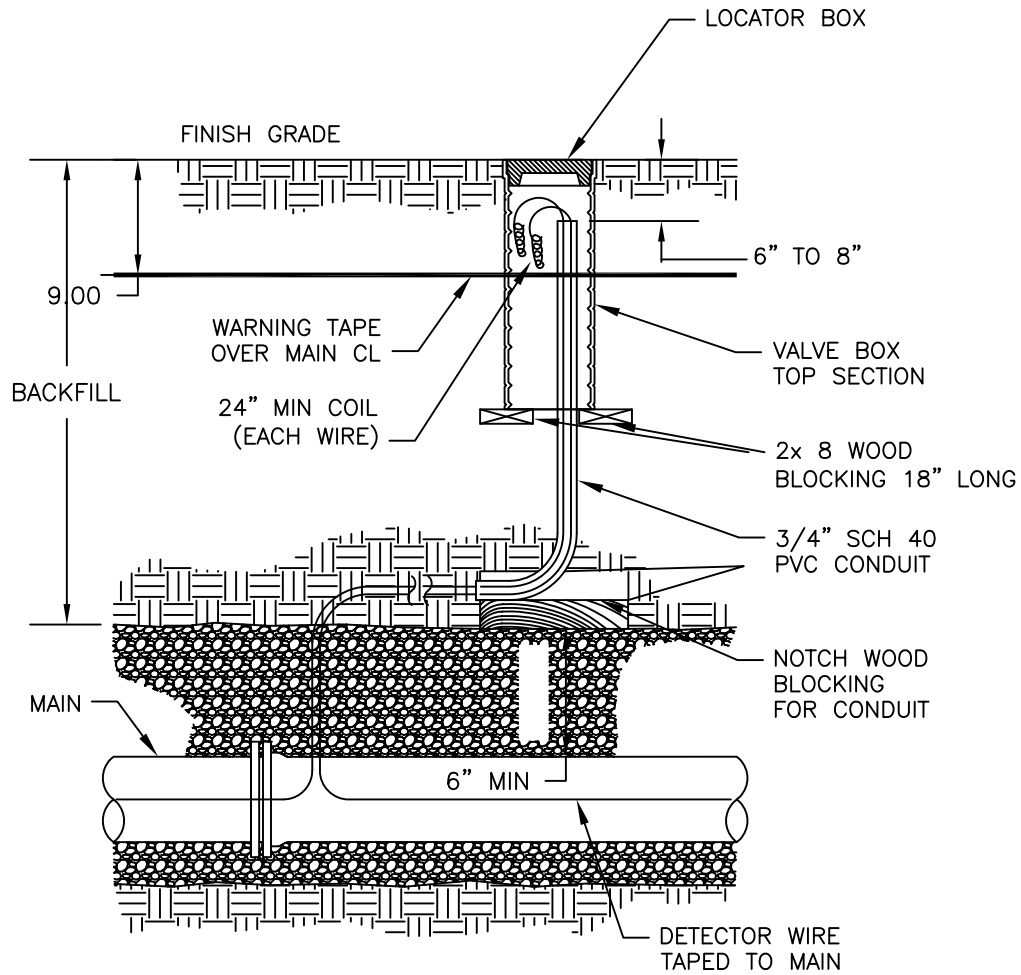
STANDARD CONSTRUCTION DETAIL
--PIPE BEDDING DETAIL--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.800000
PLOT DATE : 11/21/2017 12:14 PM

DETAIL NUMBER: **05-0011**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

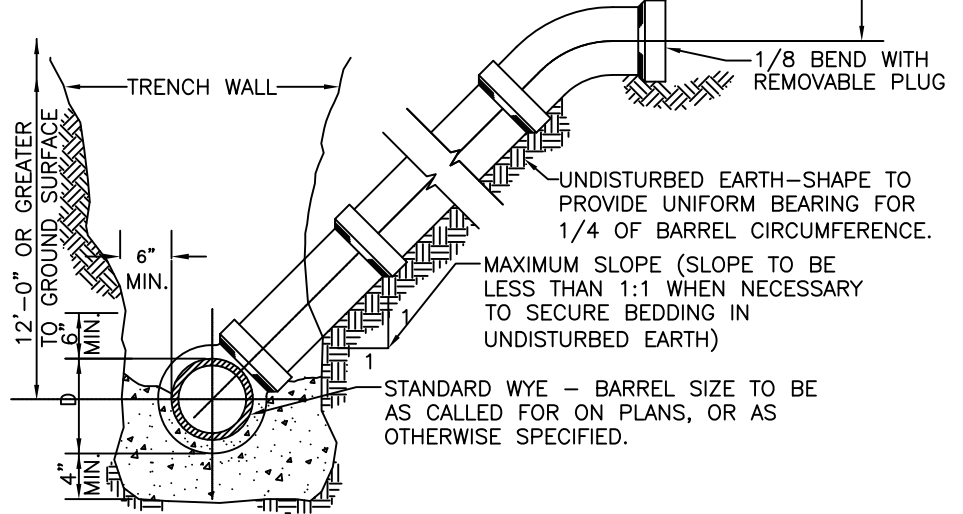
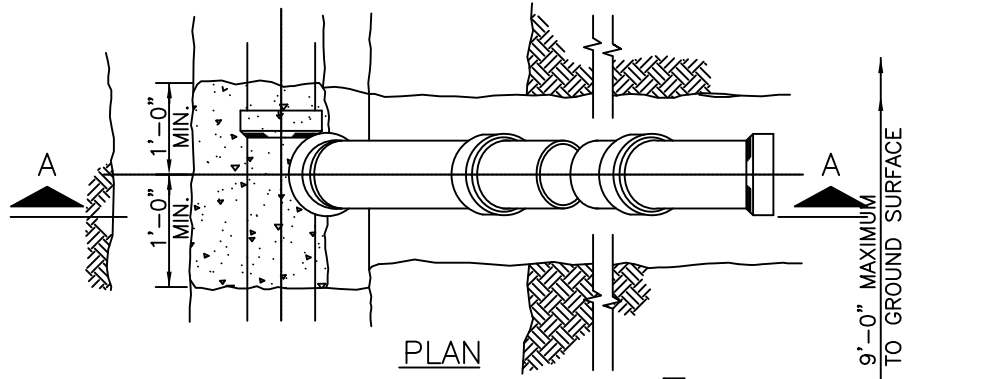
STANDARD CONSTRUCTION DETAILS
--DETECTOR WIRE AND LOCATION BOX--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

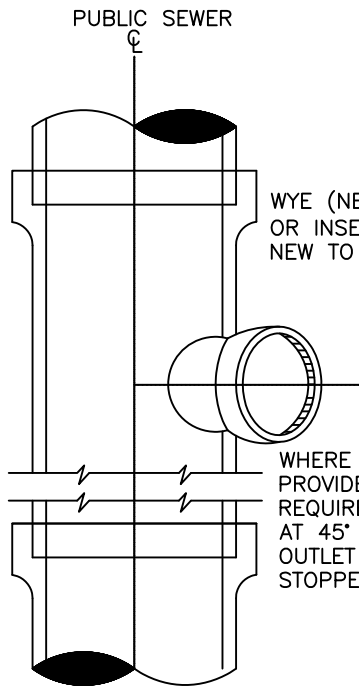
PLOT SCALE : 0.066667
PLOT DATE : 11/29/2017 12:56 PM

DETAIL NUMBER: **05-0100**
PROJECT NO:



SECTION A-A

STANDARD RISER FOR SERVICE CONNECTION



WYE (NEW CONSTRUCTION)
OR INSERT-A-TEE (EXISTING)
NEW TO EXIST MAIN

WHERE TEES AND WYES ARE NOT PROVIDED, INSERTATEE WILL BE REQUIRED. AXIS OF OUTLET PLACED AT 45° SLOPE WITH HORIZONTAL. OUTLET TO BE PROVIDED WITH STOPPER.

STANDARD SERVICE CONNECTION

NOTE:

1. RISERS TO BE CONSTRUCTED WHERE SEWER DEPTH EXCEEDS 12'-0".

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

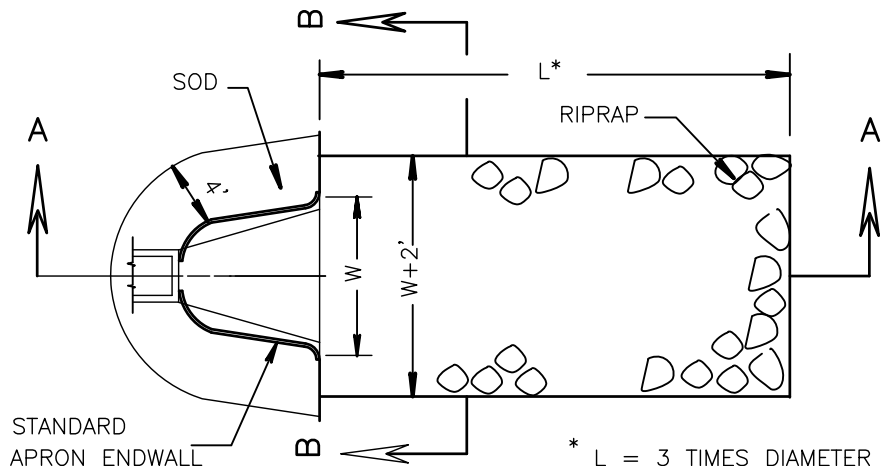
STANDARD CONSTRUCTION DETAIL
-STANDARD SERVICE CONNECTION -

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

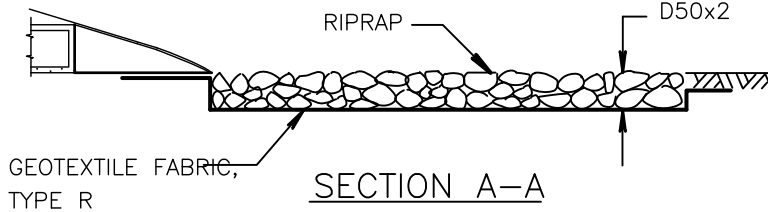
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CHECKED BY: _____ DATE: _____

PLOT SCALE : 1"=1'
PLOT DATE : 11/21/2017 12:24 P

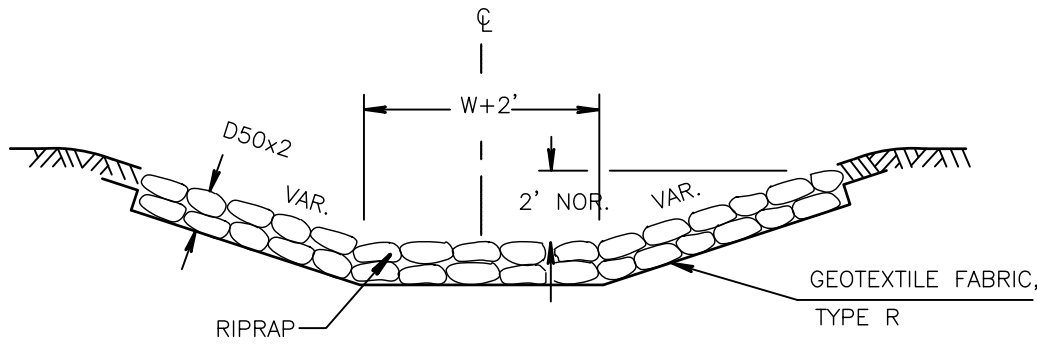
DETAIL NUMBER: **05-0156**
PROJECT NO: _____



* $L = 3 \text{ TIMES DIAMETER (NOR.) OR } 10' \text{ MIN. OR AS DIRECTED BY THE ENGINEER}$



SECTION A-A



SECTION B-B

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
--RIPRAP AND GEOTEXTILE FABRIC AT APRON ENDWALLS--

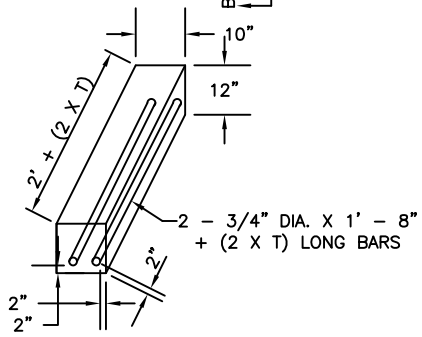
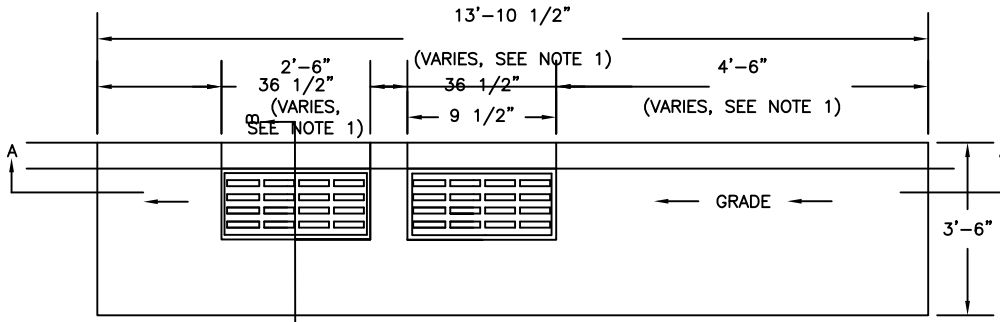
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

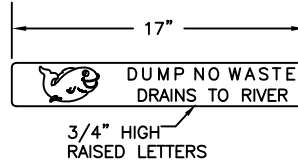
PLOT SCALE : 1:20_XREF
PLOT DATE : 11/21/2017 2:17 PM

DETAIL NUMBER: **05-0400**
PROJECT NO: _____

FILE NAME : 0:_PROJECTS\Standard Specifications\Standard Details\Final\05-0400-RIPRAP AND GEOTEXTILE FABRIC AT APRON ENDWALLS.dwg

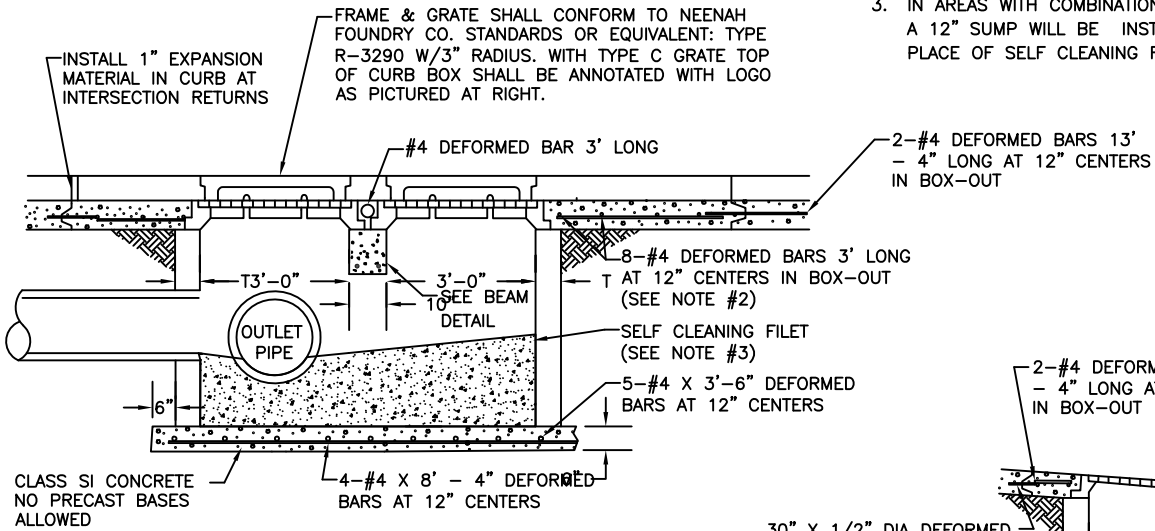


BEAM DETAIL



NOTES:

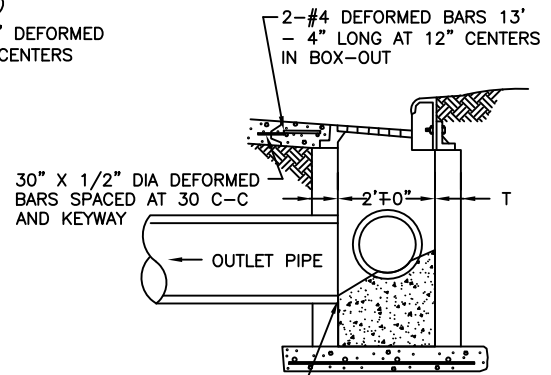
1. MATCH EXISTING JOINTS AS IS PRACTICABLE. ON NEW PAVEMENT BEGIN JOINT PATTERN FROM EDGES OF BOX OUT.
2. STEEL REBAR TO BE PLACED AS SHOWN WHETHER CATCH BASIN IS POURED INTEGRAL TO PAVEMENT OR IN A BOX OUT. MAINTAIN MINIMUM OF 2" CLEARANCE BETWEEN REBAR AND FACE OF CONCRETE.
3. IN AREAS WITH COMBINATION SEWERS. A 12" SUMP WILL BE INSTALLED IN PLACE OF SELF CLEANING FILET.



SECTION A-A

ALTERNATE MATERIAL FOR WALLS	T
PRECAST SECTIONS	5"
POURED WALLS *	6"

* CLASS SI CONCRETE, VIBRATED, WITH FORMS RIDGED AND TRUE TO VERTICAL ALIGNMENT.



SECTION B-B

ALL PIPE SHALL END FLUSH TO THE INSIDE WALL OF CB

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAIL
--DOUBLE INLET DETAIL--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

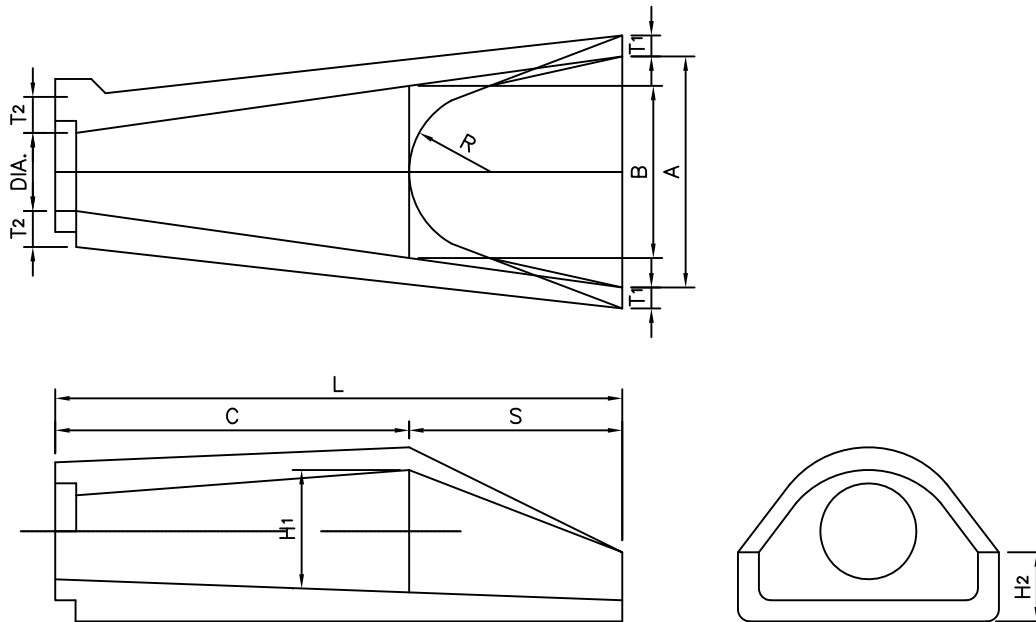
DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1"=1'
PLOT DATE : 11/21/2017 2:21 PM

DETAIL NUMBER: **05-0507**
PROJECT NO: _____

NOTES:

1. REINFORCING IN THE "C" PORTION SHALL BE THE SAME AS SPECIFIED FOR CONCRETE PIPE ASTM C76 AND AASHTO M170 CLASS III AND/OR PAIDD PUB. 280 TYPE A STANDARD INSTALLATION WITH FILL HEIGHT OF $3 < H < 7$.
2. CONCRETE IN THESE END SECTIONS SHALL HAVE A MINIMUM STRENGTH OF 4000 PSI.
3. VARIATIONS IN MANUFACTURING DIMENSIONS SHALL BE AS CALLED FOR IN ASTM C76 AND AASHTO M170 AND/OR PAIDD PUB.280.
4. PIPE TO END SECTION CONNECTION SHALL MATCH JOINTS OF STANDARD PIPE DETAILS.
5. REFER TO STANDARD DETAILS FOR INFORMATION NOT LISTED ON THIS DRAWING.



DIA	A	B	C	T ₁	T ₂	H ₁	H ₂	L	S	R
in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
12	30	24	46	3½	5	16	6	73	27	11
15	30	24	46	3½	3½	16	6	73	27	11
18	36	29	46	3½	3½	19	9	73	27	12
21	48	33	30	4½	6	25	9½	73½	43½	14
24	48	33	30	4½	4½	25	9½	73½	43½	14

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

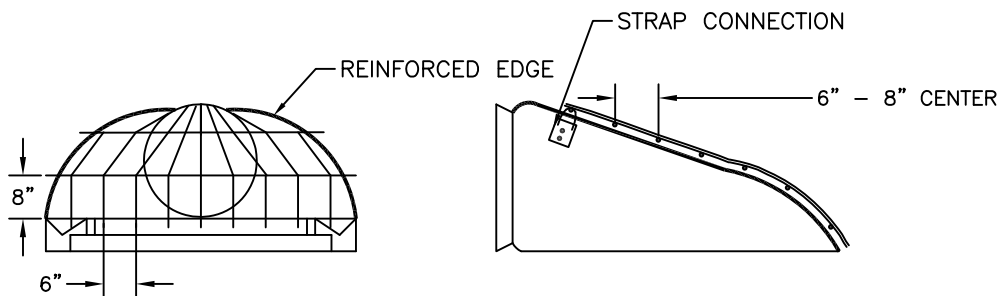
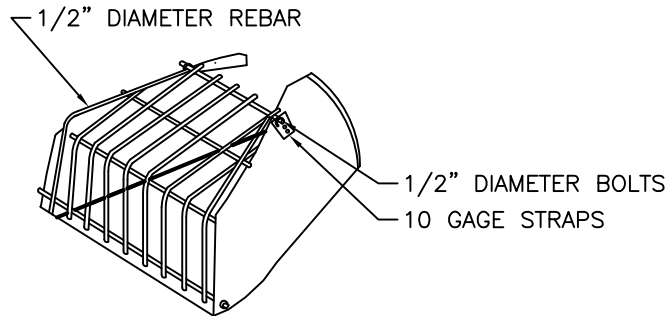
STANDARD CONSTRUCTION DETAILS
--CONCRETE FLARED END--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 75
PLOT DATE : 11/21/2017 2: 28 PM

DETAIL NUMBER: **05-0600**
PROJECT NO:



ELEVATION

CROSS SECTION

NOTES:

1. TRASH RACK BARS TO BE BLACK STEEL.
2. PAINT WITH HIGH ZINC COATING AFTER FABRICATION.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

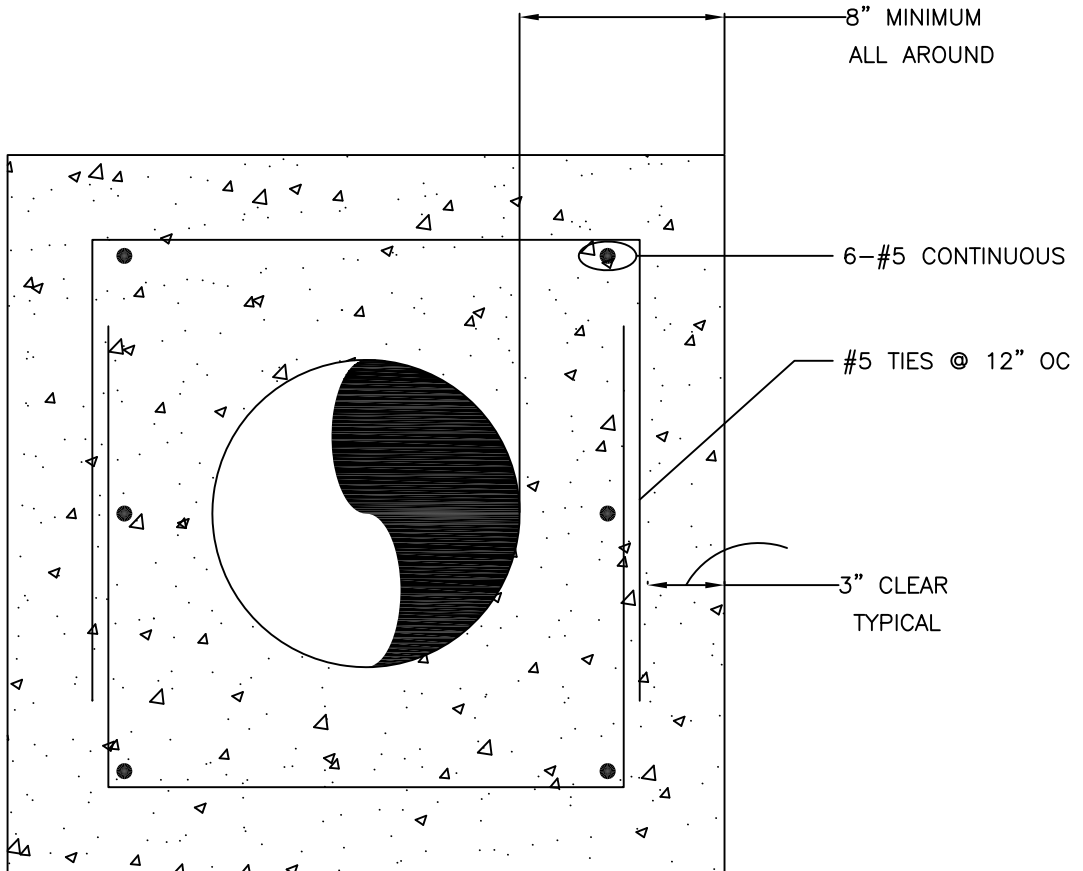
STANDARD CONSTRUCTION DETAILS
--TRASH RACK FOR END SECTION--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1 IN: 20 FT
PLOT DATE : 11/21/2017 2: 37 PM

DETAIL NUMBER: **05-0601**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

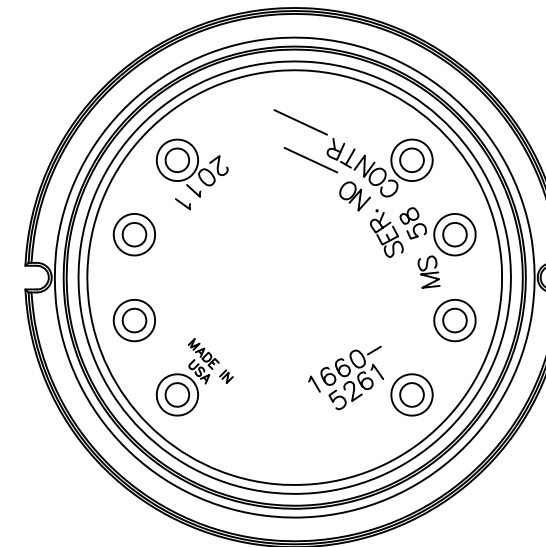
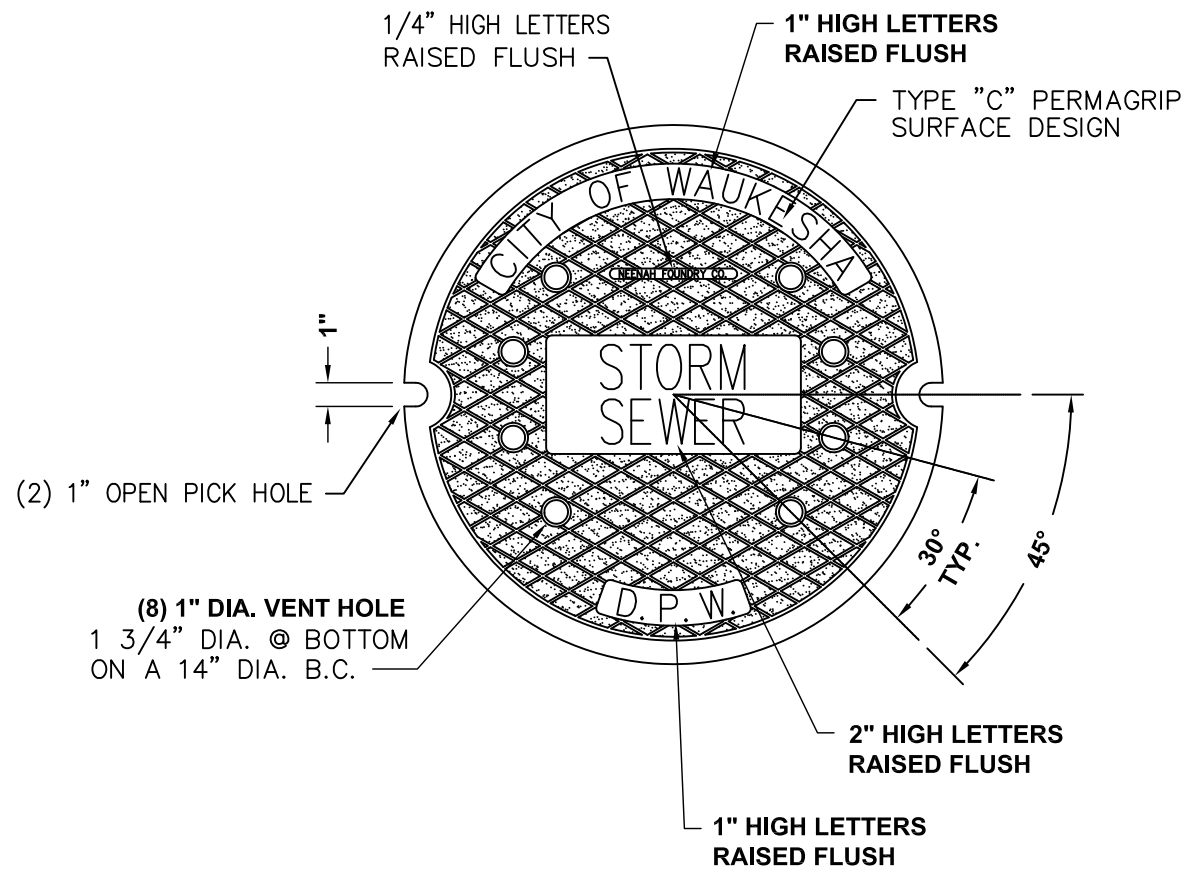
STANDARD CONSTRUCTION DETAILS
--PIPE ENCASEMENT--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

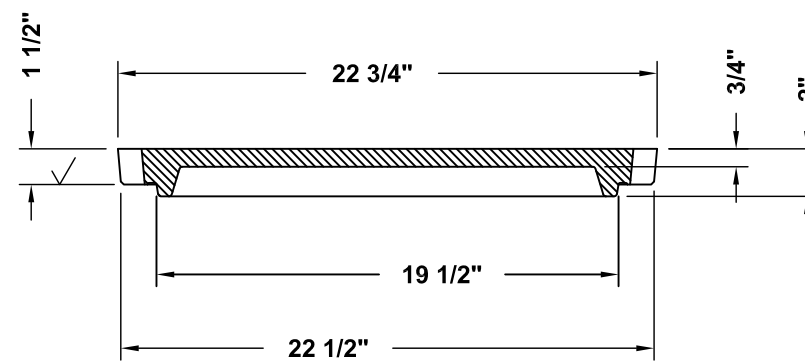
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 10' XREF
PLOT DATE : 11/21/2017 2:42 PM

DETAIL NUMBER: **05-0850**
PROJECT NO:



UNDERSIDE VIEW



MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NO PAINT
 WEIGHT: 106#

DR. E. NIVER	SCALE 1/8"=1"	TITLE: R-1660 LID LTRD. 'STORM SEWER' AND 'CITY OF WAUKESHA', 'D.P.W.'
CH.	DIM CHK.	NEENAH FOUNDRY COMPANY NEENAH WISCONSIN 54956
APP.	DATE 04-27-2011	
DATE 04-27-2011		NF-16605261 B

DATE	REVISION	INT
05-11-2011	ADDED RIB DIMENSIONS PER PATTERN CHECK	ELN

CAD DWG. REF: 16605261.DWG-2

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

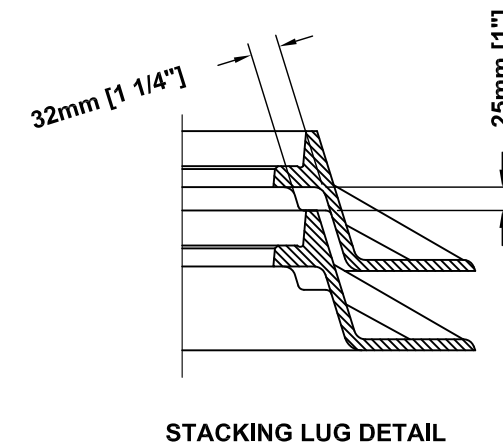
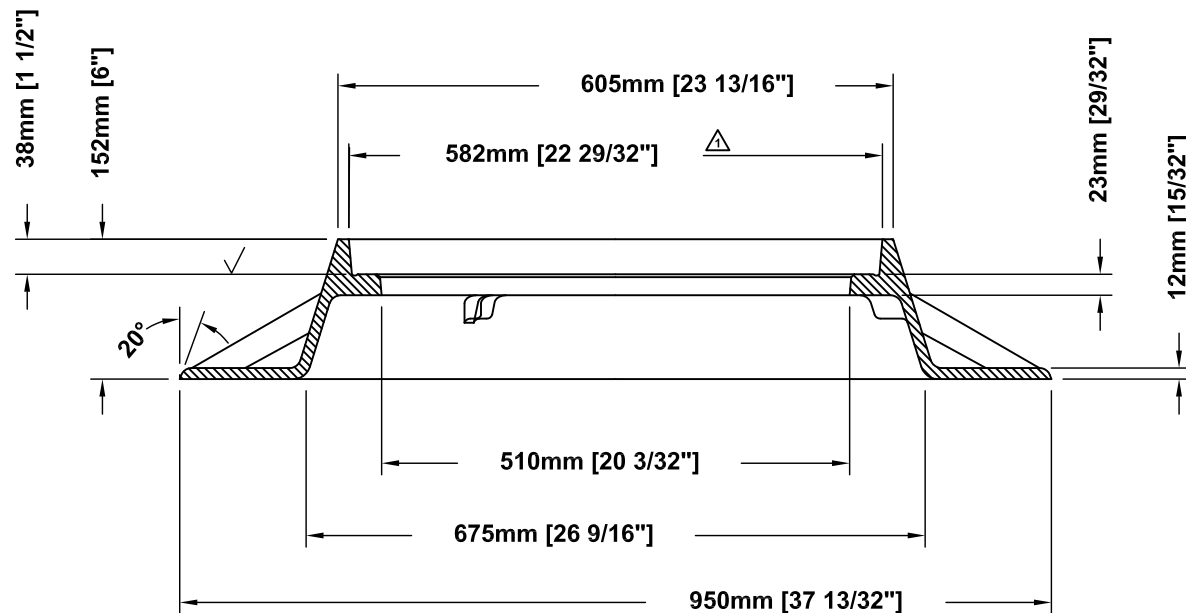
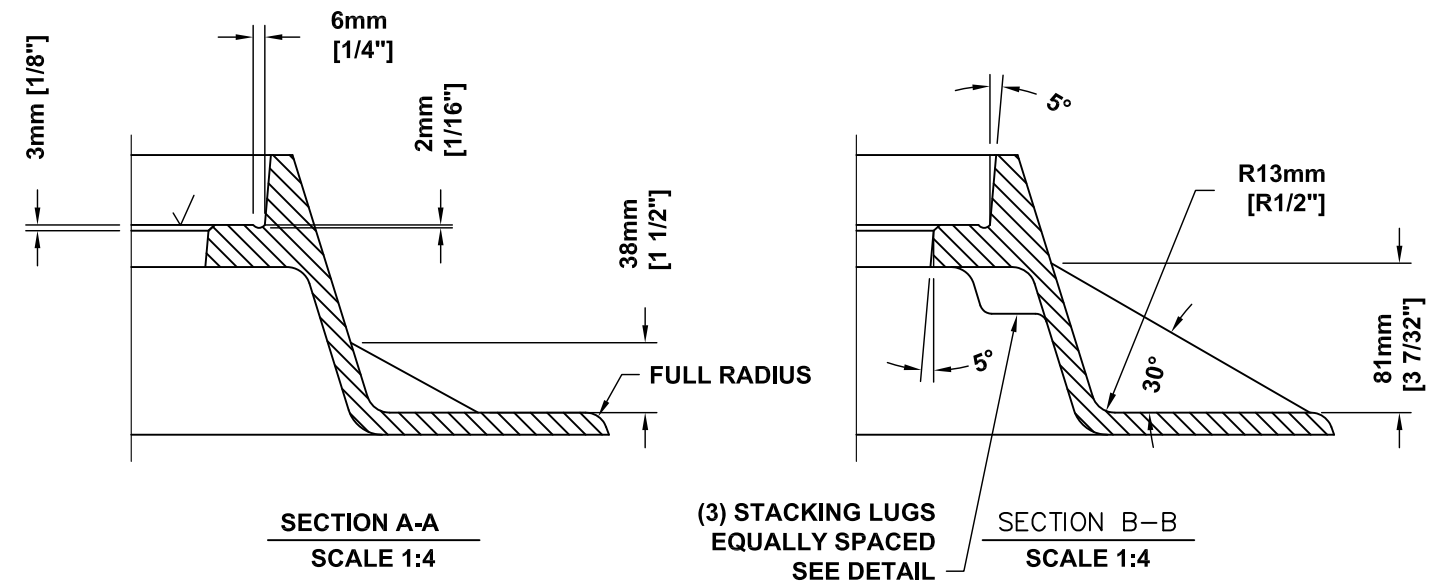
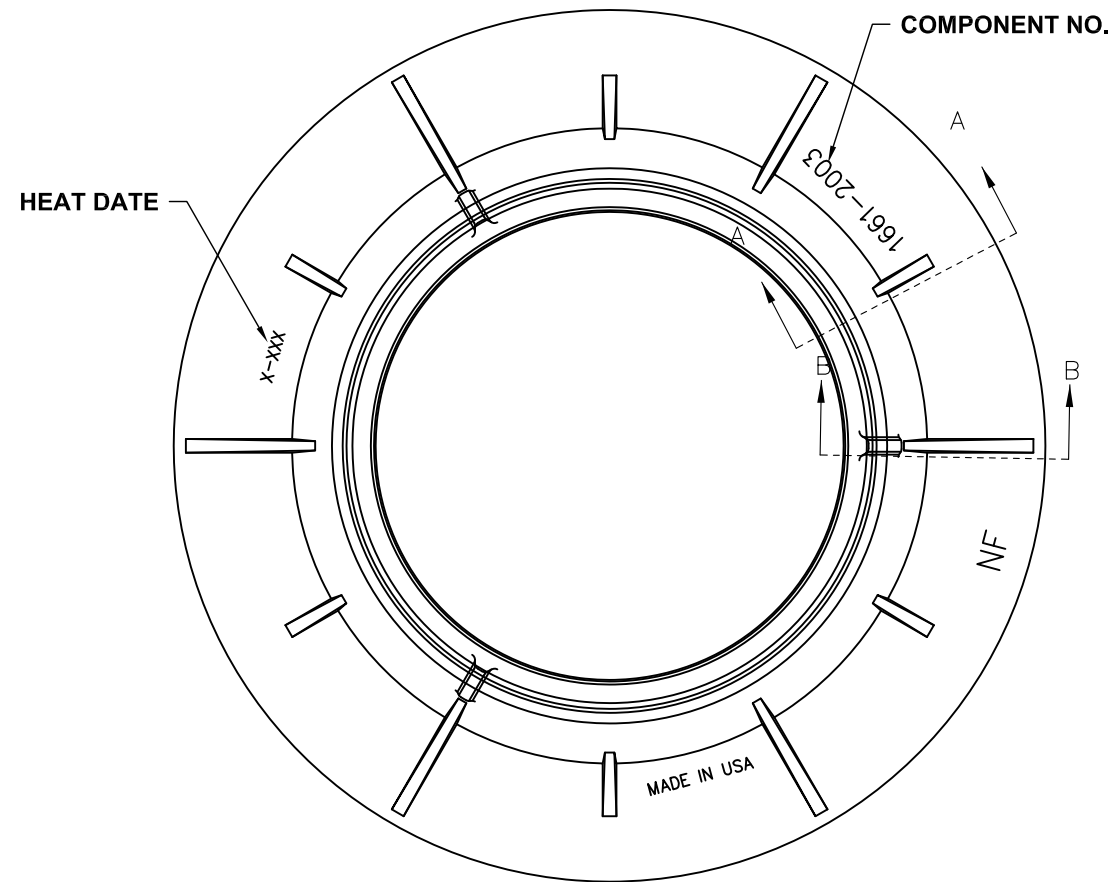
STANDARD CONSTRUCTION DETAILS
R-1660 LID LTRD. 'STORM SEWER'

APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.123430
 PLOT DATE : 11/21/2017 2:59 PM

DETAIL NUMBER: 05-1660
 PROJECT NO: STANDARD DETAILS



NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND [METRIC]
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NO PAINT
 WEIGHT: 164# WAS 1661AT01

DR. MAG	SCALE 1/8"=1"	TITLE: R-1661-A
CH.	DIM CHK.	152mm [6"] HIGH FRAME
APP.		NEENAH FOUNDRY COMPANY
DATE 07-12-2002		NF- 16612003
		B

CAD DWG. REF: 16612003.DWG- 2

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

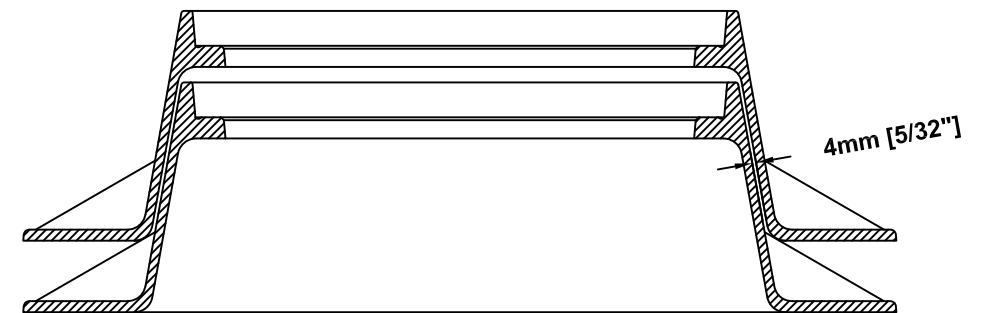
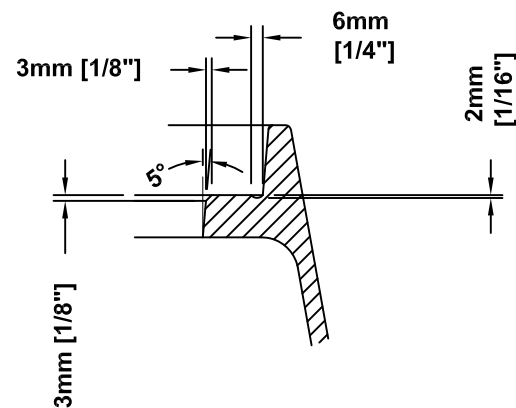
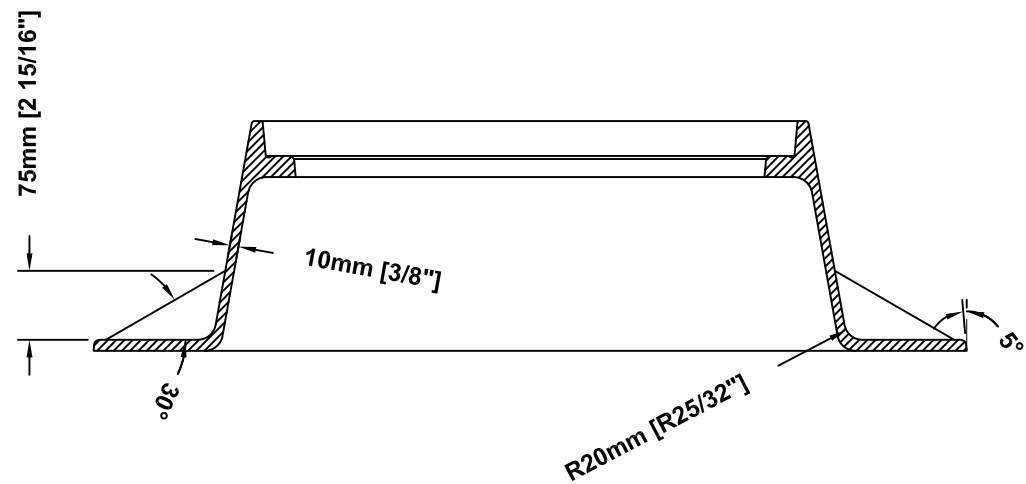
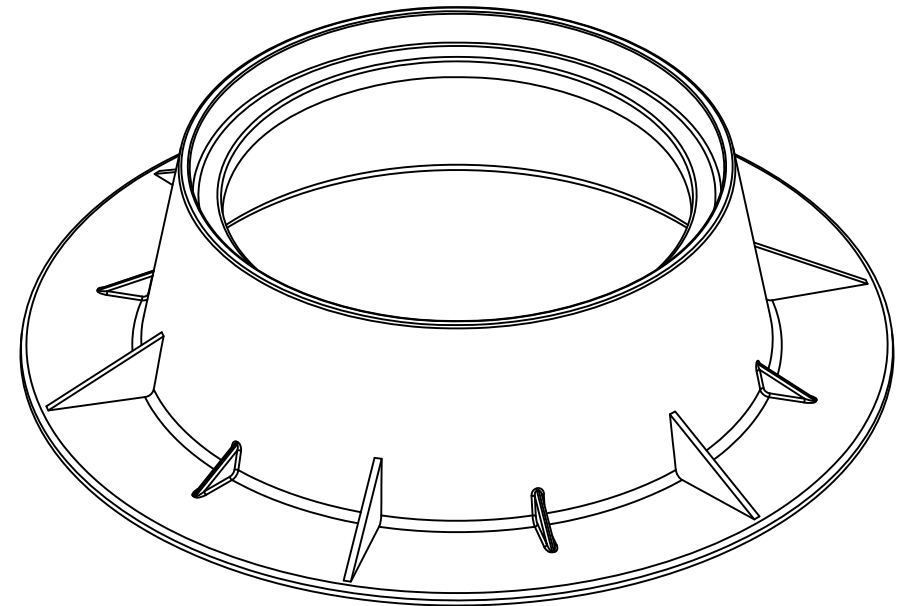
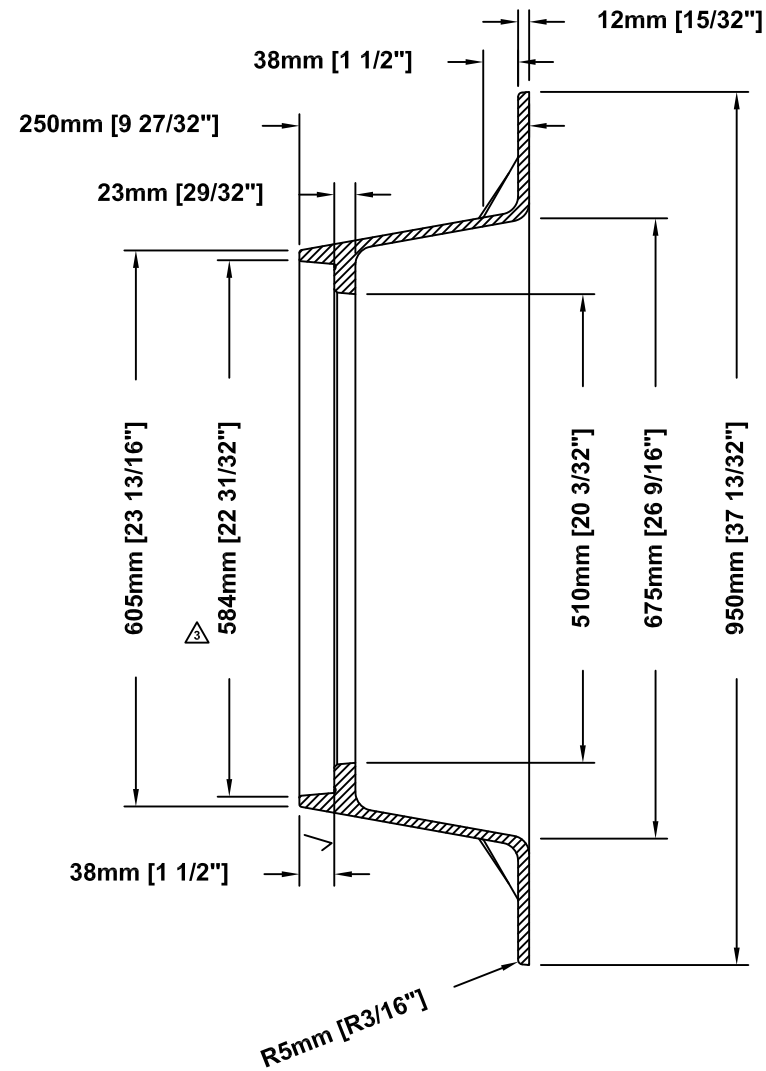
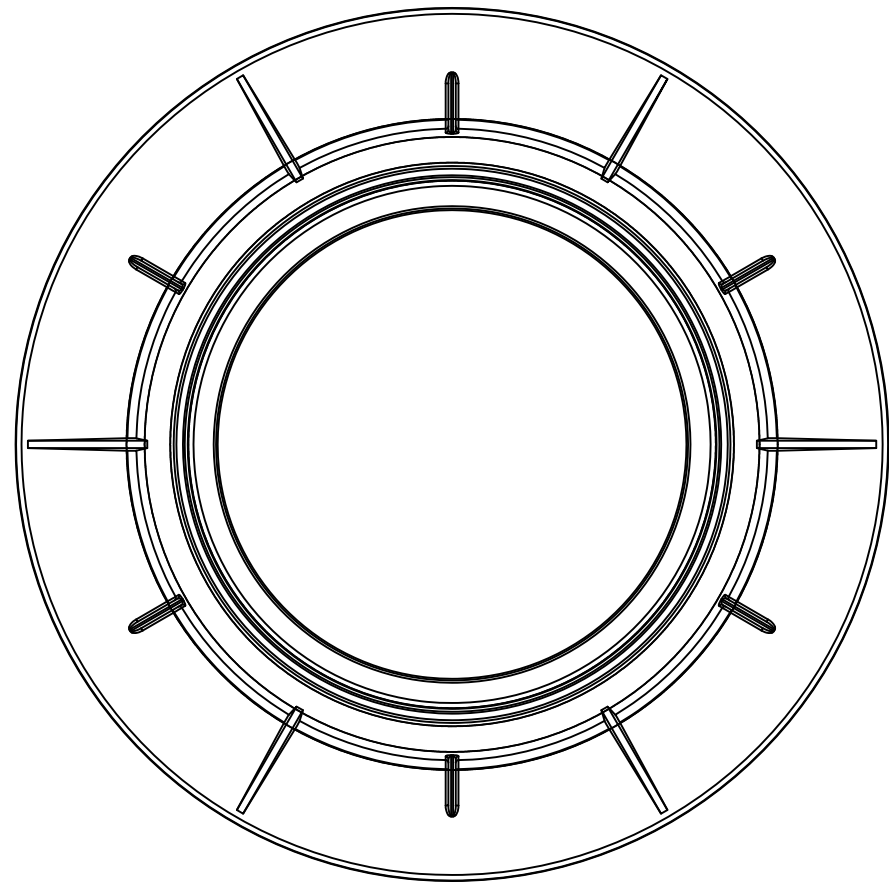
STANDARD CONSTRUCTION DETAILS
R-1661-A HIGH FRAME

APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.121382
 PLOT DATE : 11/21/2017 3:01 PM

DETAIL NUMBER: 05-1661A
 PROJECT NO: STANDARD DETAILS



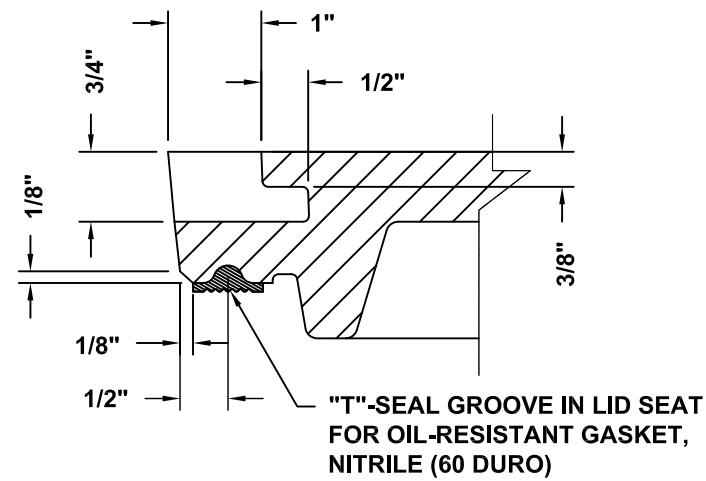
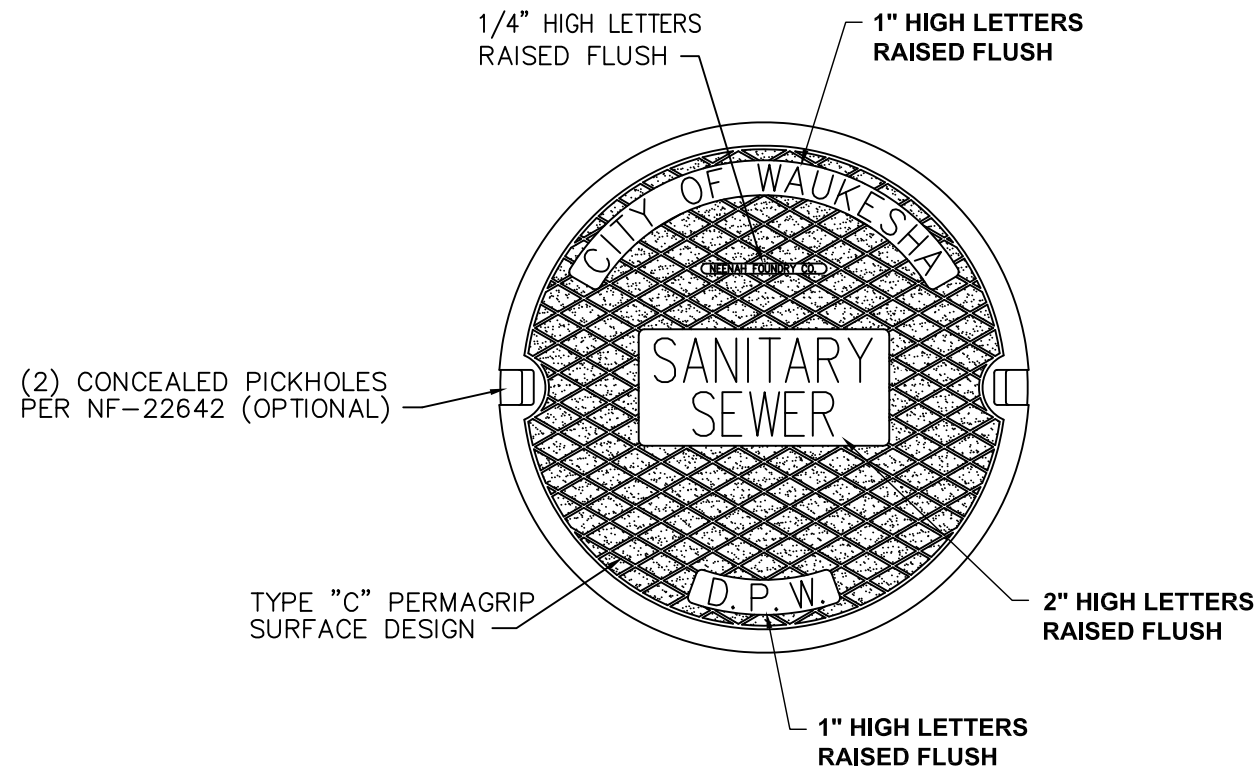
STACKING DETAIL

NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NO PAINT

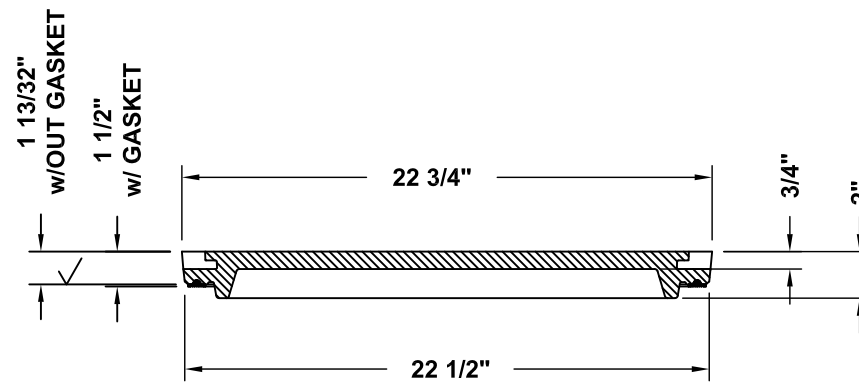
DR.	E. REMME	SCALE	TITLE:	R-1661
CH.		1/8"=1"		FRAME
APP.		DIM CHK.	NEENAH	NF- 16612001
DATE	10-17-96		FOUNDRY COMPANY	
			NEENAH WISCONSIN 54956	B

04-28-2017	WAS 582mm [29 29/32"]	RKB
01-25-2012	REVISE DIMS PER JB CSTG. CHECK	CSM
12-11-2002	AA DIM WAS 22-27/32	MAG
DATE	REVISION	INT

CAD DWG. REF: 16612001.DWG- 4



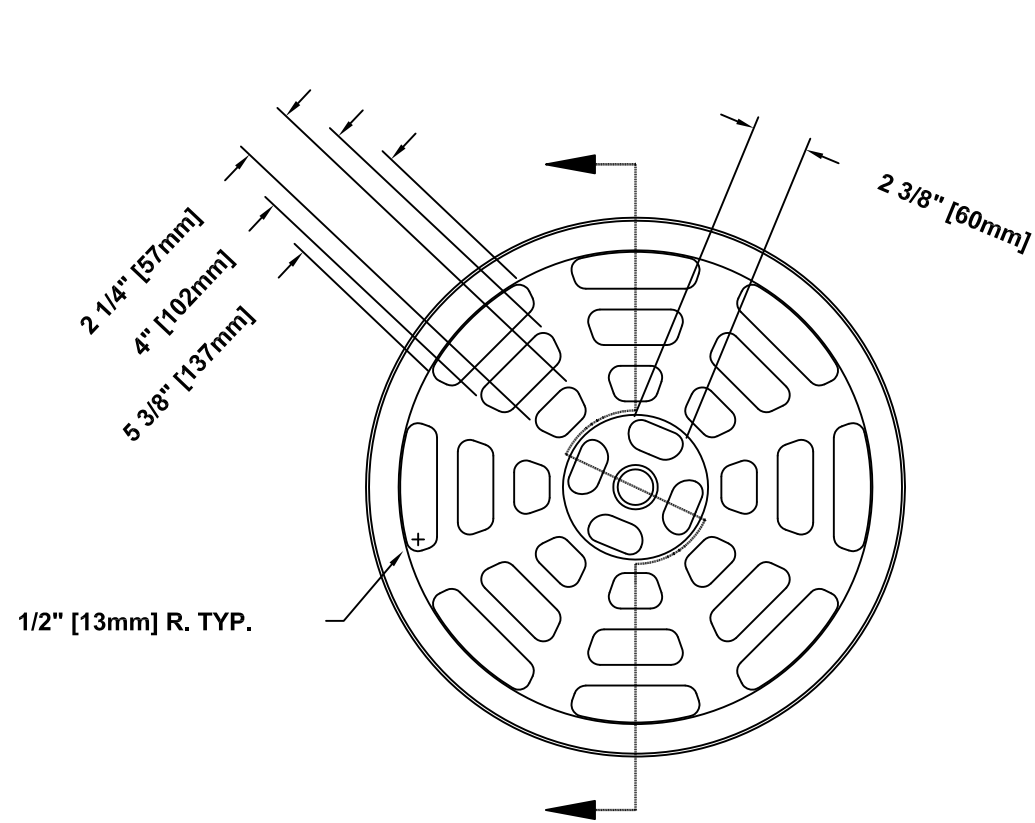
CONCEALED PICKHOLE AND
"T"-SEAL GROOVE
SCALED 1:2



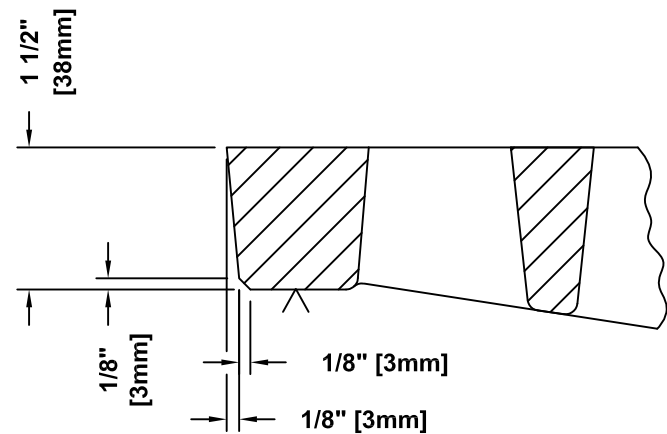
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH: NO PAINT, UNLESS SPECIFIED ON PURCHASE ORDER
WEIGHT: 108 LBS.

DR. E. NIVER	SCALE 1/8"=1"	TITLE: R-1660 PLATEN LID WITH T-SEAL	
CH. RKB		LTRD. 'CITY OF WAUKEASHA', 'D.P.W.', 'SANITARY SEWER'	
APP. SPT	NEENAH FOUNDRY  NEENAH WISCONSIN 54956 PHONE 800-558-5075 LINCOLN, NEBRASKA 68529 PHONE 800-234-7466		NF- 16605268
DATE 04-08-2016			
www.nfco.com			

CAD DWG. REF: 16605268.DWG- 1

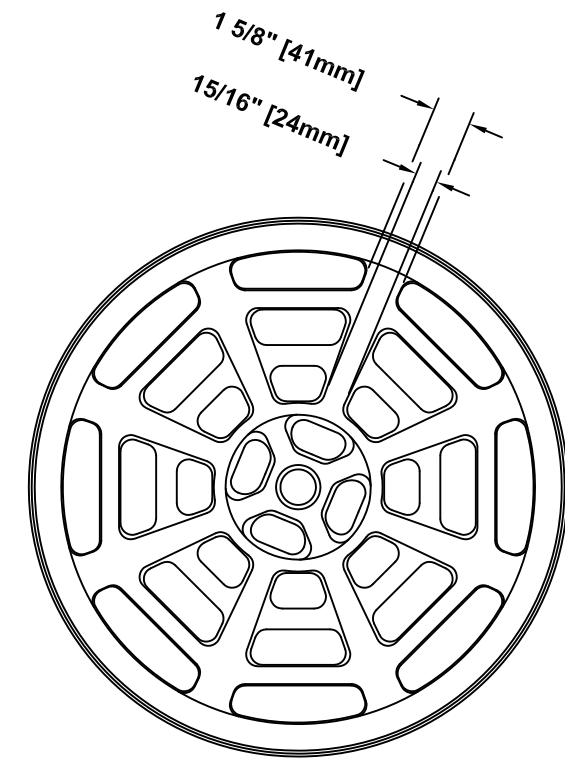
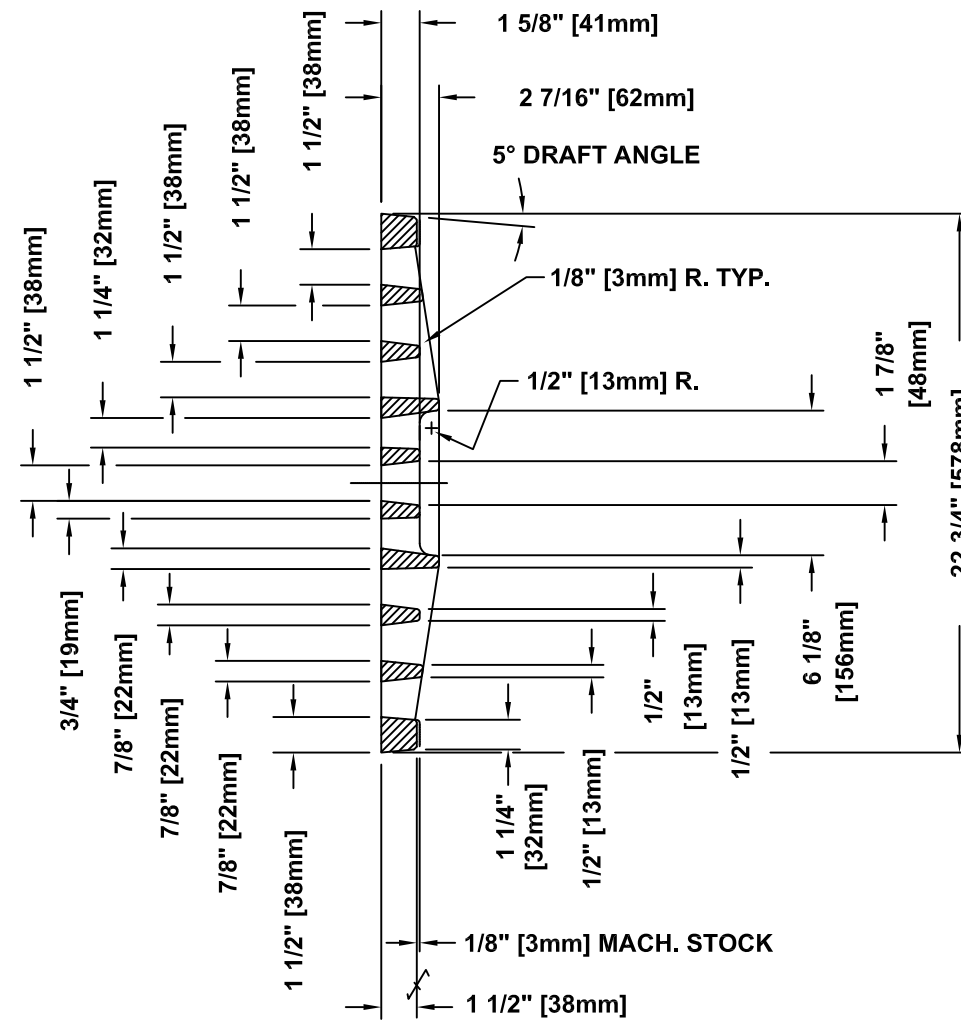


1/2" [13mm] R. TYP.



CHAMFER DETAIL

SCALE 1:2



NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND [METRIC].

FREE OPEN AREA: 144 SQ.INCHES [1 SQ.FT.]

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

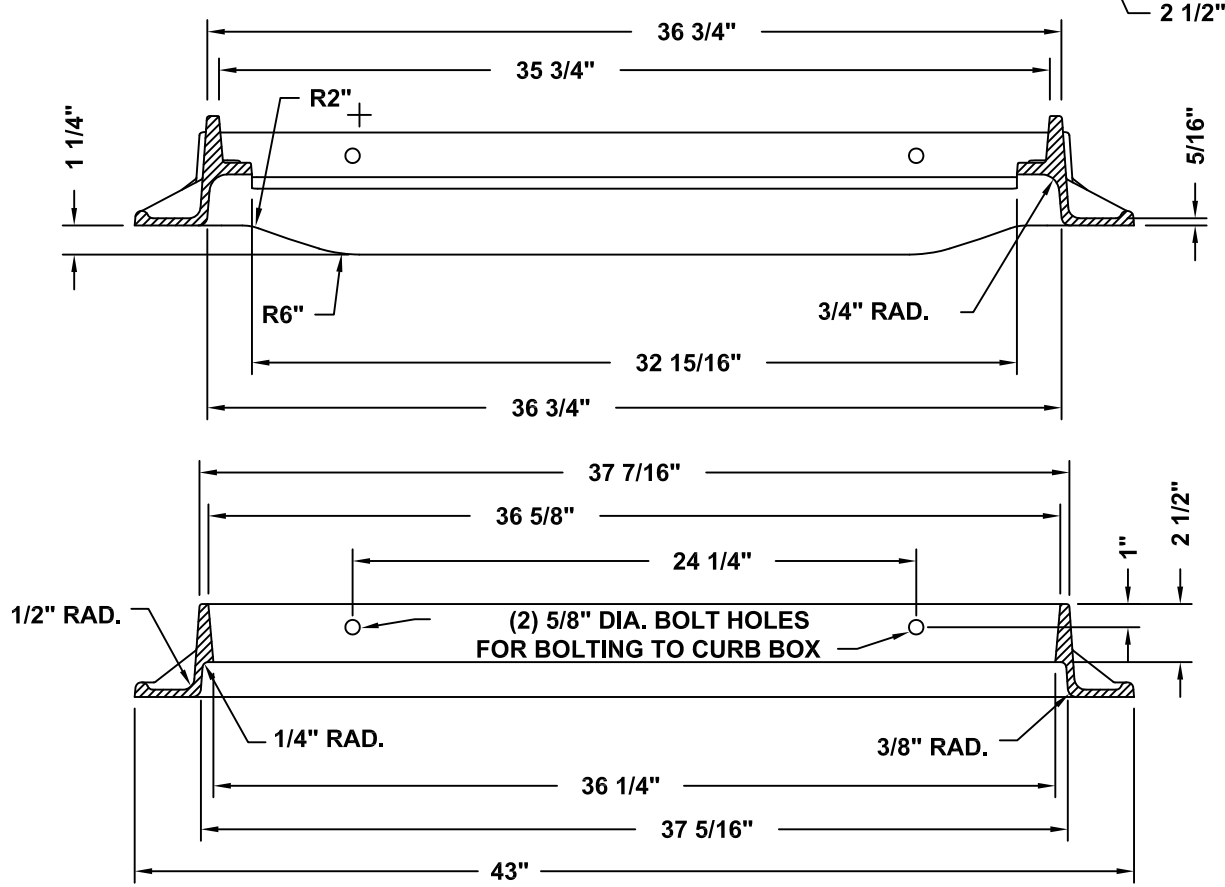
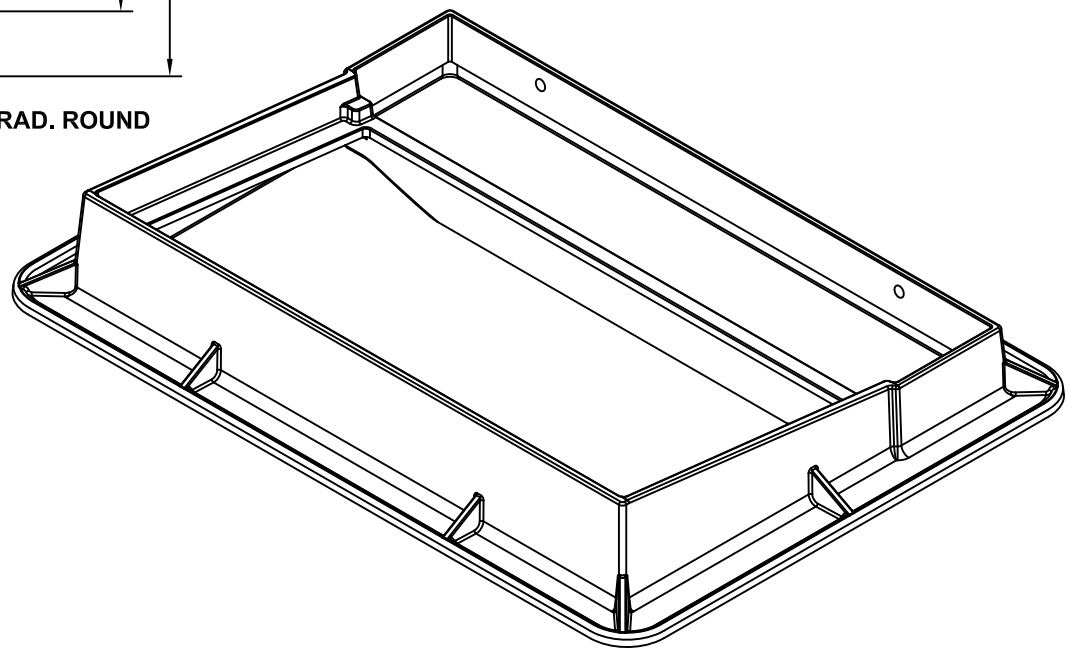
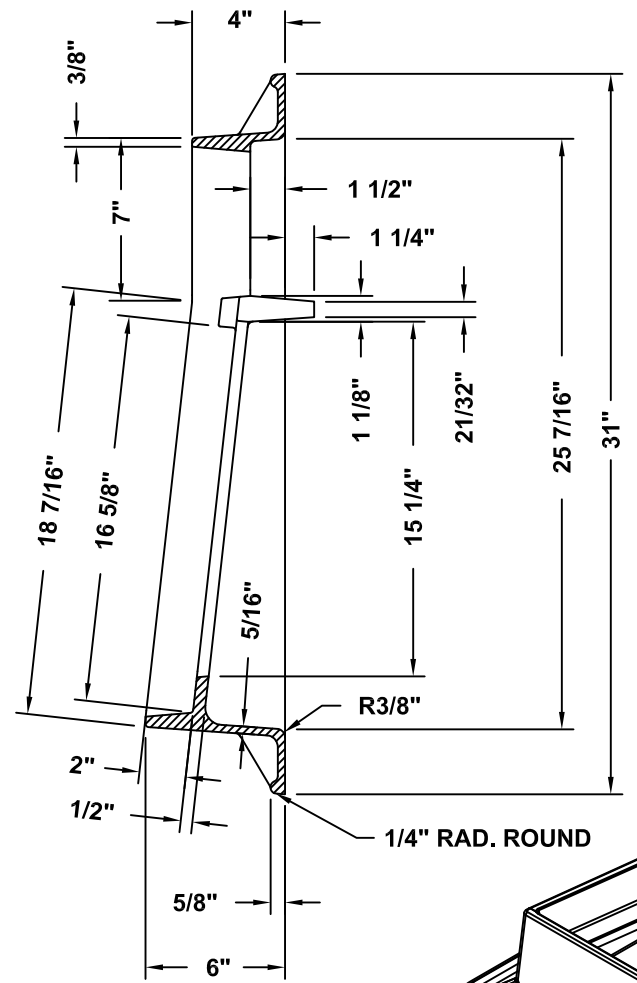
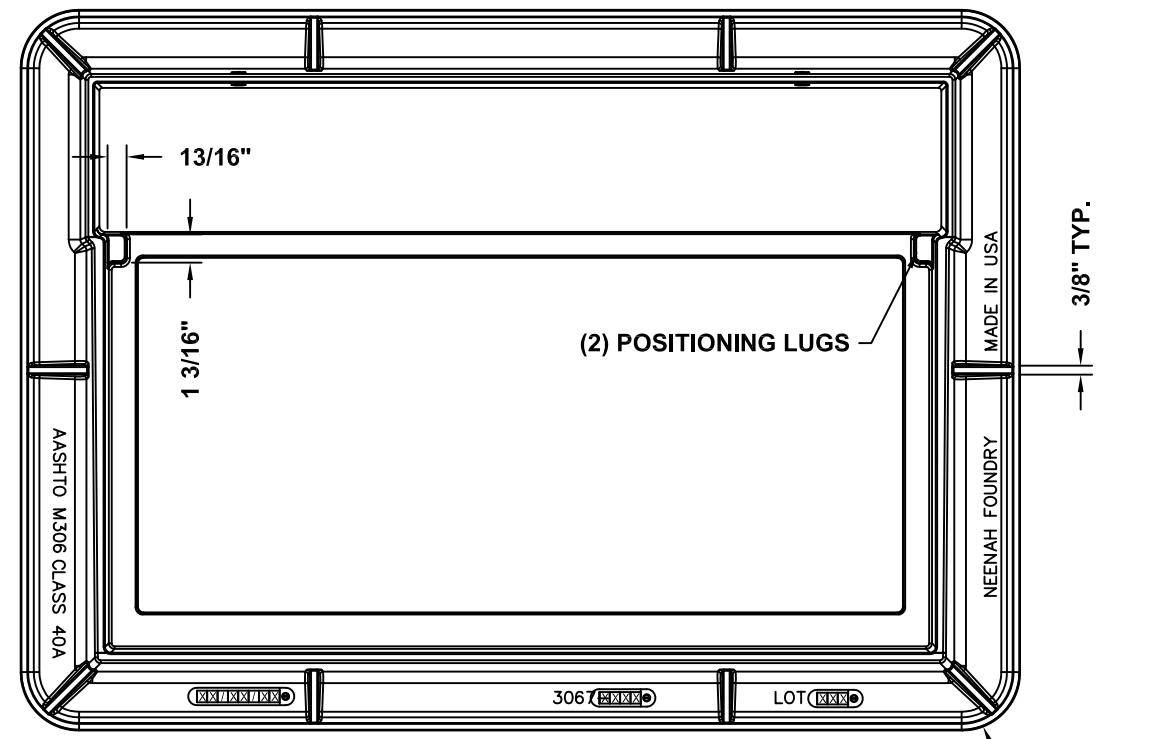
FINISH: NO PAINT

WEIGHT: 120#

THIS DWG. REPLACES NF-26906

DATE	REVISION	INT
05-19-95	ADD CHAMFER	CSK

DR. J. LIETZ	SCALE 1/8"=1"	TITLE: R-2467
CH.		TYPE "D" GRATE
APP.	DIM CHK. P.K.	NEENAH FOUNDRY COMPANY NEENAH WISCONSIN 54956
DATE 05/31/89		NF- 24670001



NOTE: MEETS LOADING REQUIREMENTS OF HS-20
 MADE IN USA
 QUALIFIES FOR "LEED" CREDITS
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 40A
 FINISH: NO PAINT UNLESS SPECIFIED ON PURCHASE ORDER
 WEIGHT: APPROX. 155#

DR.	CAG	SCALE	TITLE:
CH.	SMA	1/8"=1"	R-3067-W FRAME
APP.	NEENAH FOUNDRY		
DATE	8/20/2013	NEENAH WISCONSIN 54956 PHONE 800-558-5075	
www.neenahfoundry.com		LINCOLN, NEBRASKA 68529 PHONE 800-234-7466	
			NF- 30672301 B

04-22-2014	ADDED 1/16" TO FLANGE THICKNESS	ELN	CAG	SPT
DATE	REVISION	DR	CH	APP

CAD DWG. REF: 3062301.DWG- 2

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
-- 3067 FRAME --

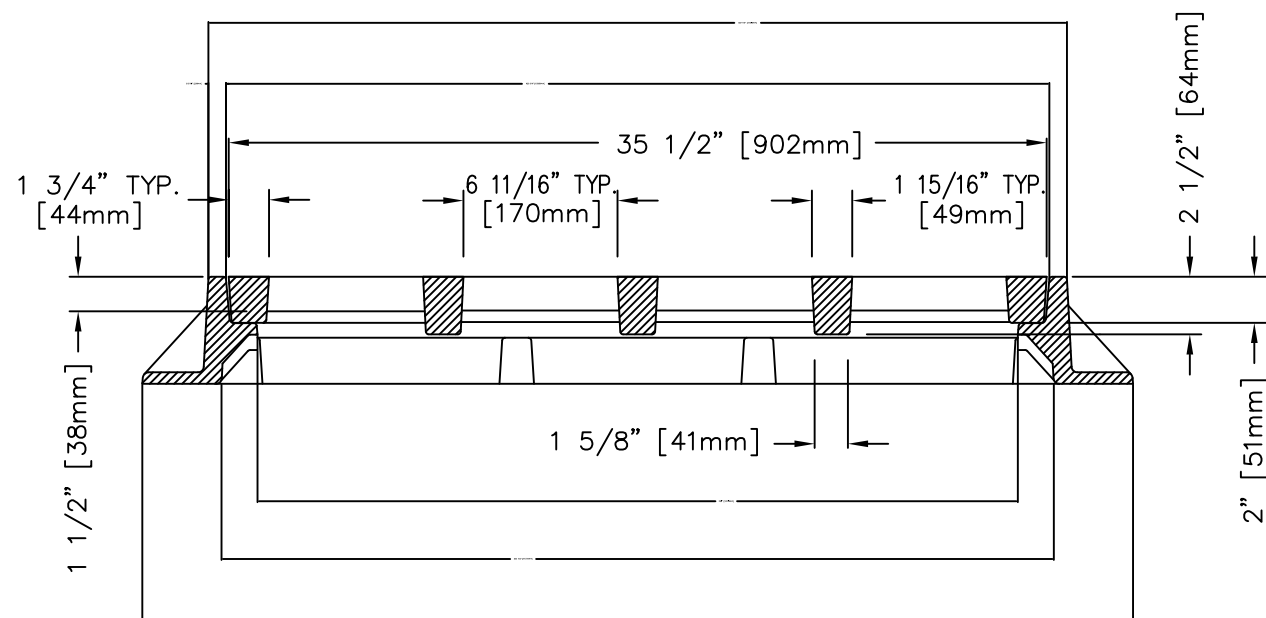
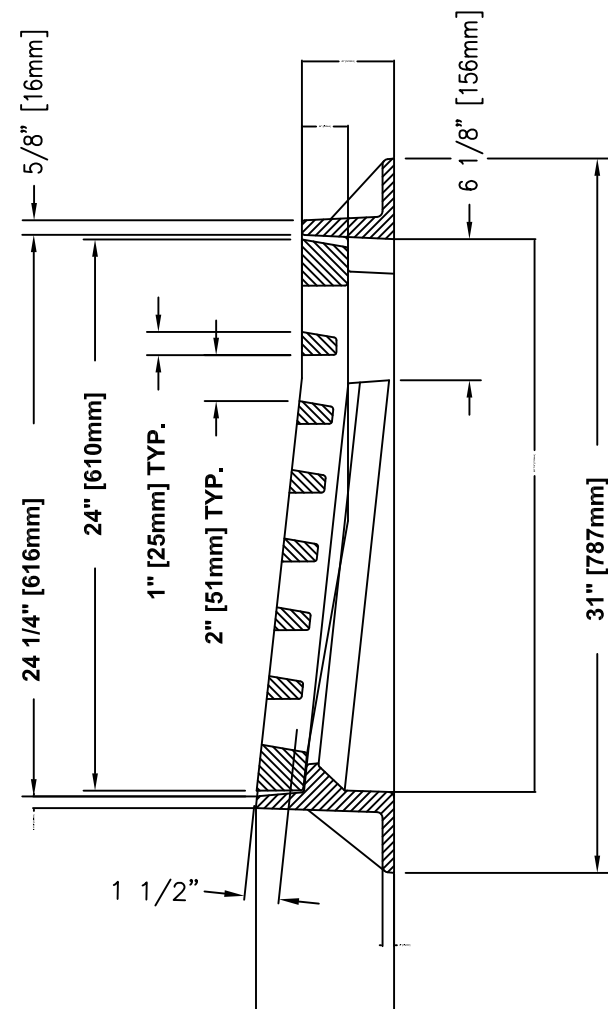
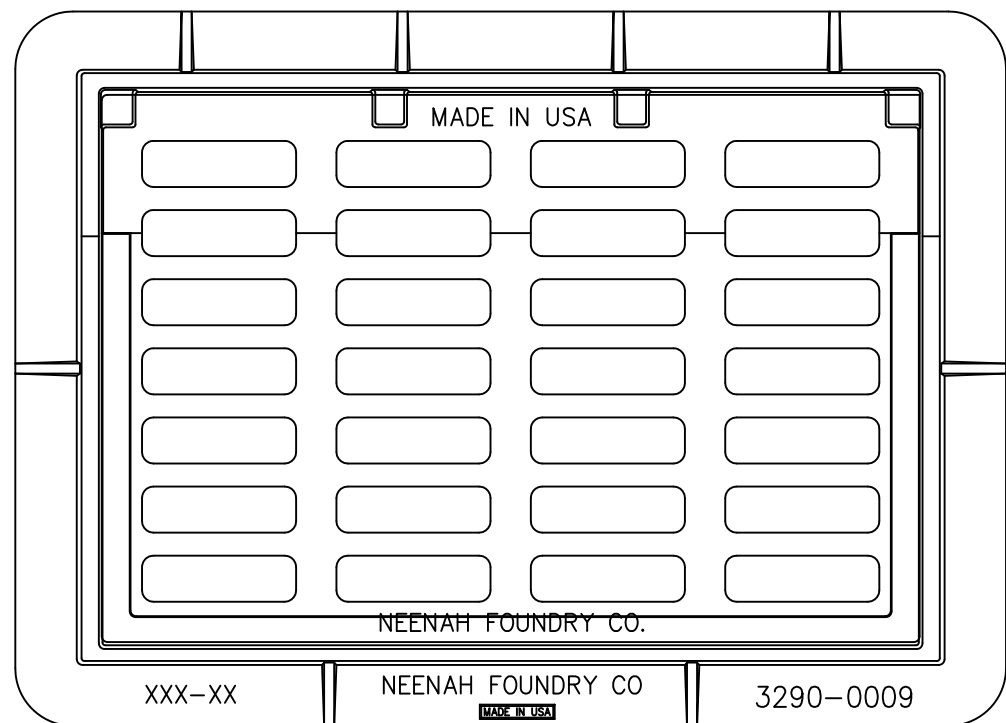
APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 1.452564
 PLOT DATE : 12/12/2017 7:31 AM

DETAIL NUMBER: 05-3067
 PROJECT NO: STANDARD DETAILS

FILE NAME : O:\PROJECTS\Standard Specifications\Details\Final\05-3067-FRAME.dwg



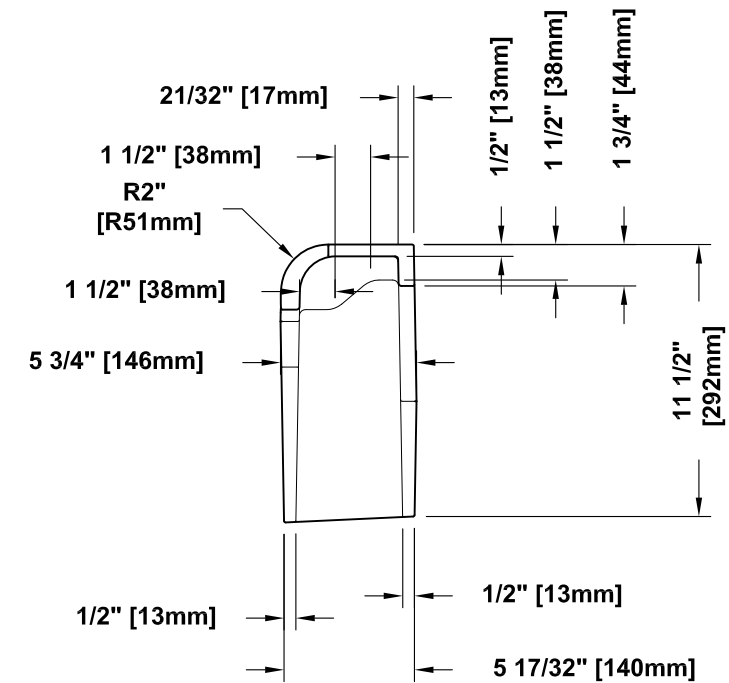
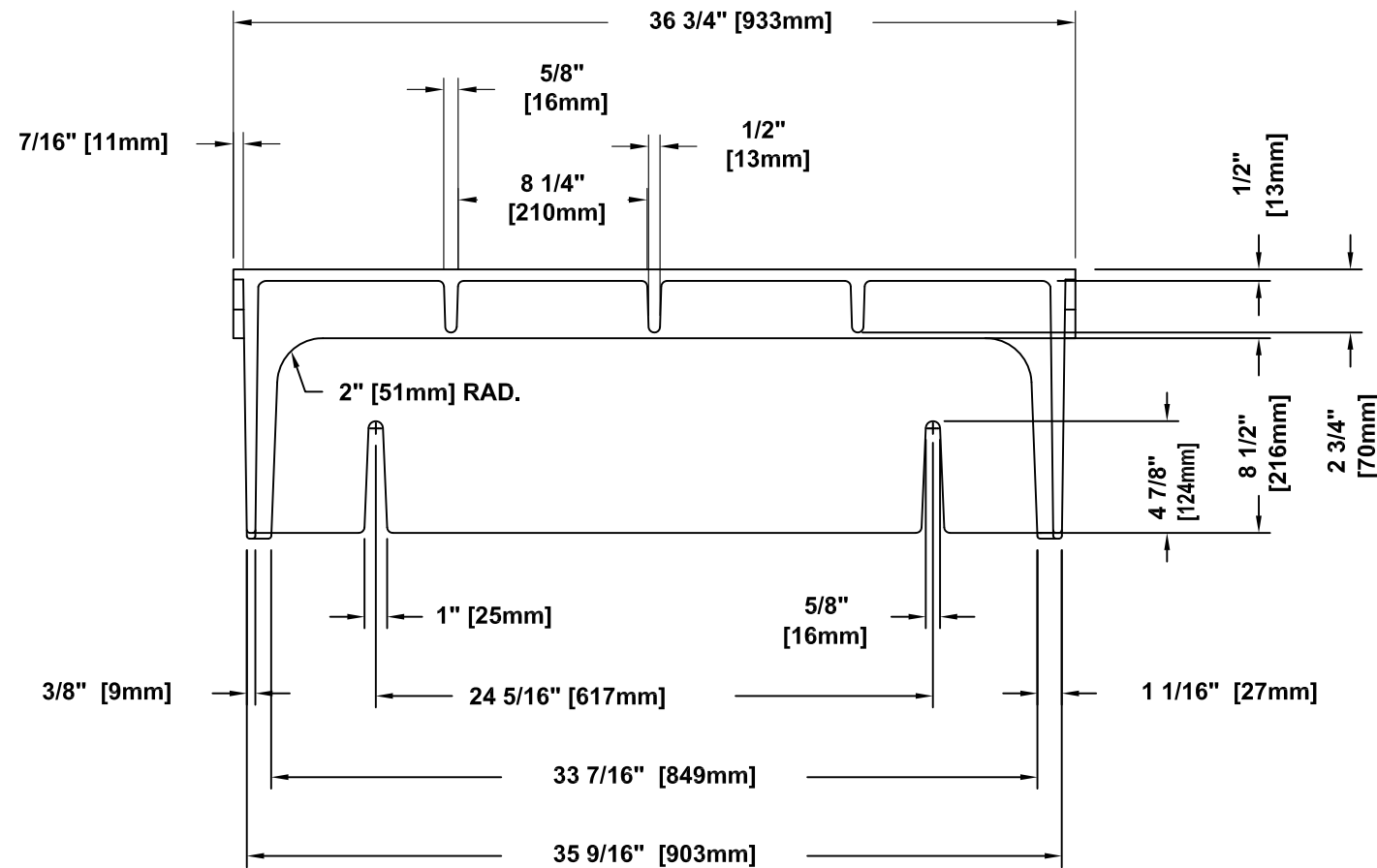
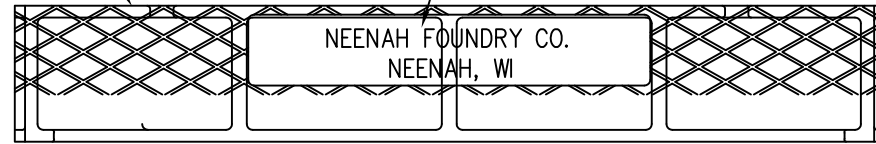
NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NOT PAINTED
 COMPONENT NO.'S: FRAME 3290-0009, LID 32900012
 WEIGHT: FRAME - 206 LBS., LID - 211 LBS.

#	DATE	DESCRIPTION	INIT
1	11-01-2002	REDREW GRATE & FRAME PER CASTING CHECK	ELR
2	12/18/87	ADDED GUSSETS & FRAME DIM.	DMA
3	12/08/87	CHECKED LID DIMENSIONS	ELR

DR. <i>D. Anderson</i>	SCALE 1/8"=1"	TITLE: R-3290-A GUTTER INLET
CH.	DIM CHK.	NEENAH FOUNDRY COMPANY NEENAH WISCONSIN 54956
APP.		NEF NF-3290 300 B
DATE 1-28-86		

TYPE "C" CHECKERED TOP DESIGN

3/4" [19mm] HIGH RAISED LETTERS
FLUSH w/ TOP SURFACE



NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

FINISH: NO PAINT

WEIGHT: APPROX. 108#

DATE	REVISION	INT
03-29-2017	UPDATED INTERNAL RIBS	RKB
12-3-2004	REMOVED 4 INTERNAL RIBS PER S.A.	KMH
11-20-2000	REVISE DIMS. PER TM LAW & PER S.A. CHK., CHG. NF LTG-INSERT	CSK
04-03-2000	REVISED BOLT SLOT SIZE & LOC. PER RANDY R.	ELR
7-21-95	CHANGED "NEENAH" LETTERING	ELR
7-19-95	REMOVED PERMAGRIP TEXTURE	ELR
7-10-95	ADDED METRIC AND "C" COPE	ELR

DR. S. ENDERBY	SCALE 1/8"=1"	TITLE: R-3067 CURB BOX
CH.	DIM CHK.	NEENAH FOUNDRY COMPANY
APP.		NF - 30670003
DATE 11/17/89		B

CAD DWG. REF: 30670003.DWG- 9

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
--3290 CURB BOX --

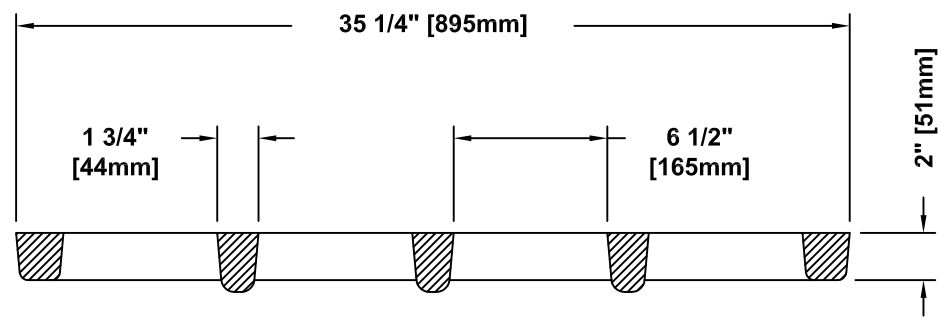
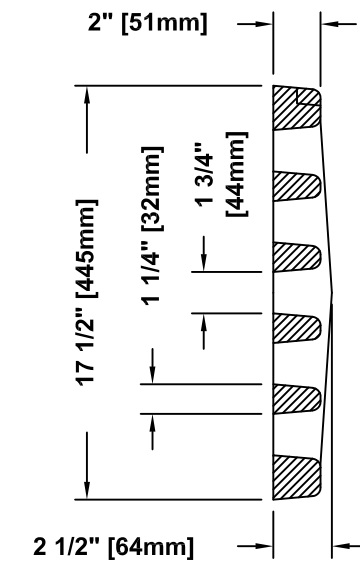
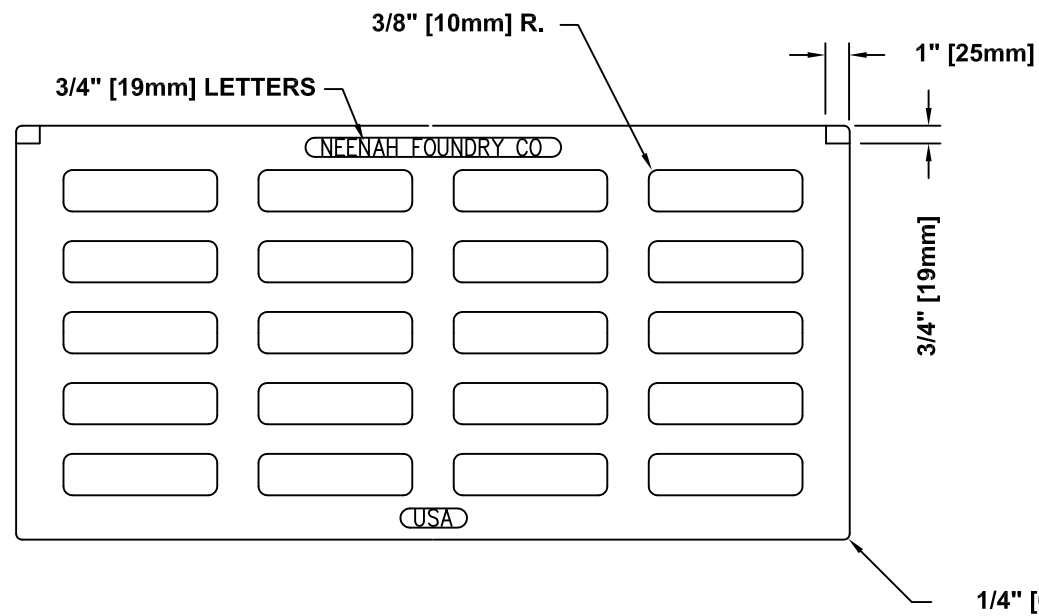
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.123162
PLOT DATE : 12/12/2017 1:00 PM

DETAIL NUMBER 05-3290B
PROJECT NO: STANDARD DETAILS

FILE NAME : O:\PROJECTS\Standard Specifications\Standard Details\Final\05-3067-CURB_BOX.dwg



NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND [METRIC].

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

FREE OPEN AREA: 1.6 SQ. FT.

FINISH: NO PAINT

WEIGHT: 178#

DR. E. REMME	SCALE 1/8"=1"	TITLE: R-3067 TYPE "C" GRATE	
CH.	DIM CHK. E.R.	NEENAH FOUNDRY COMPANY NEENAH WISCONSIN 54956	NF - 32903004
APP.	DATE 8-02-96		B

DATE	REVISION	INT
10-23-15	REVISE PER PATTERN CHECK	RKB
1-16-97	REVISE PER DIM. CHECK	CSK
10-07-96	ADDED LARGER RADII TO RIBS	ELR

CAD DWG. REF: 32903004.DWG- 4

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
--3290 GRATE--

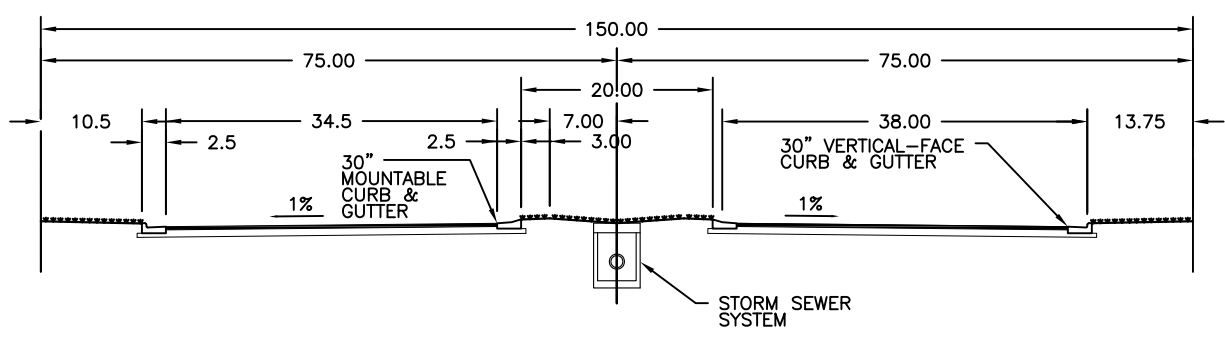
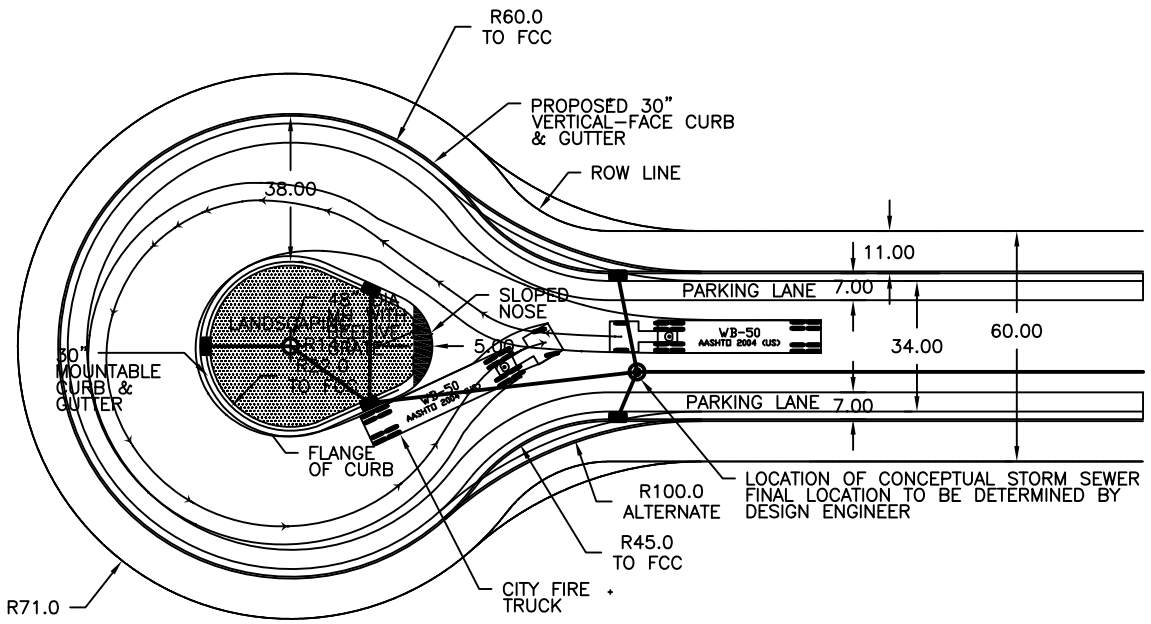
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.123162
PLOT DATE : 12/12/2017 1:04 PM

DETAIL NUMBER 05-3290C
PROJECT NO: STANDARD DETAILS

FILE NAME : O:\PROJECTS\Standard Specifications\Standard Details\Final\05-3290-GRATE.dwg



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
CUL DE SAC

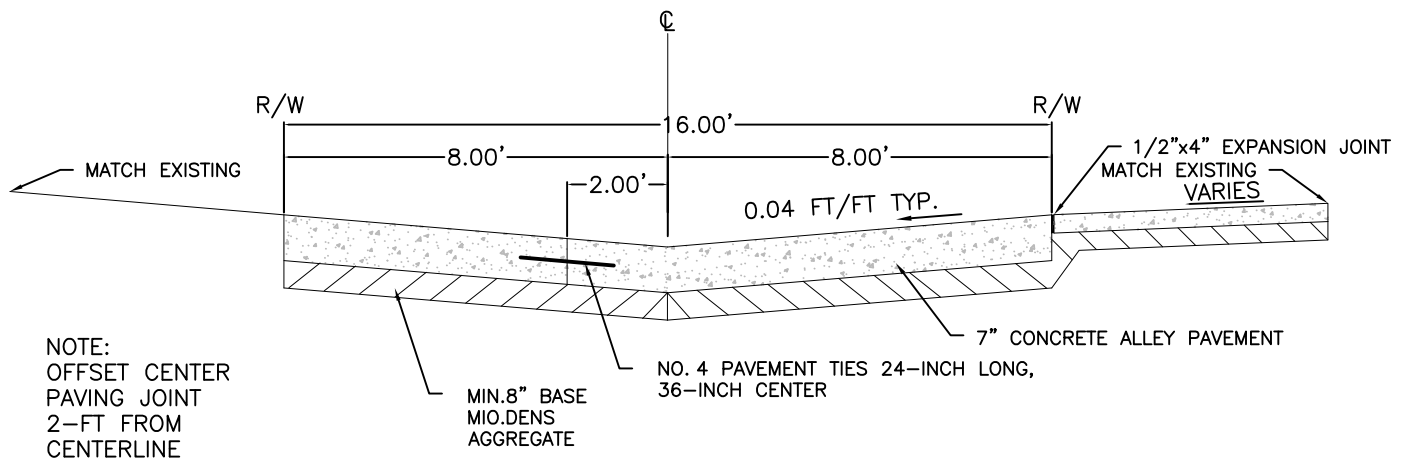
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 50' XREF
PLOT DATE : 11/27/2017 7:39 AM

DETAIL NUMBER: **07-0020**
PROJECT NO:

FILE NAME : O:\PROJECTS\Standard Specifications\Standard Details\Final\07-0020-CULDESAC.dwg



NOTE:
 OFFSET CENTER
 PAVING JOINT
 2-FT FROM
 CENTERLINE

MIN. 8" BASE
 MIO. DENS
 AGGREGATE

NO. 4 PAVEMENT TIES 24-INCH LONG,
 36-INCH CENTER

7" CONCRETE ALLEY PAVEMENT

1/2"x4" EXPANSION JOINT
 MATCH EXISTING
 VARIES

CITY OF WAUKESHA
 DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
 -TYPICAL 16' WIDE CROSS SECTION CONCRETE ALLEY-

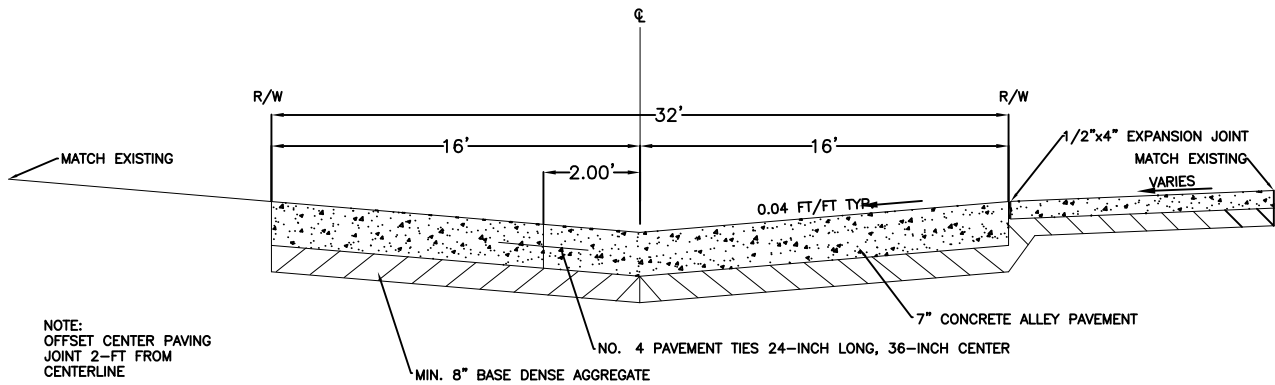
APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 3" = 1'-0" XREF
 PLOT DATE : 11/27/2017 7:43 AM

DETAIL NUMBER: **07-0050**
 PROJECT NO:

FILE NAME : 0:\PROJECTS\Standard Specifications\Final\07-0050-TYPICAL CROSS SECTION CONCRETE ALLEY 16' PAVEMENT.dwg



NOTE:
 OFFSET CENTER PAVING
 JOINT 2-FT FROM
 CENTERLINE

MIN. 8" BASE DENSE AGGREGATE

NO. 4 PAVEMENT TIES 24-INCH LONG, 36-INCH CENTER

7" CONCRETE ALLEY PAVEMENT

1/2"x4" EXPANSION JOINT
 MATCH EXISTING
 VARIES

CITY OF WAUKESHA
 DEPARTMENT OF PUBLIC WORKS

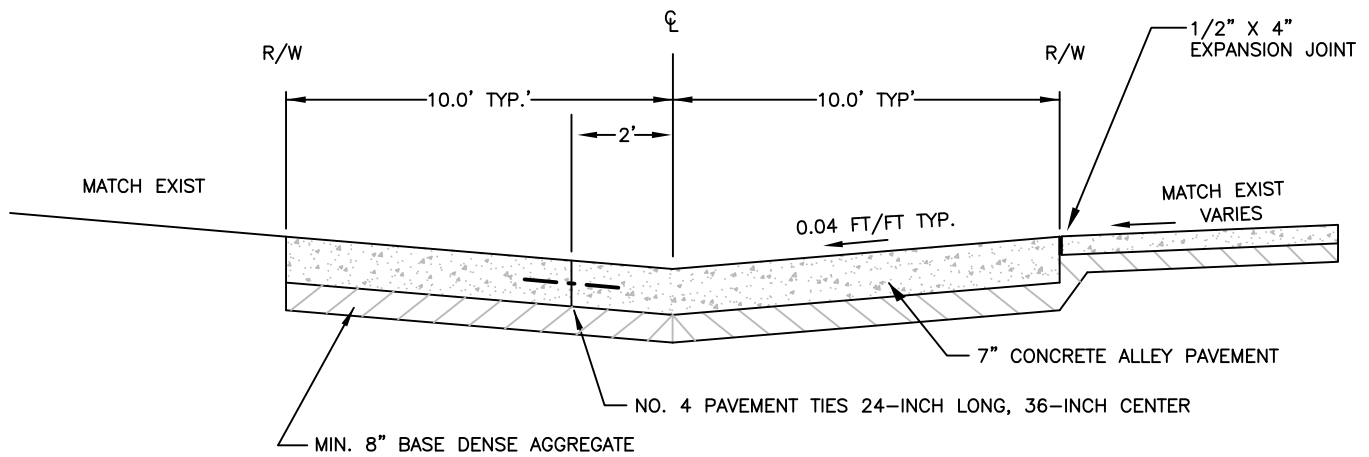
STANDARD CONSTRUCTION DETAILS
 -TYPICAL 32' WIDE CROSS-SECTION CONCRETE ALLEY-

APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 1:50_XREF
 PLOT DATE : 11/27/2017 7:46 AM

DETAIL NUMBER: **07-0051**
 PROJECT NO: _____



NOTE: OFFSET CENTER PAVING JOINT
2-FT FROM CENTERLINE

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

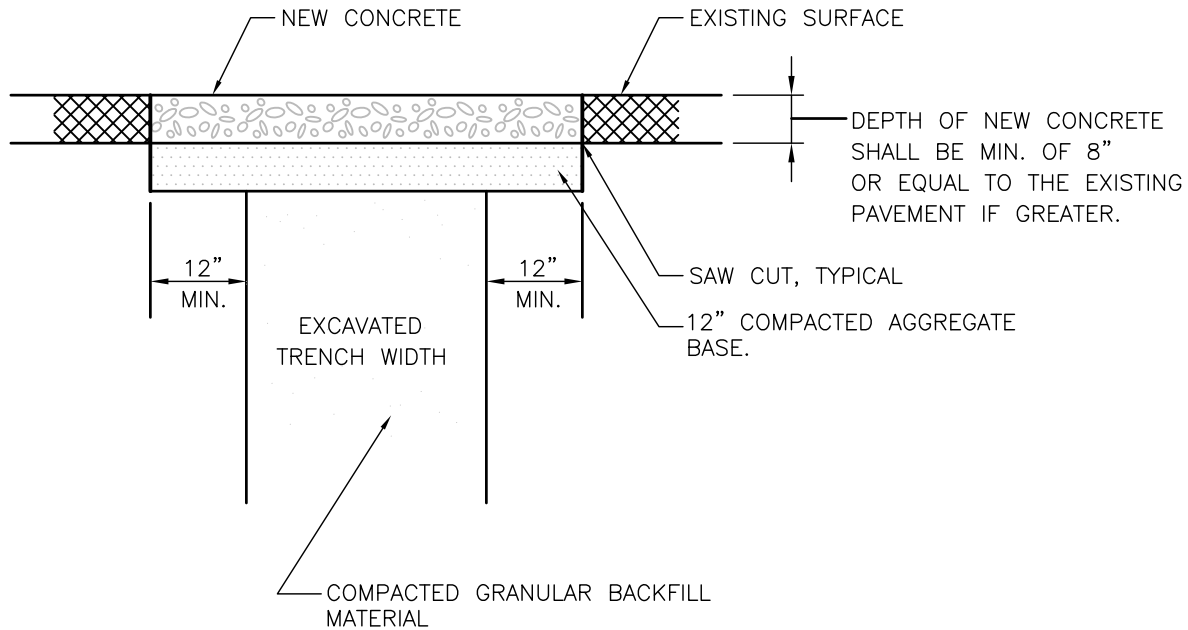
STANDARD CONSTRUCTION DETAILS
--TYPICAL 20' WIDE CROSS SECTION CONCRETE ALLEY--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1 1/2" = 1'-0" XREF
PLOT DATE : 11/27/2017 8:50 AM

DETAIL NUMBER: **07-0100**
PROJECT NO: _____



NOTE: SEE WIDOT SDD 13A7 FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT REPAIR AND REPLACEMENT REINFORCING REQUIREMENTS.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

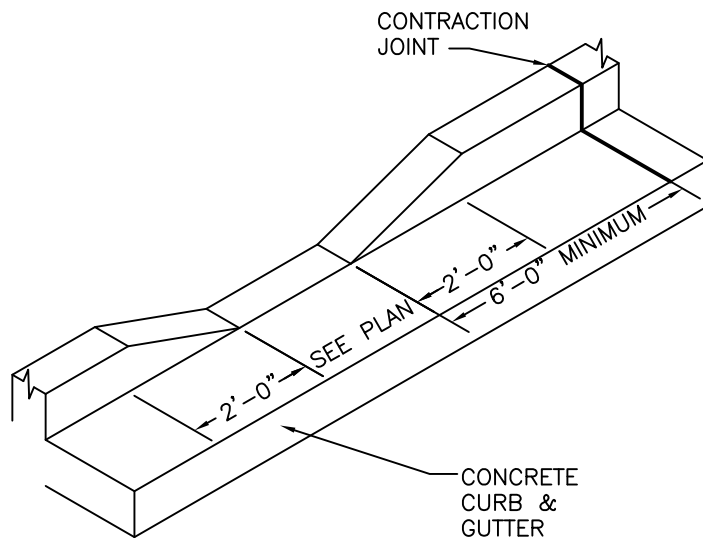
STANDARD CONSTRUCTION DETAILS
--CONCRETE PAVEMENT REPLACEMENT--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/29/2017 12:58 PM

DETAIL NUMBER: **07-0110**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

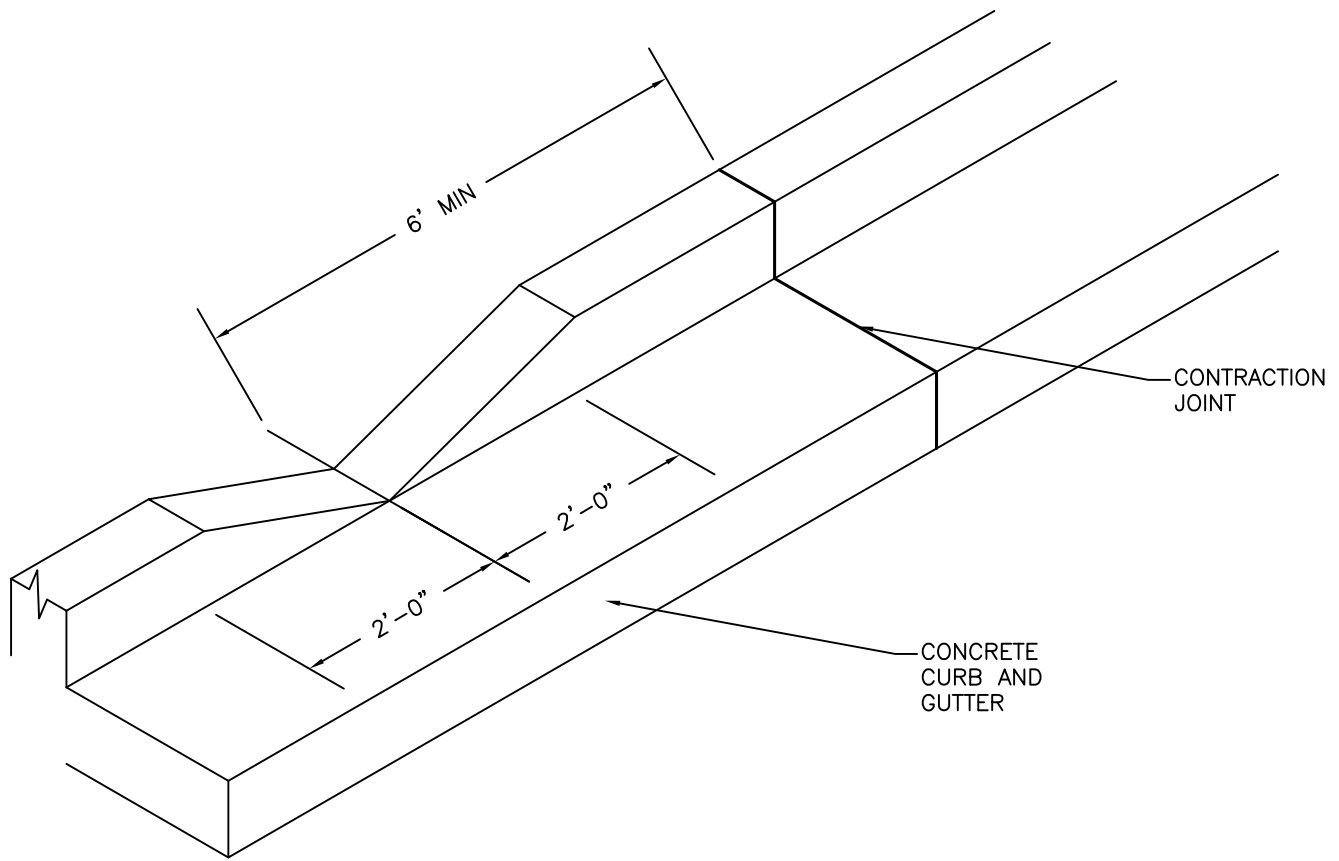
STANDARD CONSTRUCTION DETAILS
-- CURB DEPRESSION --

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1:20_XREF
PLOT DATE : 11/29/2017 1:00 PM

DETAIL NUMBER: **07-0250**
PROJECT NO: _____



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

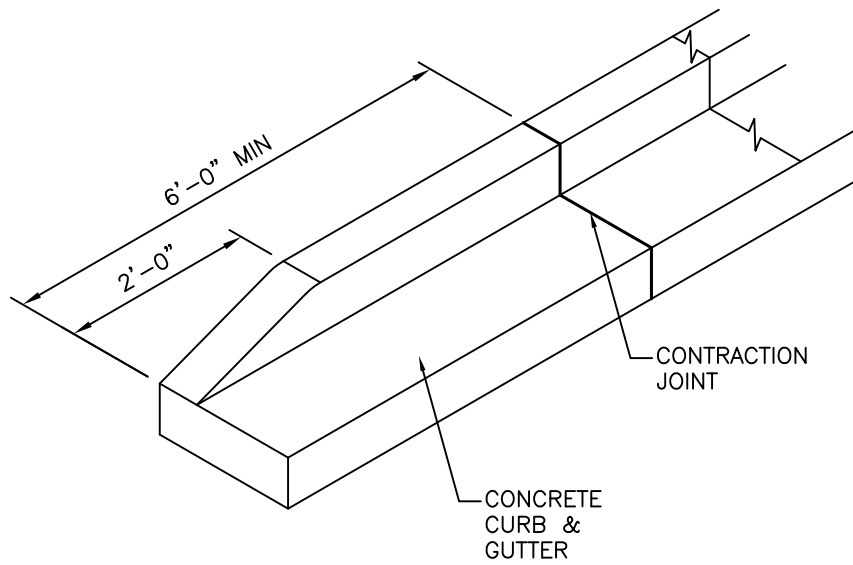
STANDARD CONSTRUCTION DETAILS
--CURB DEPRESSION--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : **1" = 1'**
PLOT DATE : 11/27/2017 8:59 AM

DETAIL NUMBER: **07-0251**
PROJECT NO: _____



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

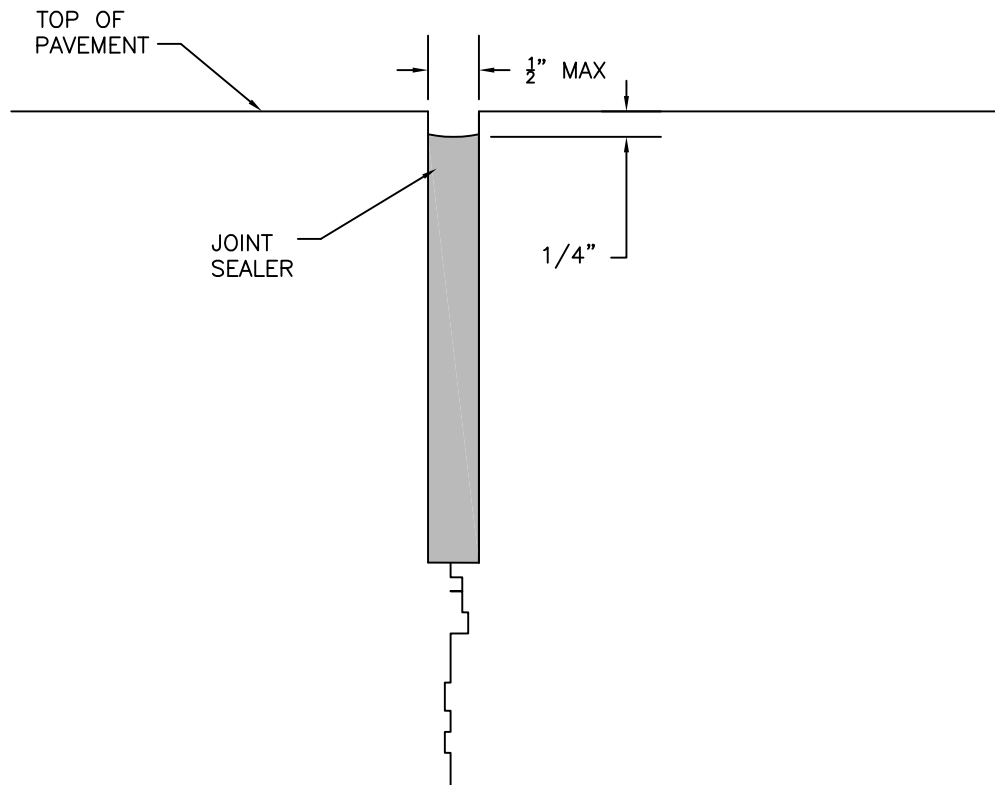
STANDARD CONSTRUCTION DETAILS
--CURB TAPER--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/27/2017 9:00 AM

DETAIL NUMBER: **07-0252**
PROJECT NO:



NOTES:

1. AFTER SAWING, BLOW WITH OIL- AND WATER-FREE COMPRESSED AIR TO ELIMINATE DEBRIS
2. WATER SEAL WITH APPROVED JOINT SEALER.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

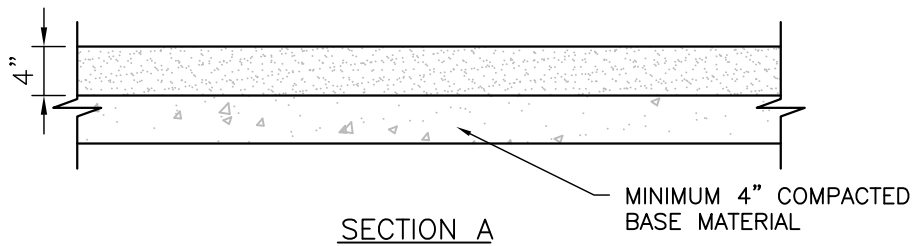
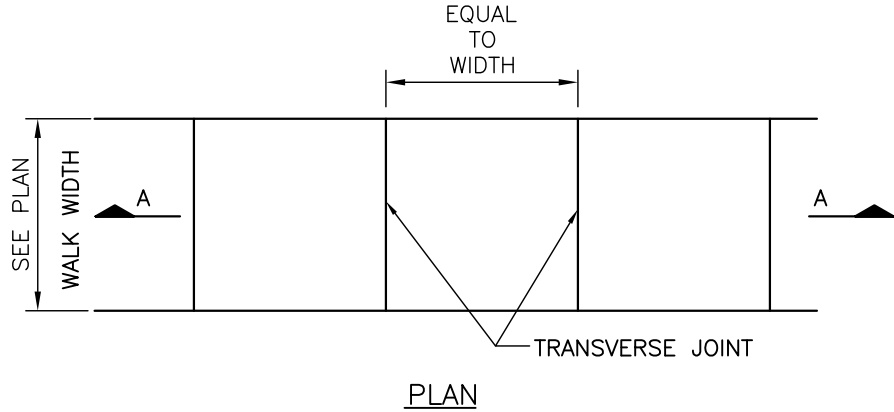
STANDARD CONSTRUCTION DETAILS
-- JOINT FILLER --

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : **1 IN:10 FT**
PLOT DATE : 11/16/2017 10:49 AM

DETAIL NUMBER: **07-0285**
PROJECT NO: _____



NOTES:

1. TRANSVERSE JOINTS SHALL BE CUT WITH A JOINTER HAVING A RADIUS OF 1/4" AT SPACING AS INDICATED OR AS DIRECTED BY THE ENGINEER.
2. SIDEWALK SHALL BE 6" THICK AT ALL DRIVEWAY CROSSING.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

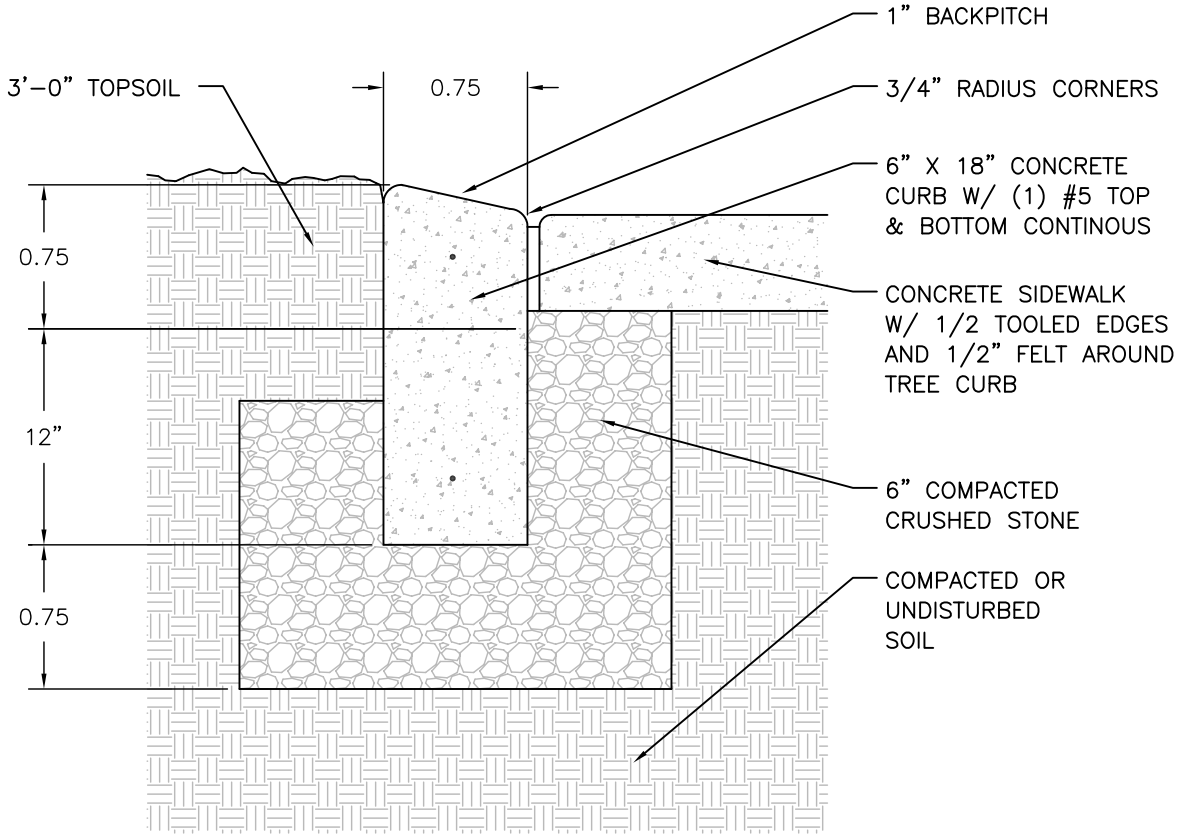
STANDARD CONSTRUCTION DETAILS
--CONCRETE SIDEWALK--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/27/2017 9:15 AM

DETAIL NUMBER: **07-0300**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

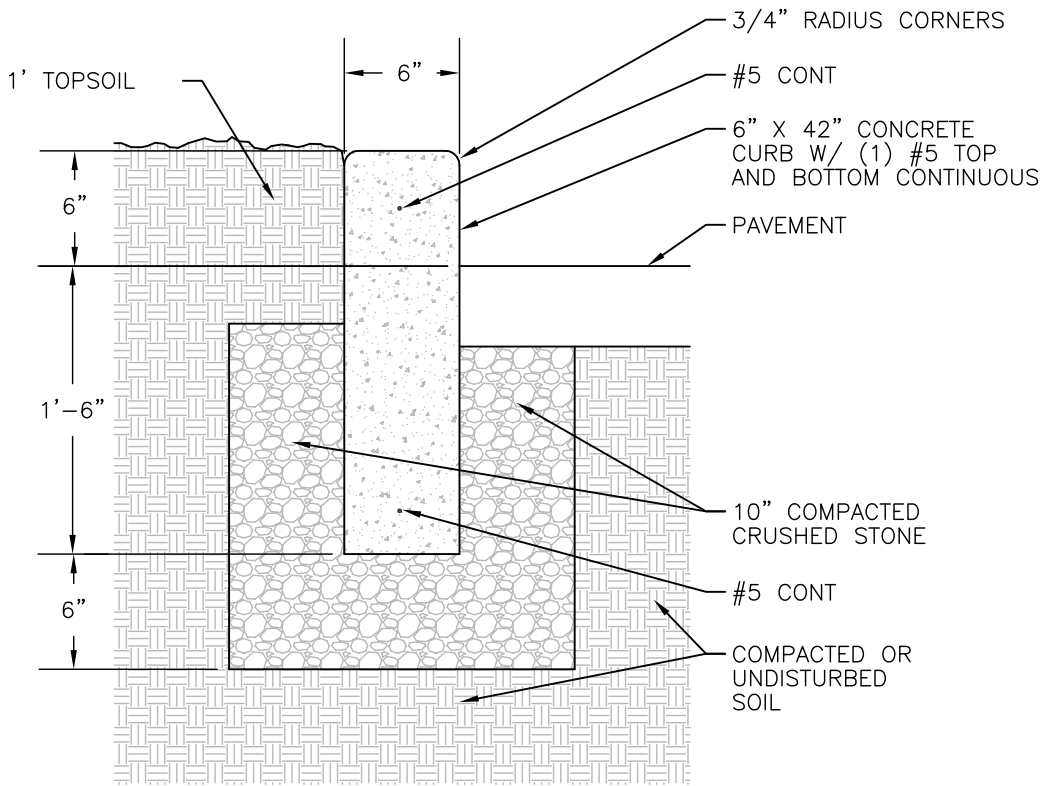
STANDARD CONSTRUCTION DETAILS
-- TREE CURB --

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/16/2017 8:50 AM

DETAIL NUMBER: **07-0301**
PROJECT NO: _____



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

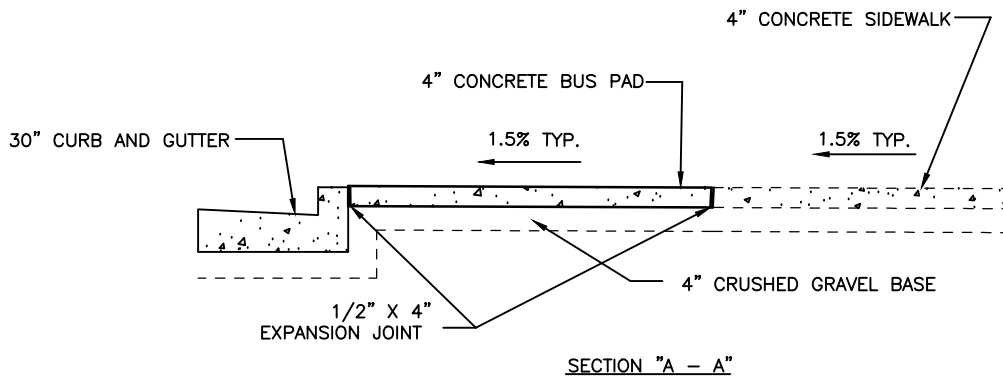
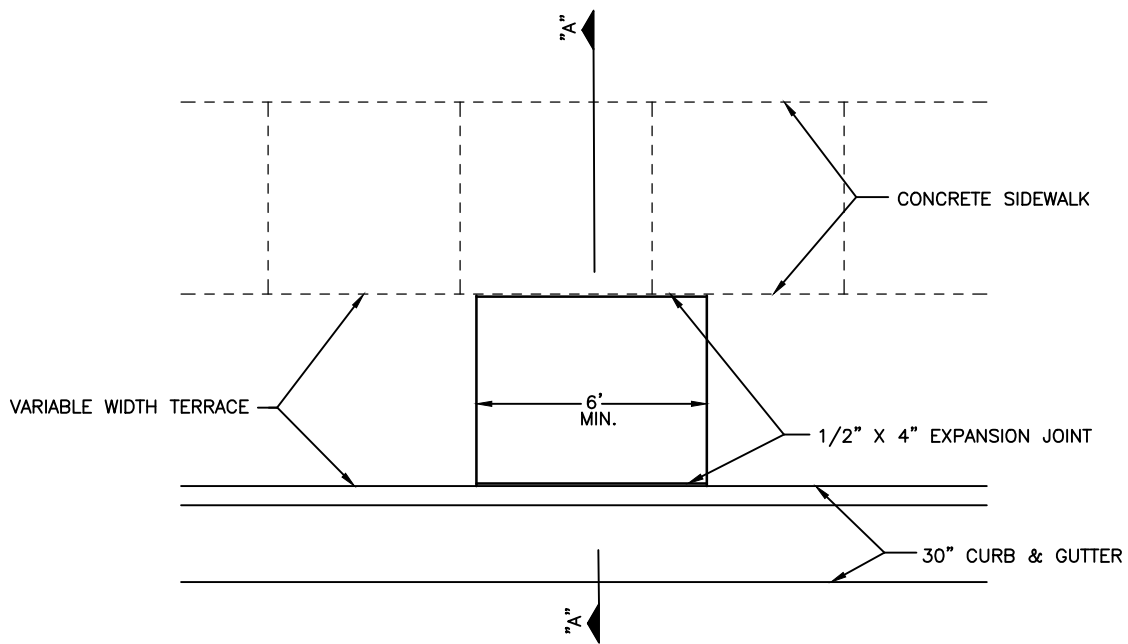
STANDARD CONSTRUCTION DETAILS
--STRAIGHT CURB--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 20' XREF
PLOT DATE : 11/27/2017 9:17 AM

DETAIL NUMBER: **07-0302**
PROJECT NO:



NOTES:

1. MAXIMUM SLOPE ON PAD SHALL BE $\pm 1.5\%$
2. PAD WIDTH SHALL BE 6' MIN.
3. NON SLIP SURFACE REQUIRED (BROOM FINISH)
4. $\pm 0.5\%$ CONSTRUCTION TOLERANCE IN SIDEWALK CROSS-SLOPE. CROSS-SLOPE SHALL NOT EXCEED 2.00%.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

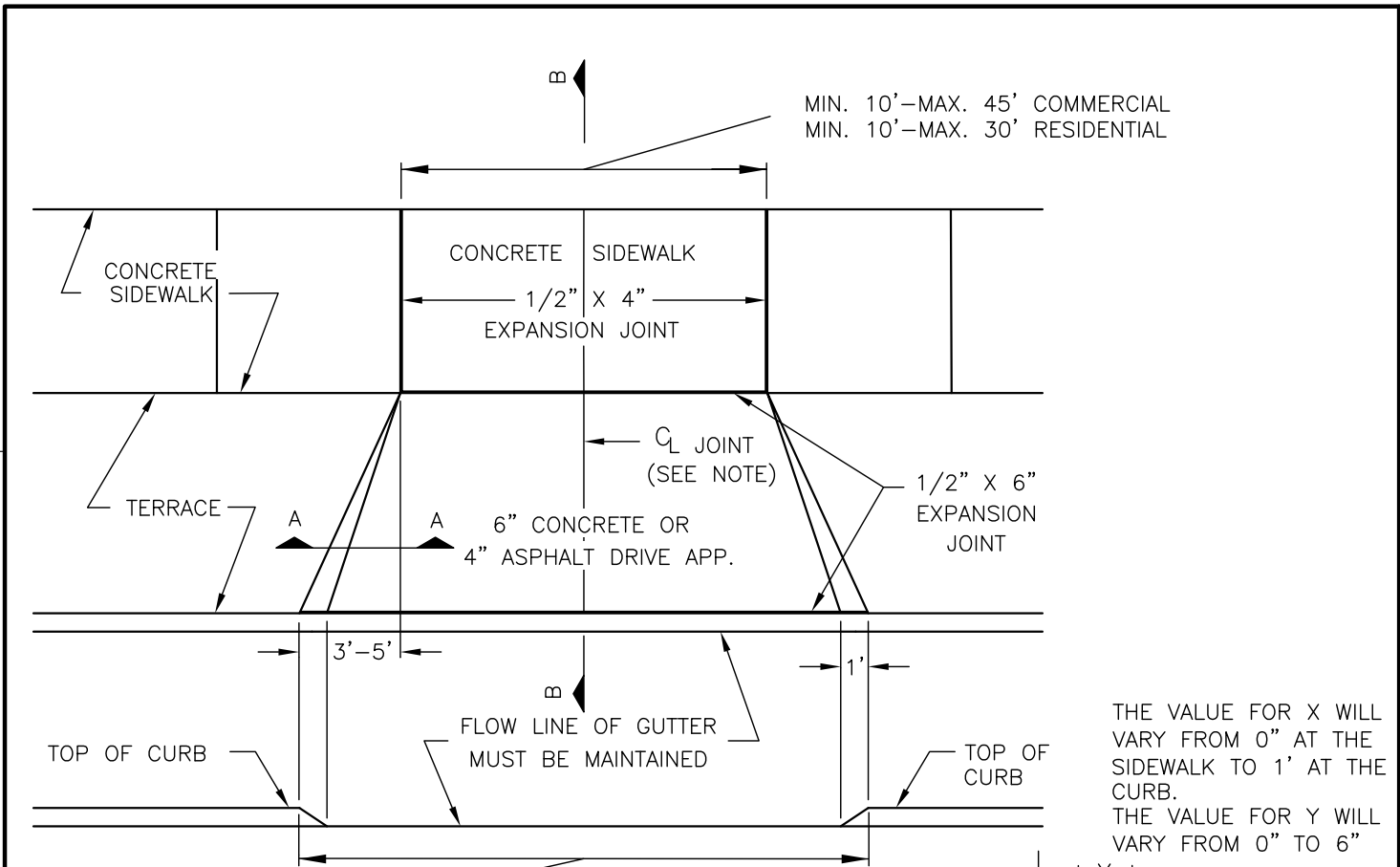
STANDARD CONSTRUCTION DETAILS
STANDARD BUS PAD

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

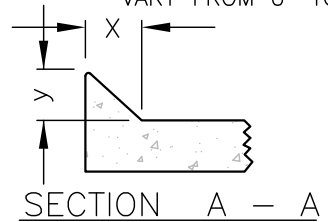
PLOT SCALE : 1:5_XREF
PLOT DATE : 11/27/2017 9:28 AM

DETAIL NUMBER: **07-0310**
PROJECT NO:

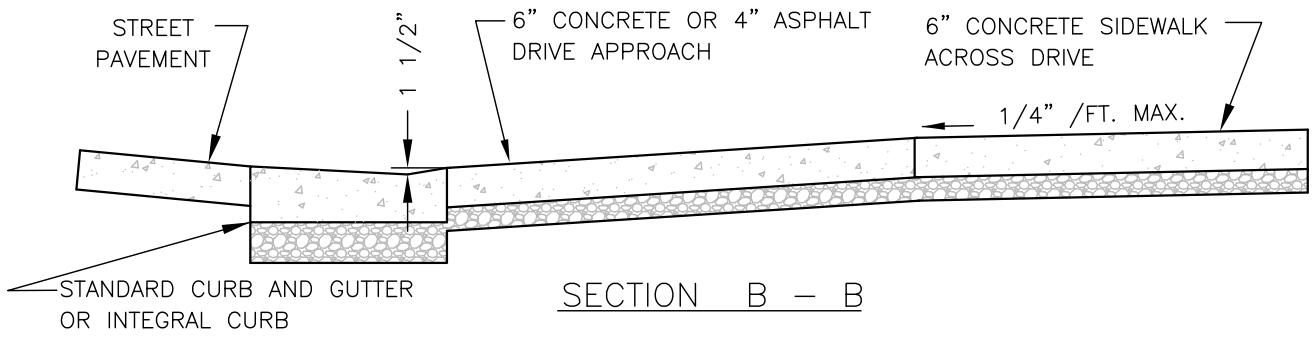


MIN. 10'-MAX. 45' COMMERCIAL
MIN. 10'-MAX. 30' RESIDENTIAL

THE VALUE FOR X WILL VARY FROM 0" AT THE SIDEWALK TO 1' AT THE CURB.
THE VALUE FOR Y WILL VARY FROM 0" TO 6"



RESIDENTIAL - MAX. 40'
COMMERCIAL - MAX. 55'

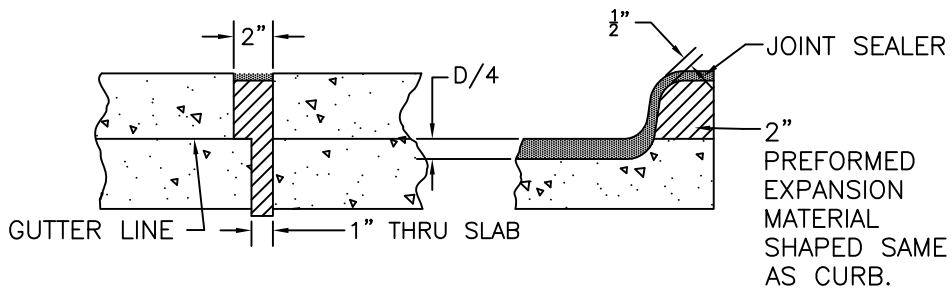


NOTES:
DRIVEWAYS 10' TO 20' WIDE SHALL HAVE ONE ϕ JOINT. DRIVEWAYS 21' TO 30' WIDE SHALL HAVE TWO ϕ JOINTS EQUALLY SPACED. 1/2" X 6" EXPANSION JOINT AT THE FACE OF WALK AND BACK OF CURB IS REQUIRED ONLY FOR CONCRETE DRIVE APPROACH. FLARE WIDTH, 3' MIN. TO 5' MAX.

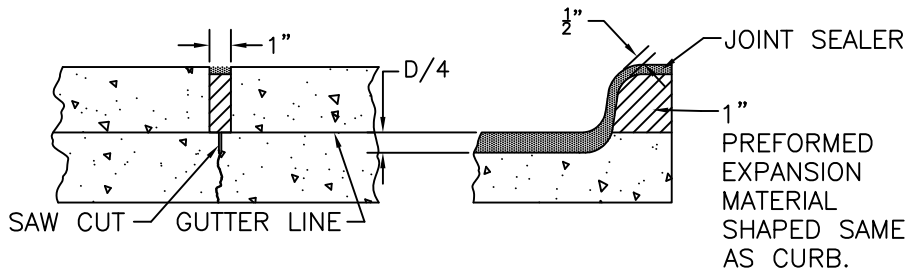
8" CONCRETE ALLOWED FOR APPROACH AND SIDEWALK FOR HEAVY TRAFFIC.
4" OF DENSE AGGREGATE BASE (3/4" OR 1 1/4") REQUIRED UNDER APPROACH AND SIDEWALK
5" MINIMUM OF DENSE AGGREGATE BASE (3/4" OR 1 1/4") REQUIRED UNDER CURB AND GUTTER

CITY OF WAUKESHA DEPARTMENT OF PUBLIC WORKS		STANDARD CONSTRUCTION DETAILS --STANDARD DRIVE APPROACH--		
APPROVED: ALEX DAMIEN	DATE: _____	DRAWN BY: DSB	DATE: _____	PLOT SCALE : 1:5_XREF
APPROVED: _____	DATE: _____	CHECKED BY: _____	DATE: _____	PLOT DATE : 11/27/2017 9:30 AM
				DETAIL NUMBER: 07-0320
				PROJECT NO: _____

FILE NAME : 0:\PROJECTS\Standard Specifications\Final\07-0320-STANDARD DRIVE APPROACH.dwg



WITH EXPANSION JOINT



WITH TRANSVERSE CONTRACTION JOINT

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
CURB JOINT

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

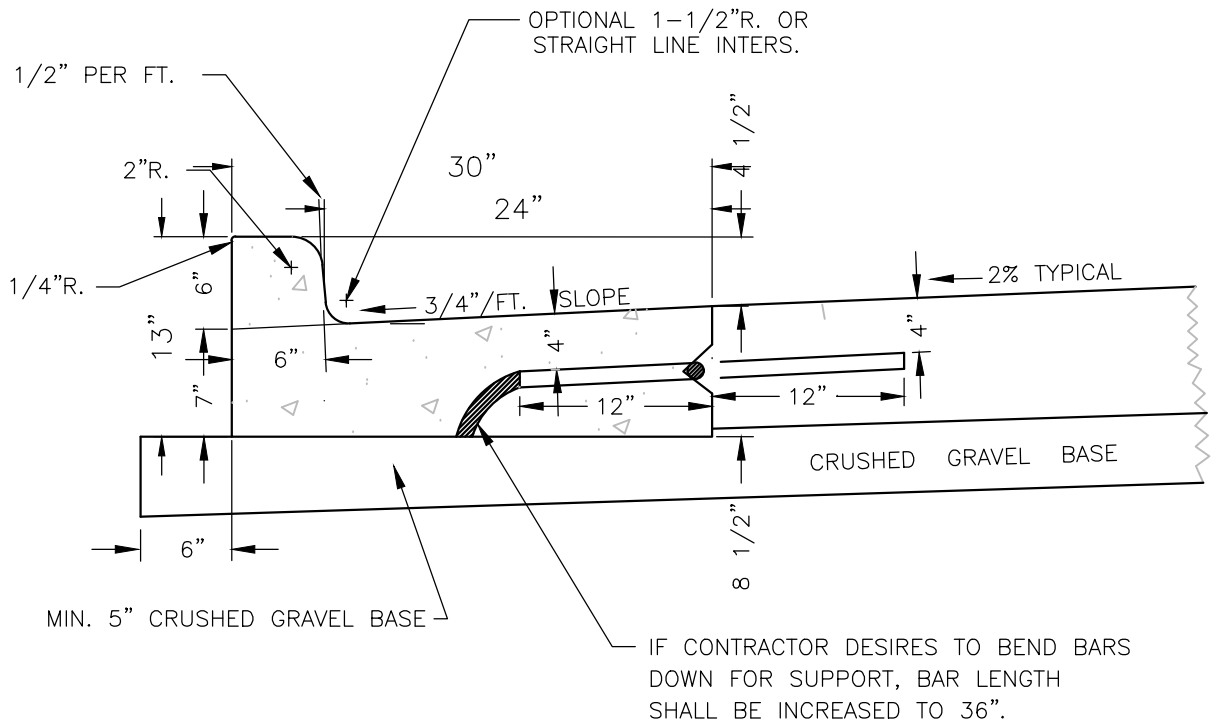
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.075000
PLOT DATE : 11/16/2017 7:45 AM

DETAIL NUMBER: **07-0325**
PROJECT NO:

NOTE: THE CURB AND GUTTER SHALL BE TIED TO THE PAVEMENT WITH NO.4, 2'-0" DEFORMED EPOXY-COATED TIE BARS SPACED AT 3'-0" C-C

NOTE: AT ALL HANDICAP RAMP LOCATIONS THE CROSS SLOPE OF THE FLANGE CANNOT EXCEED 1/4"/FT. THIS MUST BE MAINTAINED THE WIDTH OF THE RAMP. TRANSITION A MINIMUM 5 FT. ALONG THE FACE OF THE FLANGE ON EITHER SIDE OF THE RAMP TO THE TYPICAL CROSS SLOPE.



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
30" COMBINATION CURB AND GUTTER TYPE A

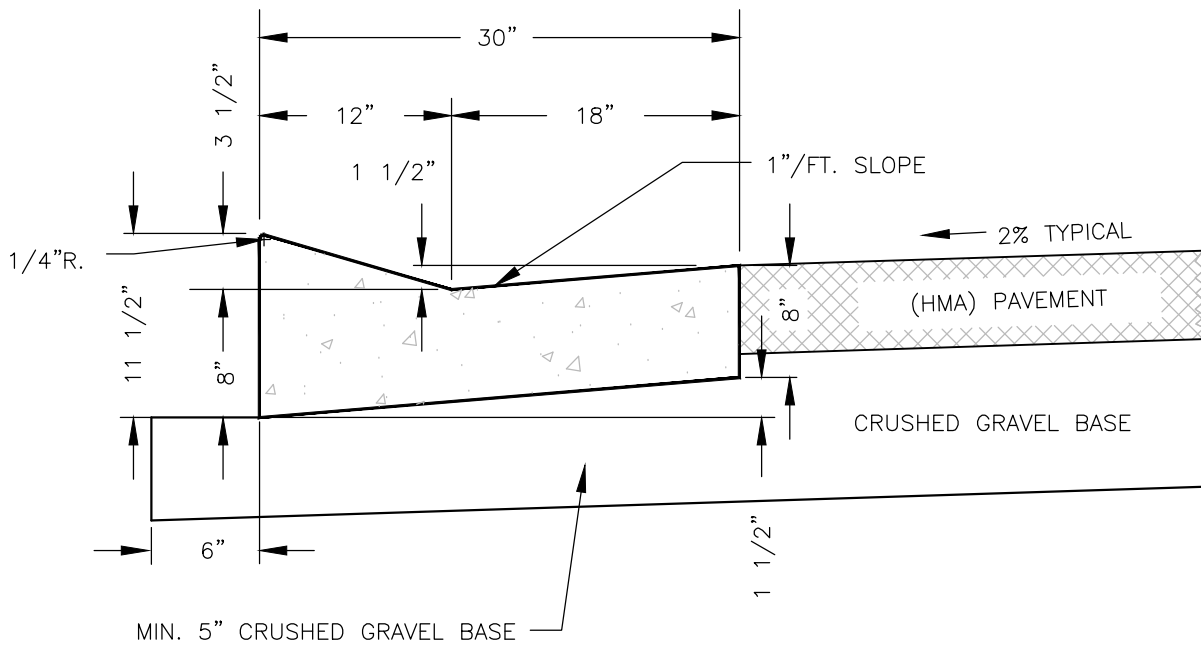
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/15/2017 3:47 PM

DETAIL NUMBER: **07-0330**
PROJECT NO:

NOTE: AT ALL HANDICAP RAMP LOCATIONS THE CROSS SLOPE OF THE FLANGE CANNOT EXCEED 1/4"/FT. THIS MUST BE MAINTAINED THE WIDTH OF THE RAMP. TRANSITION A MINIMUM 5 FT. ALONG THE FACE OF THE FLANGE ON EITHER SIDE OF THE RAMP TO THE TYPICAL CROSS SLOPE.



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
30" COMB. CURB & GUTTER

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

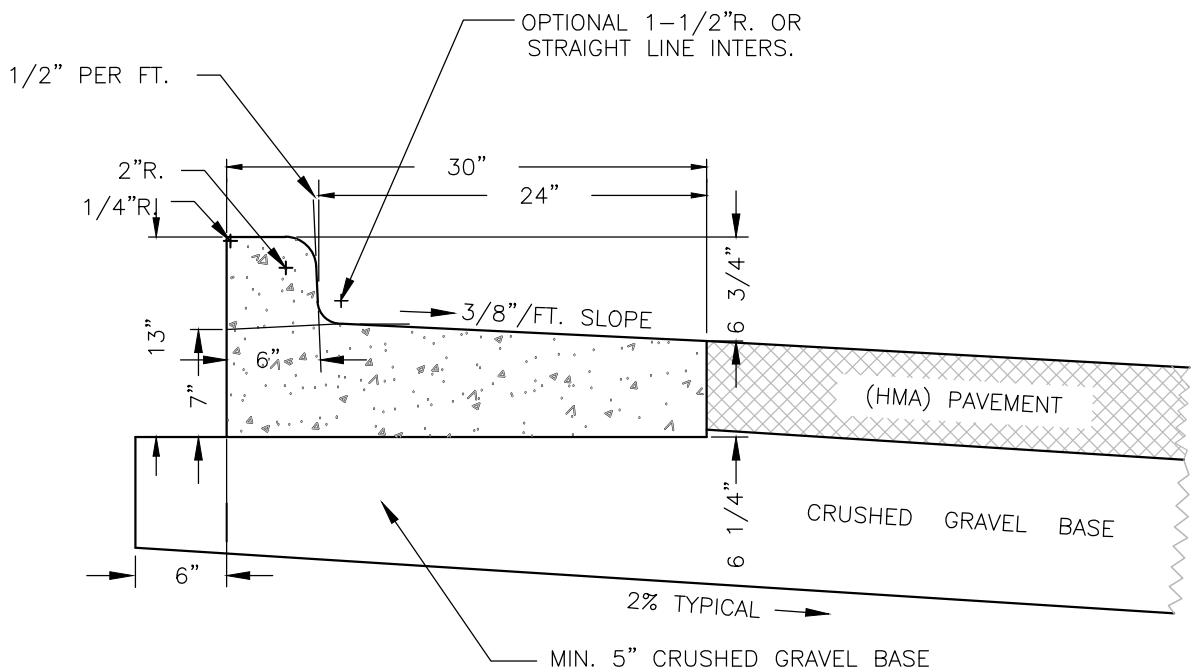
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/27/2017 9:33 AM

DETAIL NUMBER: **07-0332**
PROJECT NO: _____

NOTE: AT ALL HANDICAP RAMP LOCATIONS THE CROSS SLOPE OF THE FLANGE CANNOT EXCEED 1/4"/FT. THIS MUST BE MAINTAINED THE WIDTH OF THE RAMP. TRANSITION A MINIMUM 5 FT. ALONG THE FACE OF THE FLANGE ON EITHER SIDE OF THE RAMP TO THE TYPICAL CROSS SLOPE.

NOTE: WHEN TYPE "B" CURB AND GUTTER IS USED WITH CONCRETE PAVEMENT THE CURB AND GUTTER SHALL BE TIED TO THE PAVEMENT WITH NO.4, 2'-0" DEFORMED EPOXY-COATED TIE BARS SPACED AT 3'-0" C-C.



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
--30 INCH COMBO. CURB & GUTTER TYPE B (INVERTED PAN)--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

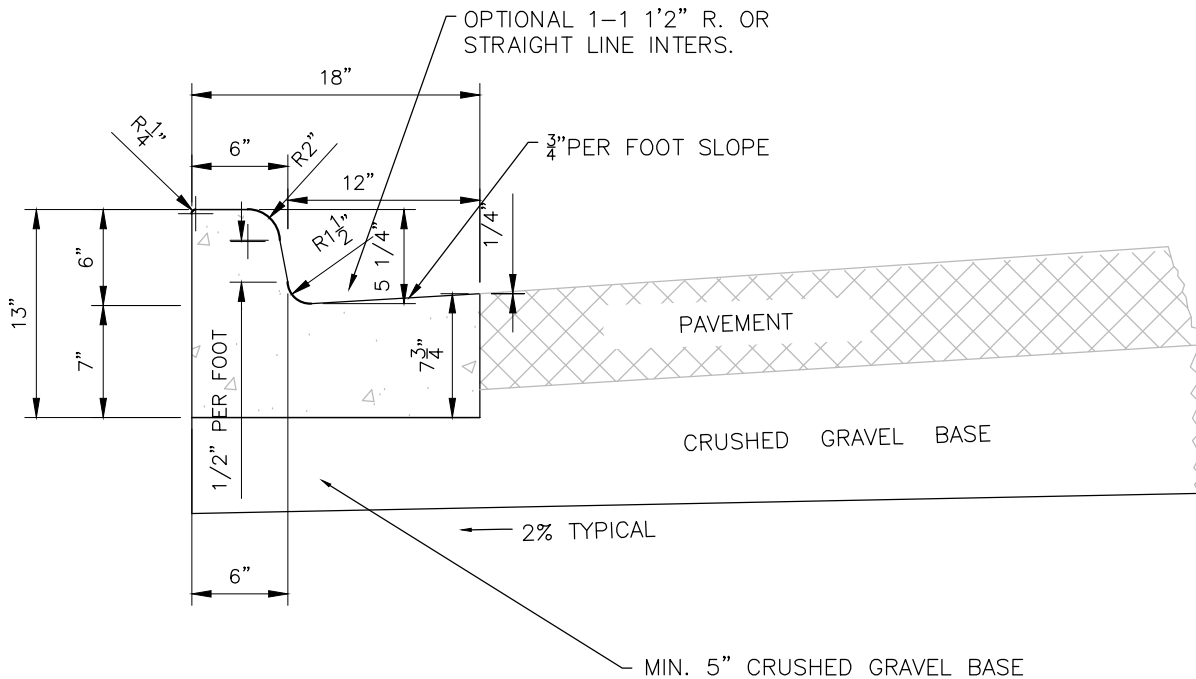
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/15/2017 1:52 PM

DETAIL NUMBER: **07-0333**
PROJECT NO:

NOTE: AT ALL HANDICAP RAMP LOCATIONS THE CROSS SLOPE OF THE FLANGE CANNOT EXCEED 1/4"/FT. THIS MUST BE MAINTAINED THE WIDTH OF THE RAMP. TRANSITION A MINIMUM 5 FT. ALONG THE FACE OF THE FLANGE ON EITHER SIDE OF THE RAMP TO THE TYPICAL CROSS SLOPE.

NOTE: WHEN TYPE "A" CURB AND GUTTER IS USED WITH CONCRETE PAVEMENT THE CURB AND GUTTER SHALL BE TIED TO THE PAVEMENT WITH NO. 4, 2'-0" DEFORMED EPOXY-COATED TIE BARS SPACED AT 3'-0" C. TO C.



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
18-INCH TYPE A

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

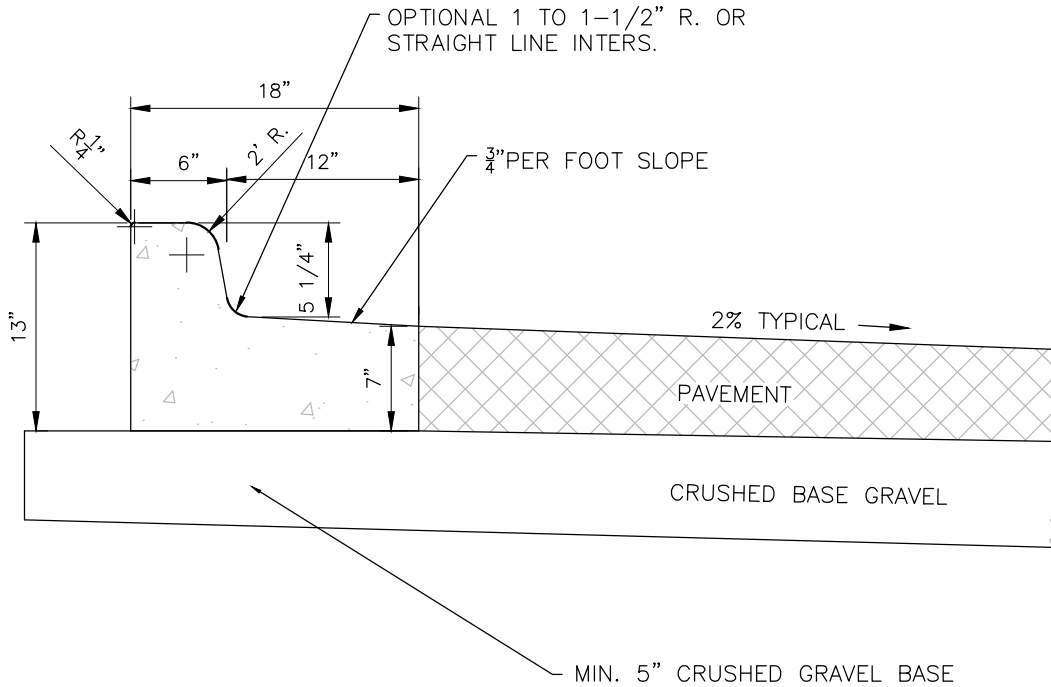
DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : _____
PLOT DATE : 11/27/2017 9:34 AM

DETAIL NUMBER: **07-0340**
PROJECT NO: STANDARD DETAILS

NOTE: AT ALL HANDICAP RAMP LOCATIONS THE CROSS SLOPE OF THE FLANGE CANNOT EXCEED 1/4"/FT. THIS MUST BE MAINTAINED THE WIDTH OF THE RAMP. TRANSITION A MINIMUM 5 FT. ALONG THE FACE OF THE FLANGE ON EITHER SIDE OF THE RAMP TO THE TYPICAL CROSS SLOPE.

NOTE: WHEN TYPE "A" CURB AND GUTTER IS USED WITH CONCRETE PAVEMENT THE CURB AND GUTTER SHALL BE TIED TO THE PAVEMENT WITH NO. 4, 2'-0" DEFORMED EPOXY-COATED TIE BARS SPACED AT 3'-0" C. TO C.



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

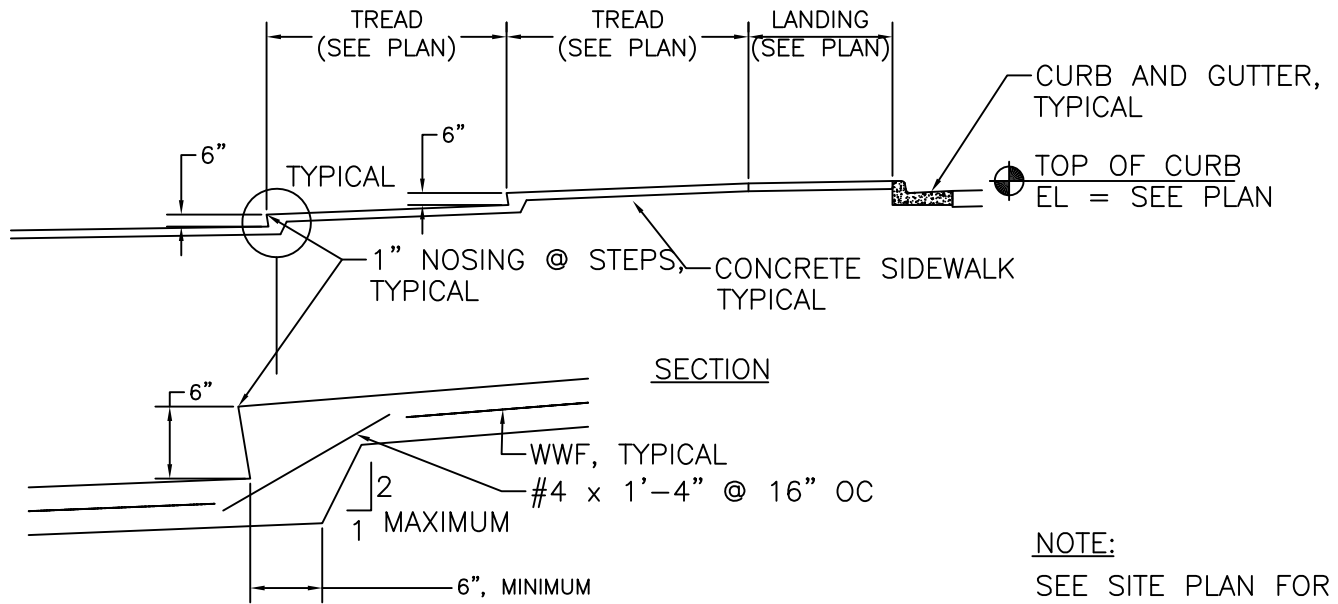
STANDARD CONSTRUCTION DETAILS
18-INCH TYPE B

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'
PLOT DATE : 11/27/2017 9:39 AM

DETAIL NUMBER: **07-0341**
PROJECT NO:



NOTE:
SEE SITE PLAN FOR ELEVATIONS.

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

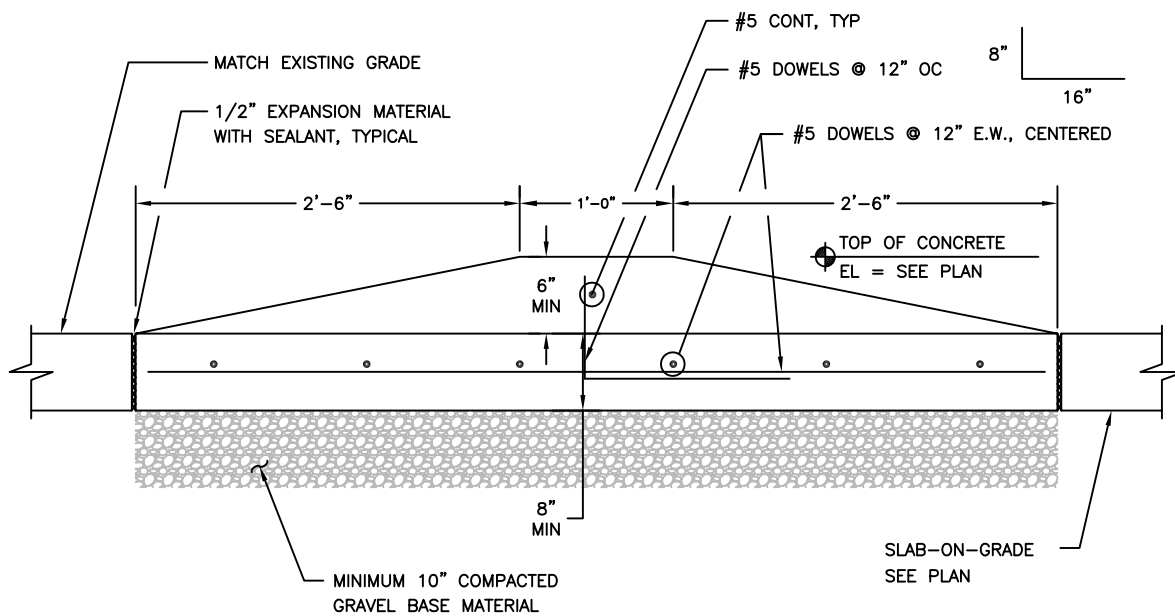
STANDARD CONSTRUCTION DETAILS
--CONCRETE WALKWAY WITH STEPS DETAIL--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'-0" XREF
PLOT DATE : 11/15/2017 1:02 PM

DETAIL NUMBER: **07-0350**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

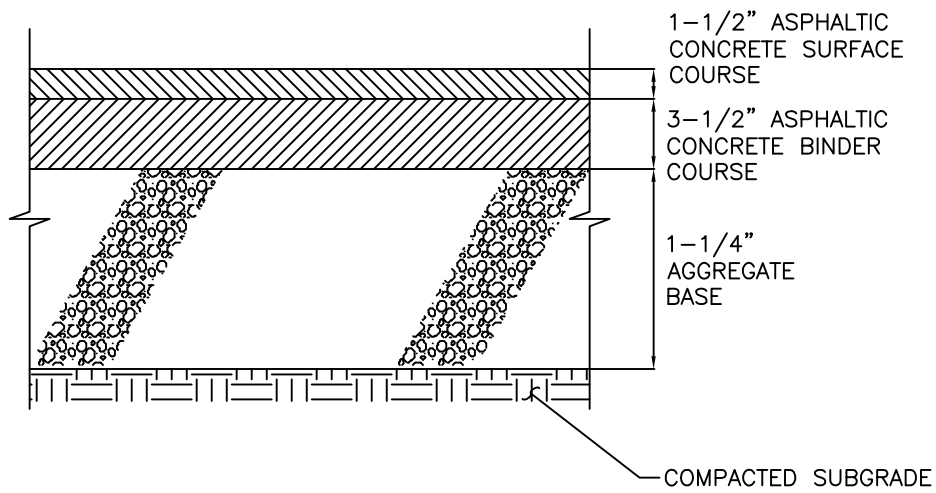
STANDARD CONSTRUCTION DETAILS
SLOPED CONCRETE BERM

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : _____
PLOT DATE : 11/15/2017 12:27 P

DETAIL NUMBER: **07-0600**
PROJECT NO: STANDARD DETAILS



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

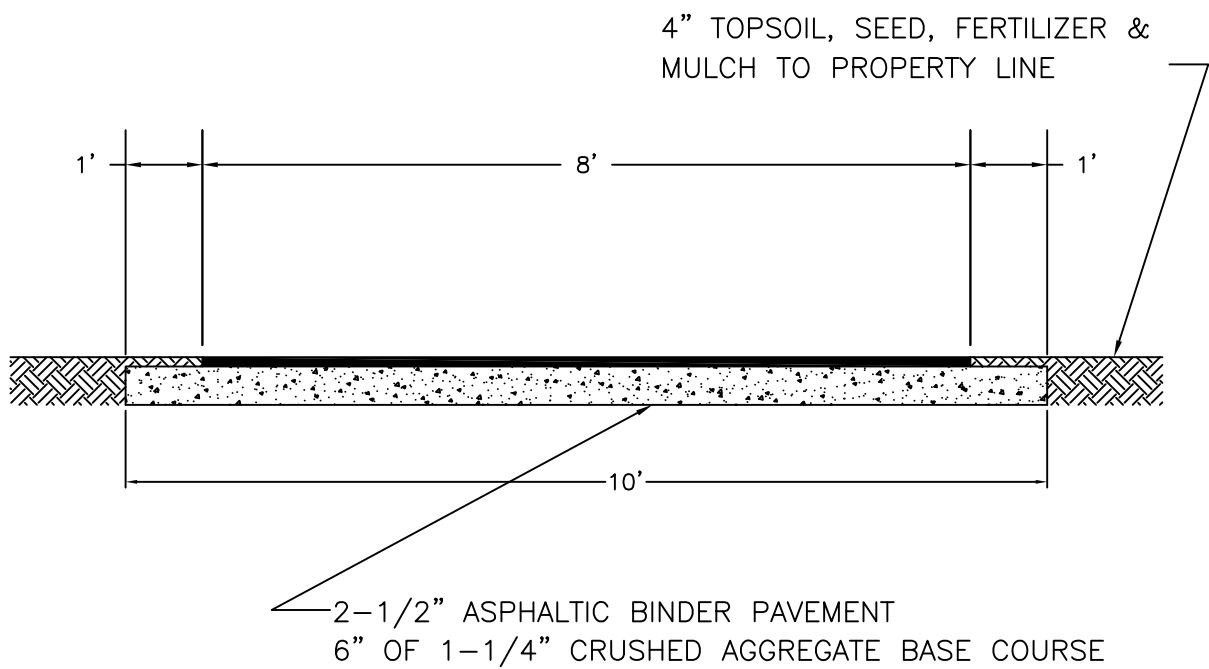
STANDARD CONSTRUCTION DETAILS
-- ASPHALT PAVEMENT SECTION --

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 0.066667
PLOT DATE : 11/27/2017 9:41 AM

DETAIL NUMBER: **08-0100**
PROJECT NO:



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

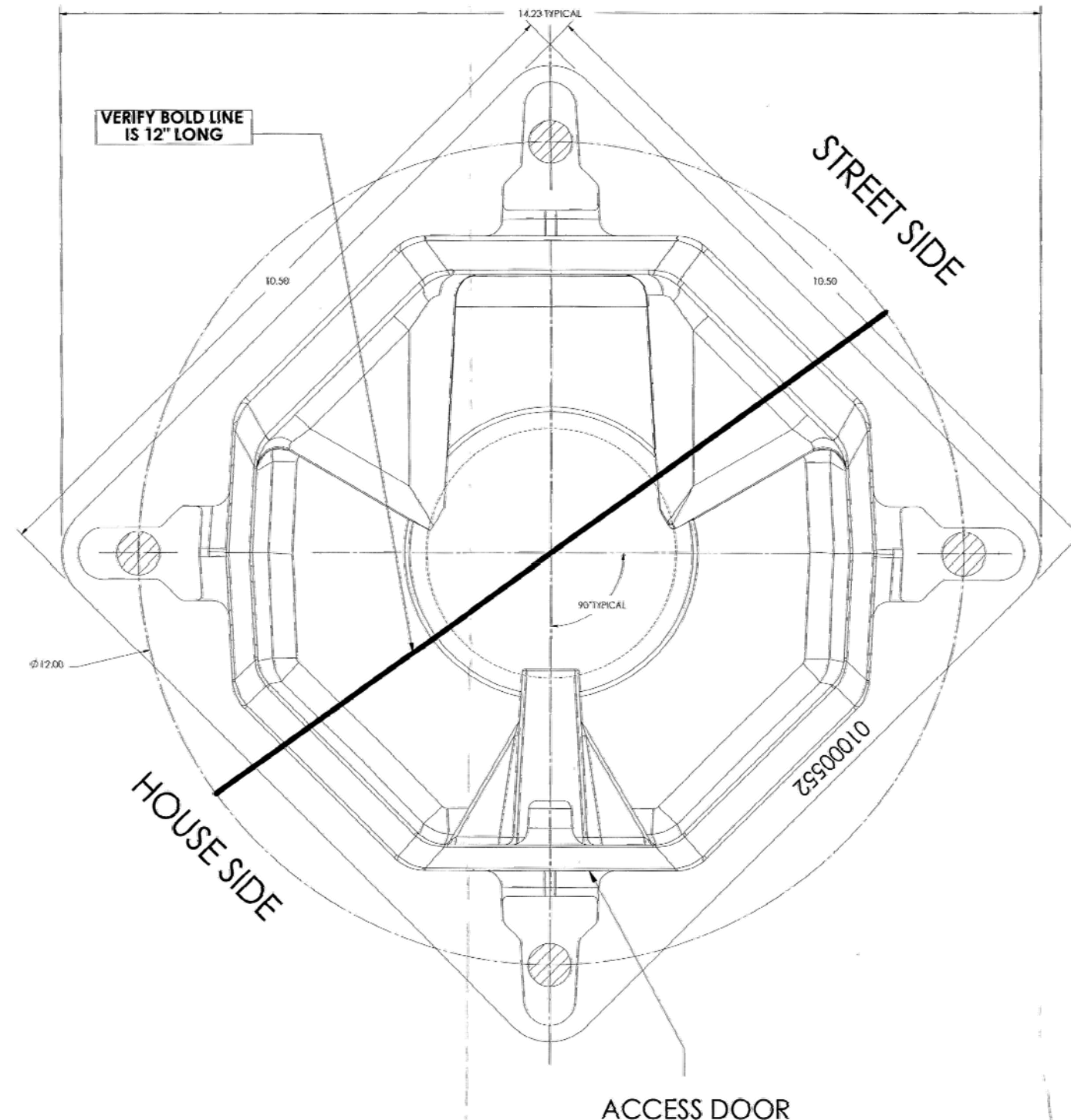
STANDARD CONSTRUCTION DETAILS
--MULTI-USE TRAIL SECTION--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

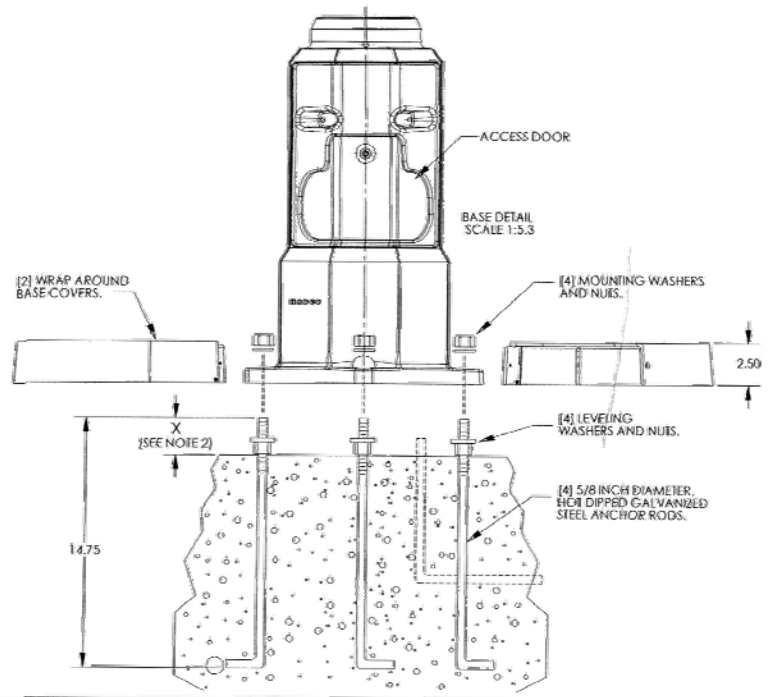
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1:2_XREF
PLOT DATE : 11/27/2017 9:43 AM

DETAIL NUMBER: **08-0215**
PROJECT NO:



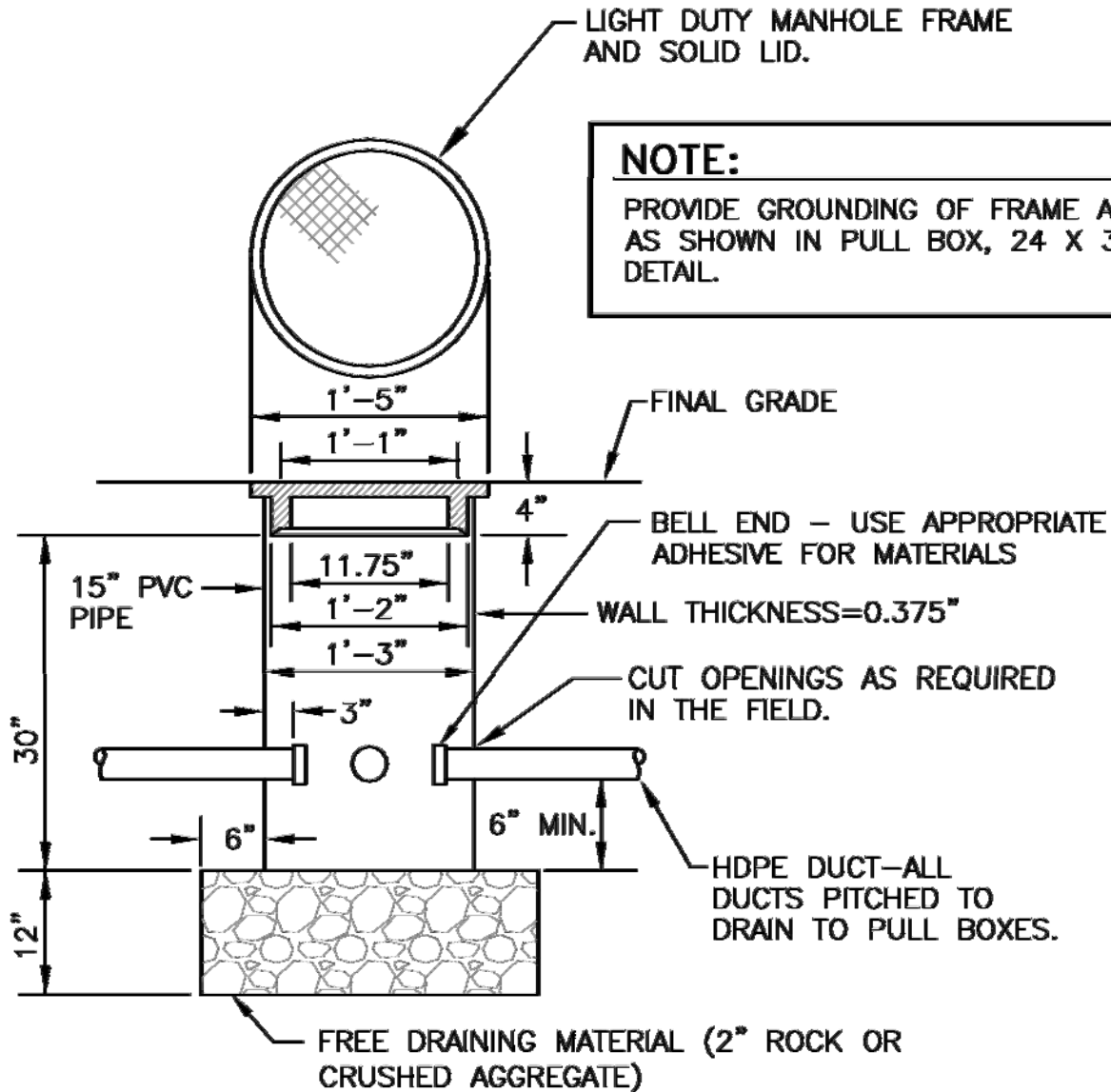
TOP SECTIONED VIEW



- NOTES:
- 1 SUGGESTED BOLT CIRCLE: 12 INCH DIAMETER
MAXIMUM BOLT CIRCLE: 12 3/4 INCH DIAMETER
MINIMUM BOLT CIRCLE: 11 3/8 INCH DIAMETER
 - 2 PHILIPS STRONGLY RECOMMENDS USING LEVELING NUTS TO MOUNT THE POST BASE. IF FOUNDATION IS NOT LEVEL, INCREASE "X" DIMENSION ACCORDINGLY WHEN USING LEVELING NUTS WITH WASHERS.

X = 2 5/8" INCHES WITH LEVELING NUTS.
WITH USE OF LEVELING NUTS, GAP BETWEEN BASE COVER AND CONCRETE COULD BE UP TO 5/8".
X = 2" INCHES WITHOUT LEVELING NUTS.
 - 3 IF USING GROUTING TO CONCEAL GAP BETWEEN BASE AND FOUNDATION, ALLOW FOR WATER DRAINAGE.
 - 4 BASE COVER DIMENSIONS:
2 3/8 INCH HIGH [INTERNALLY].
11 3/4 INCH SQUARE.
16 5/8 INCH ACROSS CORNERS.

PHILIPS 180-Craftway, P.O. Box 928 Ellensburg, Pennsylvania 17340-0928 PHILIPS OR OTHERWISE SPECIFIED. *ALL DIMENSIONS ARE IN INCHES. **ALL THREADS ARE UNF OR UNF-2B AFTER COATING. *ALL THREADS ARE TO BE VERIFIED WITH A THREAD GAUGE.	CONFIDENTIAL: This drawing is confidential and property of Philips. It may not be reproduced in whole or in part without the express written consent of PHILIPS. All rights reserved. © 2011 by Philips Electronics.	TITLE: ANCHOR ROD TEMPLATE FULL SIZE FOR P1709 SERIES POSTS DRAWN BY: J. WOJCIKOWIAK DATE: 9/23/02 CHECKED BY: B. DORON DATE: 8/4/09 APPR BY: M. S. PRESSEL DATE: 10/2/02
	SHEET SIZE: D MATERIAL: 17 X 22 WHITE BOND PAPER.	SHEET 1 OF 1 PART NO: 101006552



NOTE:
 PROVIDE GROUNDING OF FRAME AND LID AS SHOWN IN PULL BOX, 24 X 36-INCH DETAIL.

WEIGHT OF MANHOLE LID AND FRAME SHALL BE 40 POUND ± 5%

CITY OF WAUKESHA
 DEPARTMENT OF PUBLIC WORKS

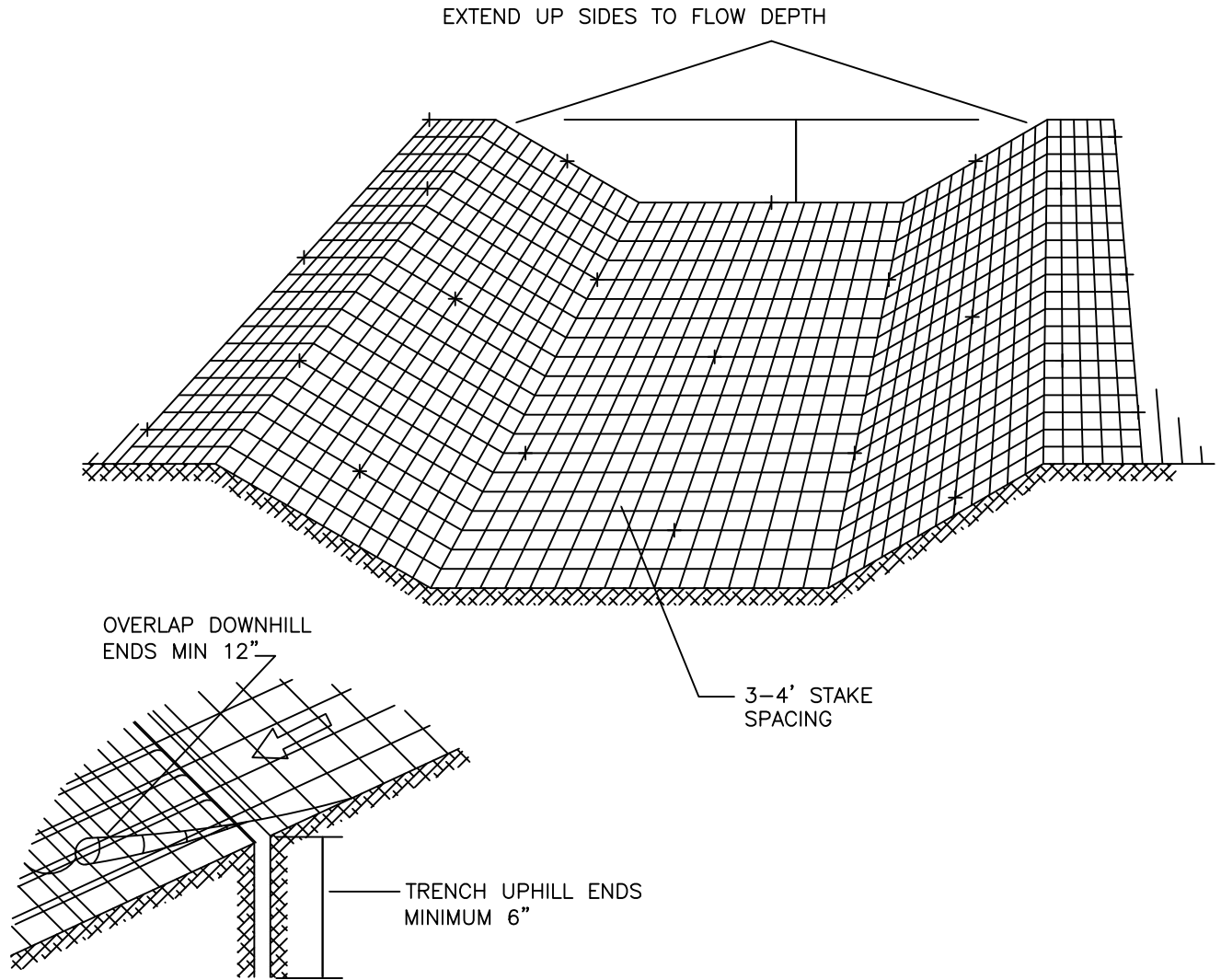
STANDARD CONSTRUCTION DETAILS
 --PULL BOX--

APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 10' XREF
 PLOT DATE : 11/16/2017 1:43 PM

DETAIL NUMBER: **11-0025**
 PROJECT NO: _____



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

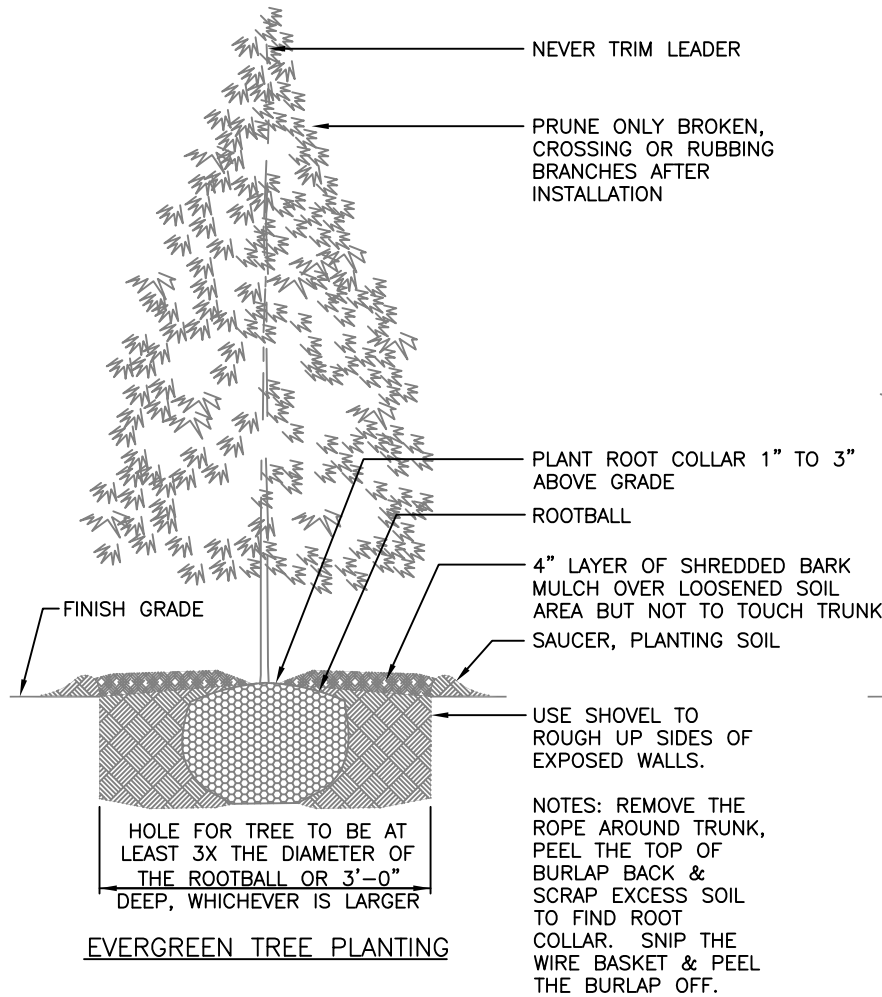
STANDARD CONSTRUCTION DETAILS
--EROSION MATTING--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

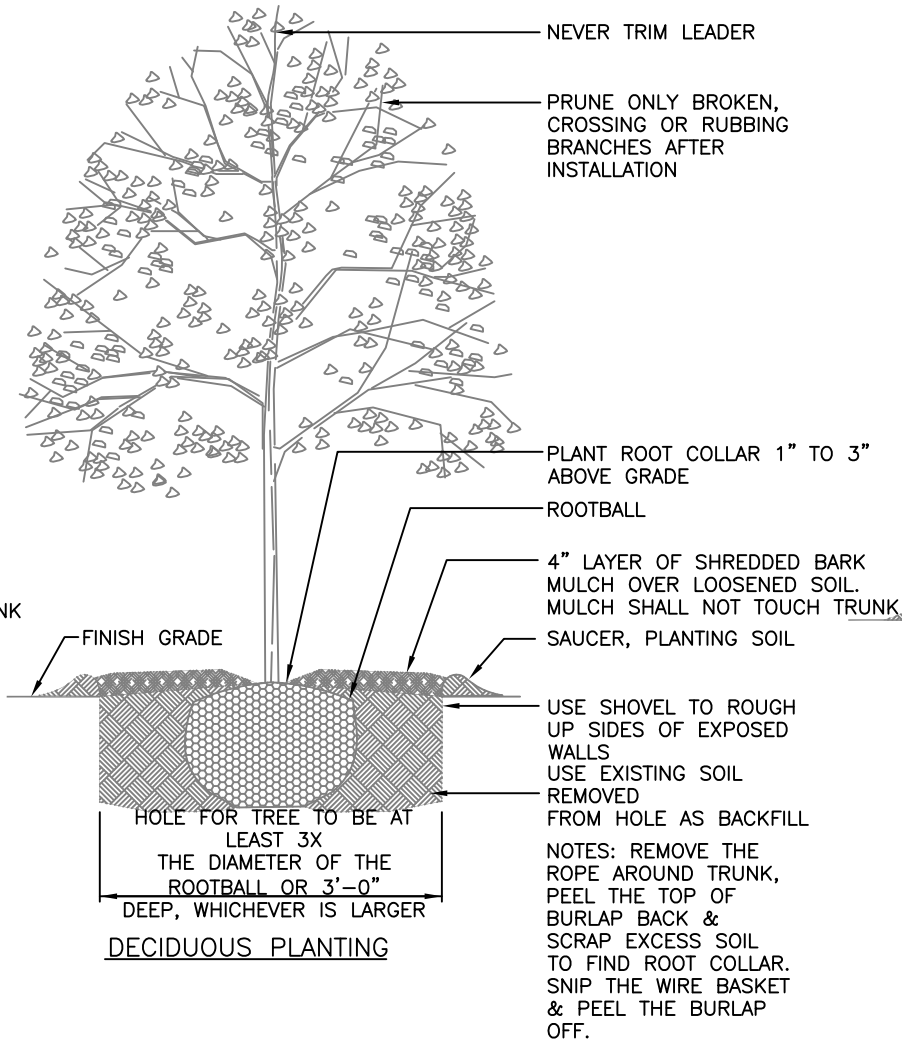
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 10' XREF
PLOT DATE : 11/16/2017 1:48 PM

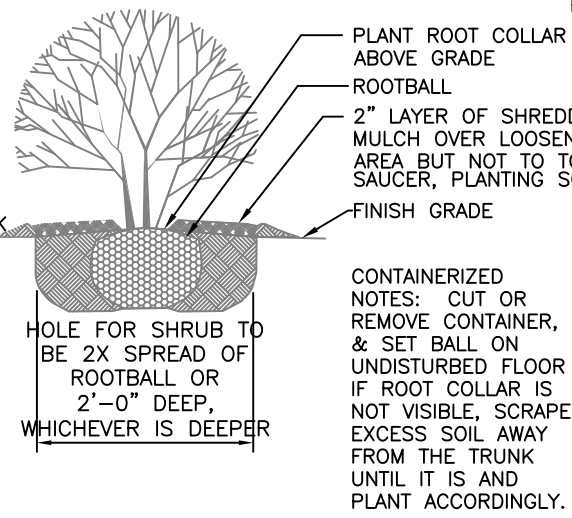
DETAIL NUMBER: **14-0003**
PROJECT NO: _____



EVERGREEN TREE PLANTING

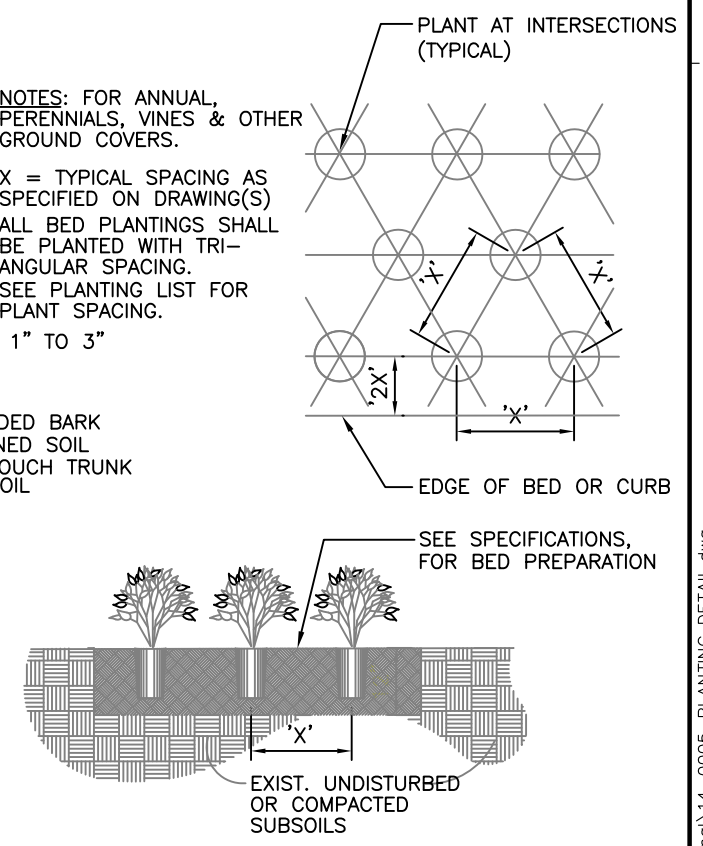


DECIDUOUS PLANTING

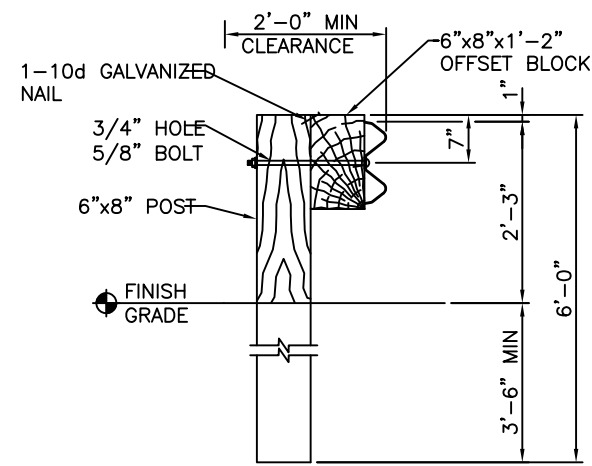


SHRUB PLANTING

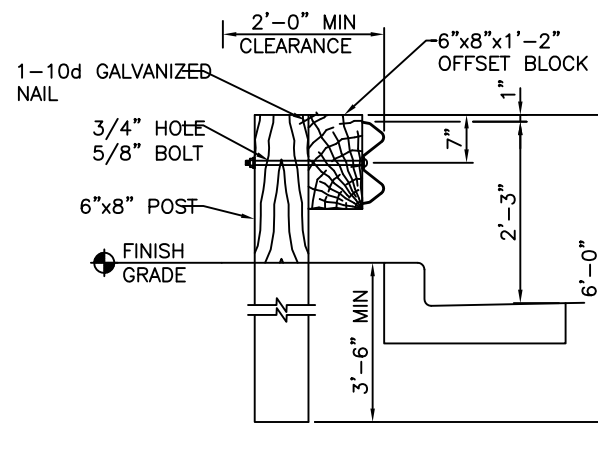
BARE ROOT NOTES: INSPECT THE ROOTS & CLIP W/ SHARP HAND PRUNERS THE DAMAGED OR BROKEN PARTS. ELIMINATE ANY ROOTS THAT COULD BECOME A GIRDLING ROOT. SPREAD ROOTS OUT RADIALLY DOWN ON THE UNDISTURBED FLOOR.



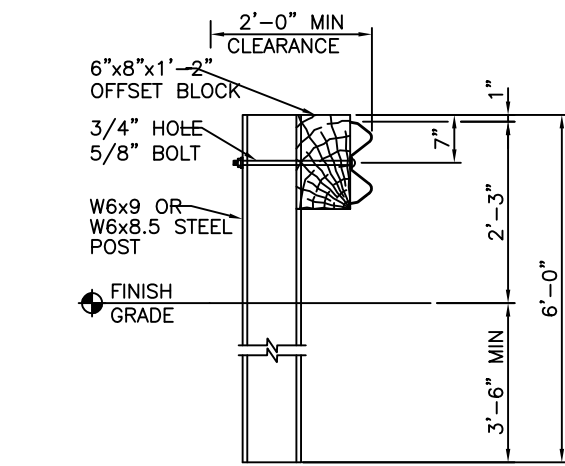
HERBACEOUS PLANTING



LOCATED ALONG ROADWAY



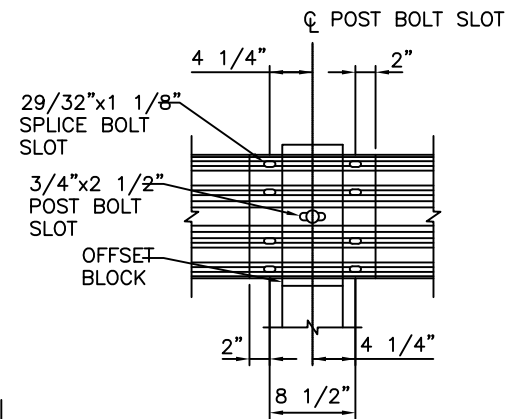
LOCATED ALONG CURB



STEEL POST CONSTRUCTION

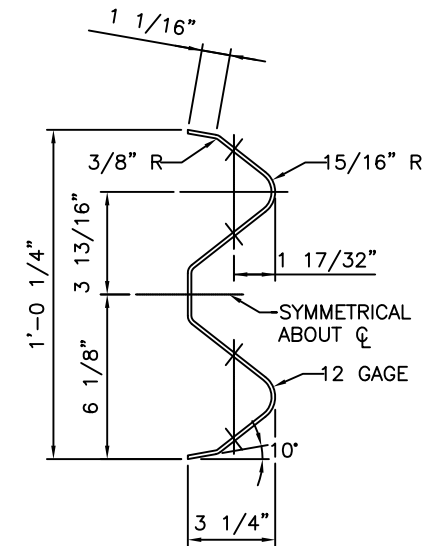
STEEL PLATE BEAM GUARD END VIEW

SCALE: 3/4"=1'-0"



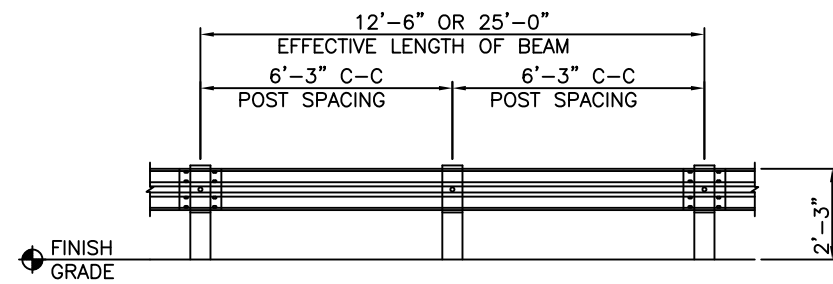
FRONT VIEW
W BEAM SPLICE

SCALE: 1/2"=1'-0"



SECTION THRU W BEAM

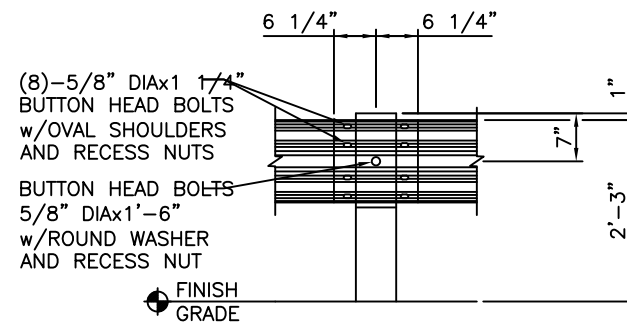
SCALE: 3/16"=1'-0"



FRONT VIEW

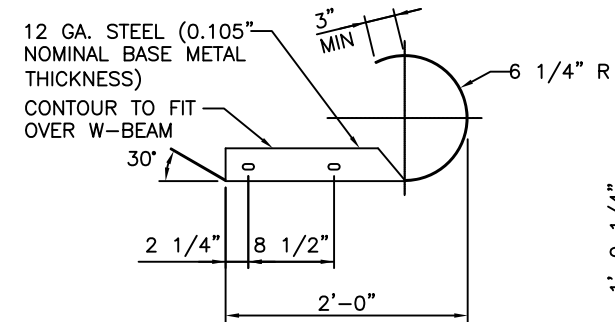
TYPICAL INSTALLATION OF STEEL PLATE BEAM GUARD

SCALE: NONE



FRONT VIEW

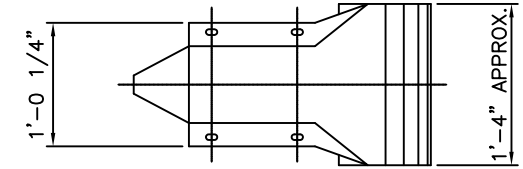
BEAM SPLICING AND POST MOUNTING DETAIL



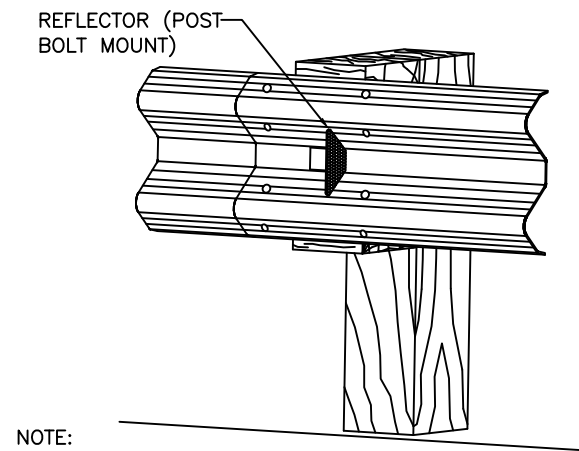
PLAN VIEW

BEAM SPLICING AND POST MOUNTING DETAIL

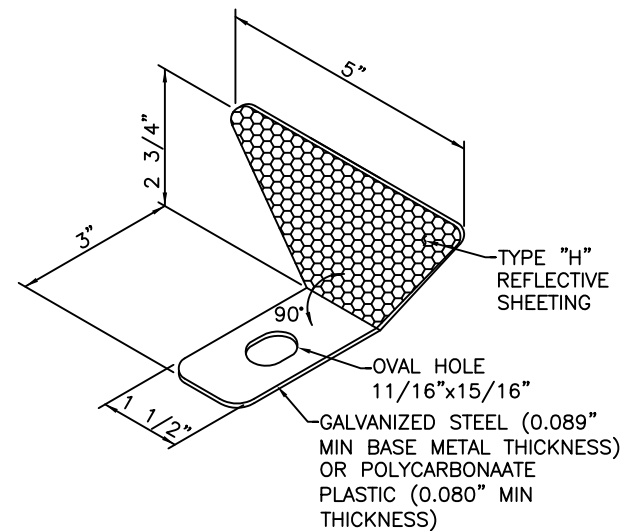
SCALE: 1/2"=1'-0"



FRONT VIEW



NOTE:
REFLECTORS SHALL BE SPACED
AT 12'-6" OC, WITH TYPE "H"
YELLOW REFLECTOR SHEETING
ON BOTH SIDES



REFLECTOR DETAIL AND TYPICAL INSTALLATION

SCALE: NONE

ON TOP & BOTTOM
RAIL USE RAIL
COUPLING APPROX.
EVERY 20', EXP.
COUPLING EVERY 100'

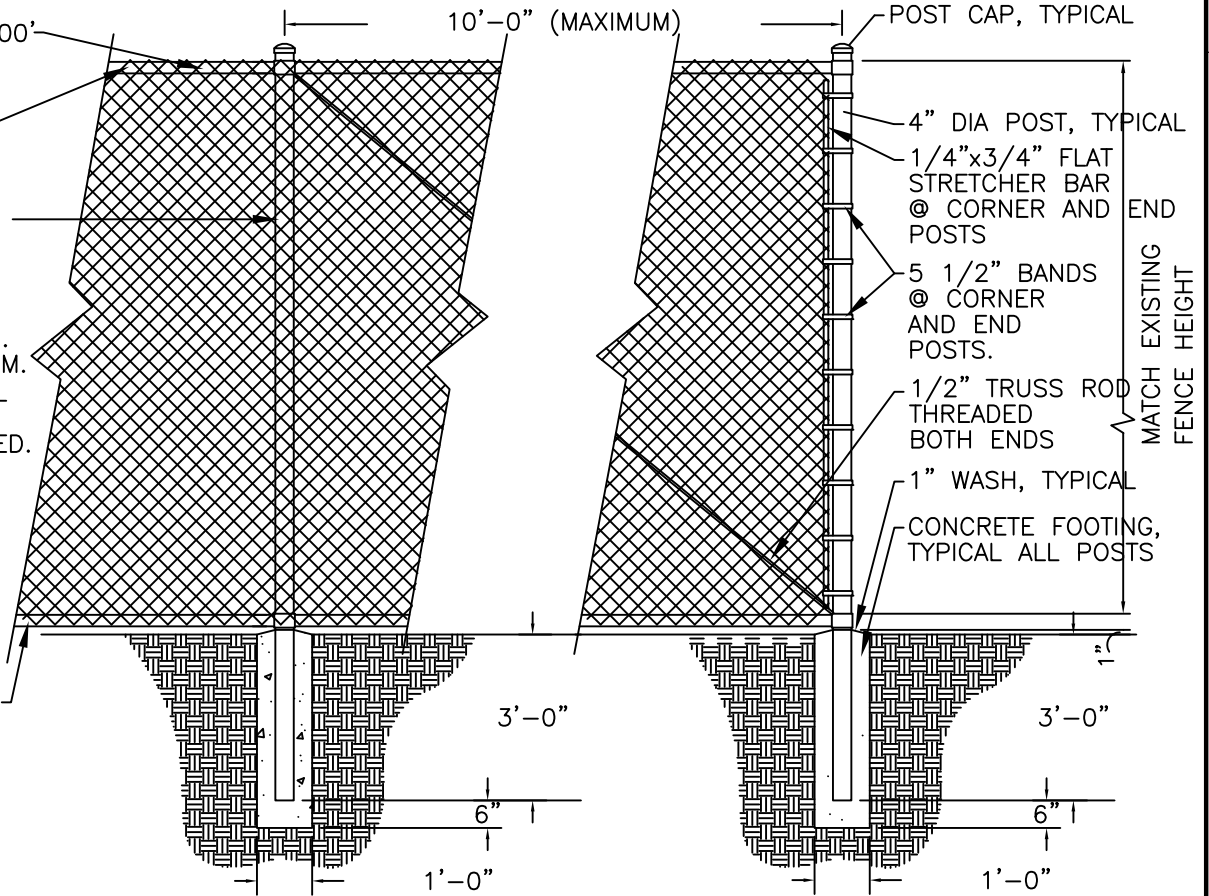
KNUCKLED
SELVAGE

LINE POSTS 4"
NORM. PIPE SIZE

NOTE:

TIES @ 24" O.C.
TOP AND BOTTOM.
ALL POSTS, RAIL
FITTINGS SHALL
BE RESIN COATED.

TOP AND BOTTOM
RAILS 2" NORM.
PIPE SIZE



POST CAP, TYPICAL

10'-0" (MAXIMUM)

4" DIA POST, TYPICAL
1/4"x3/4" FLAT
STRETCHER BAR
@ CORNER AND
END
POSTS

5 1/2" BANDS
@ CORNER
AND END
POSTS.

1/2" TRUSS ROD
THREADED
BOTH ENDS

1" WASH, TYPICAL

CONCRETE FOOTING,
TYPICAL ALL POSTS

MATCH EXISTING
FENCE HEIGHT

3'-0"

3'-0"

1'-0"

1'-0"

CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
CHAIN LINK FENCE DETAIL

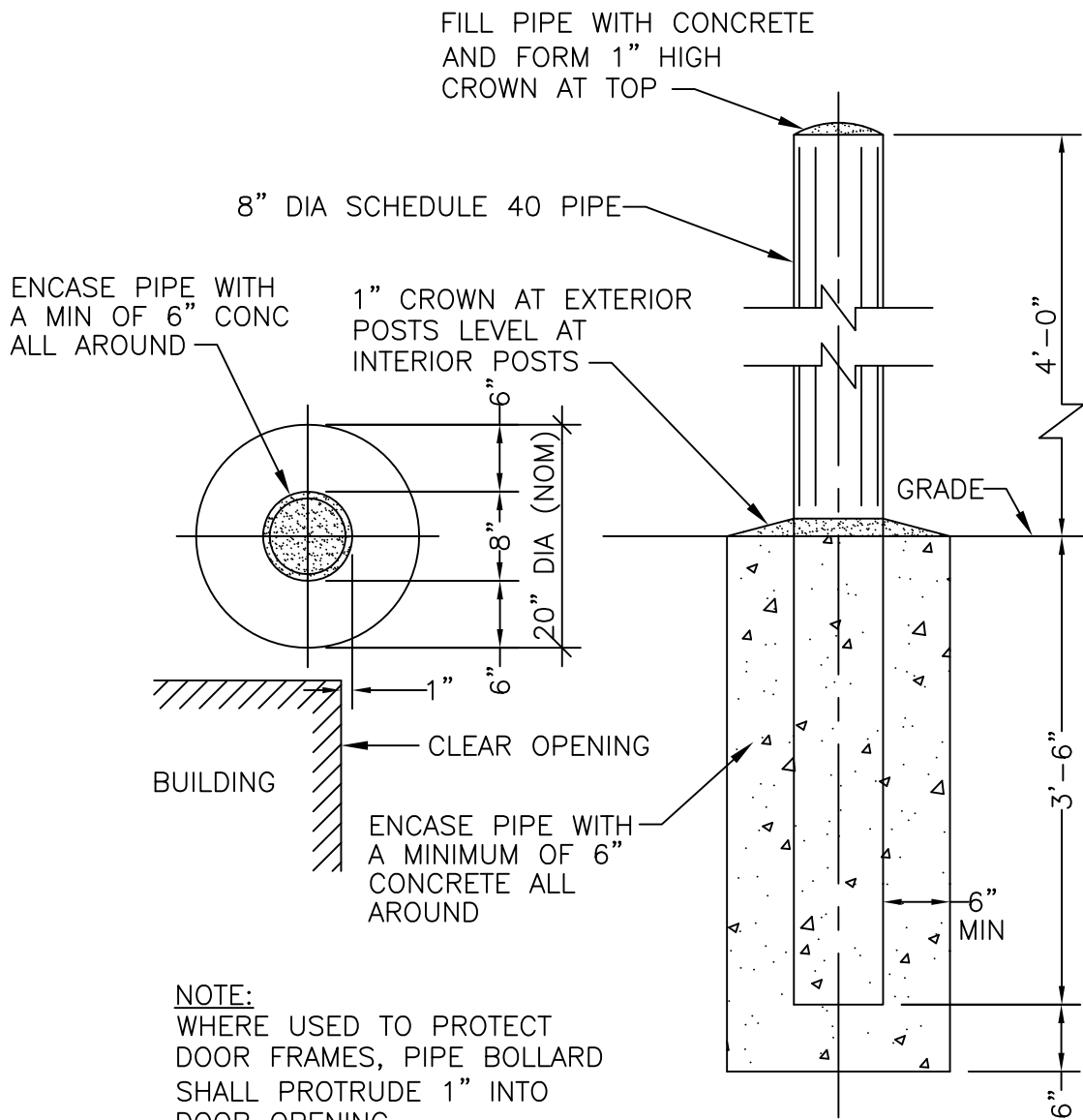
APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

DRAWN BY: JAW DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : _____
PLOT DATE : 11/15/2017 11:09 A

DETAIL NUMBER: **14-0100**
PROJECT NO: STANDARD DETAILS

FILE NAME : 0:_PROJECTS\Standard Specifications\Final\14-0100-CHAIN LINK FENCE.dwg



NOTE:
 WHERE USED TO PROTECT DOOR FRAMES, PIPE BOLLARD SHALL PROTRUDE 1" INTO DOOR OPENING.

CITY OF WAUKESHA
 DEPARTMENT OF PUBLIC WORKS

STANDARD CONSTRUCTION DETAILS
 --PIPE BOLLARD--

APPROVED: ALEX DAMIEN DATE: _____
 APPROVED: _____ DATE: _____

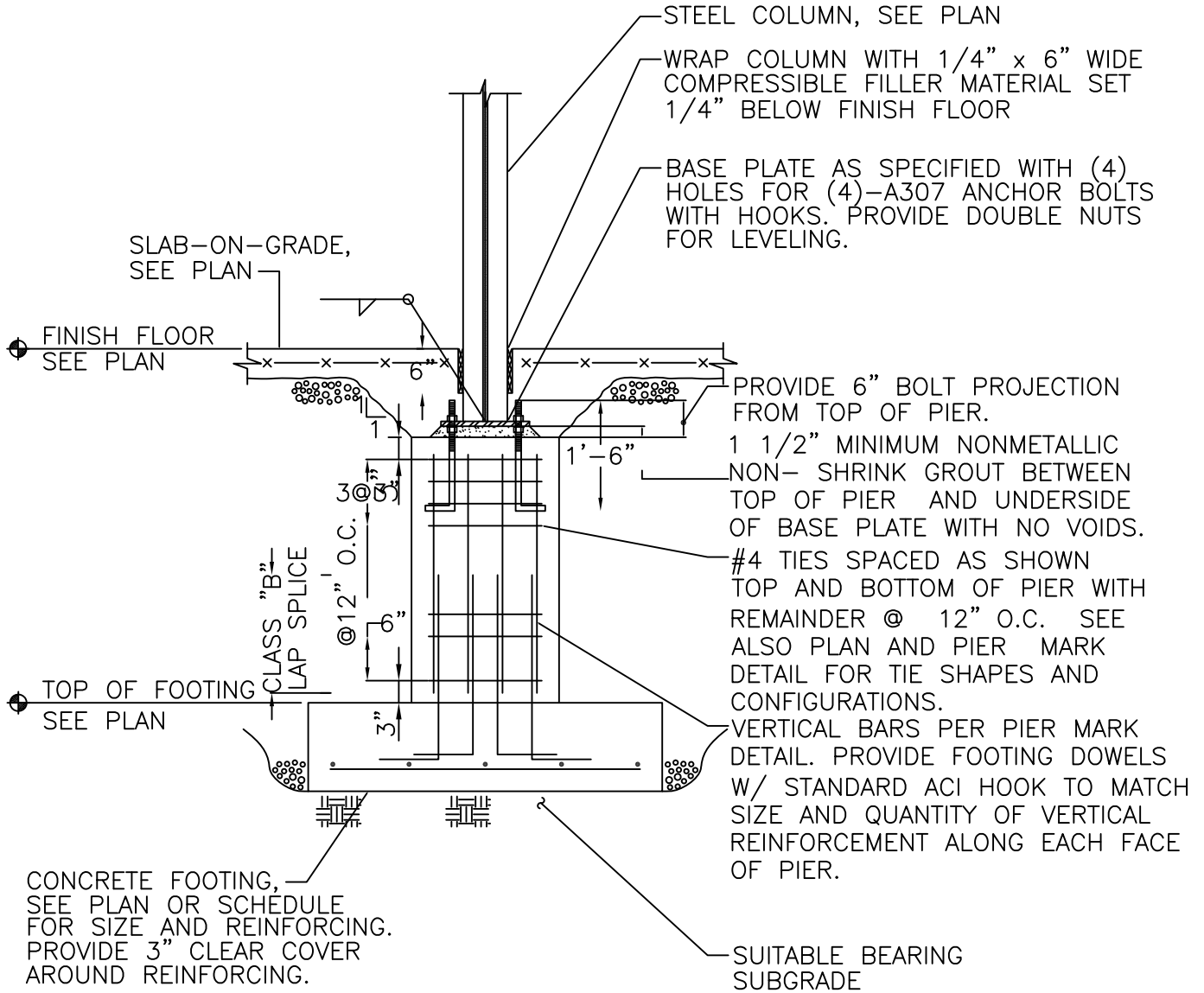
DRAWN BY: DSB DATE: _____
 CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 200' XREF
 PLOT DATE : 11/15/2017 10:57 AM

DETAIL NUMBER: **14-0200**
 PROJECT NO: _____

NOTE:

WHEN PIER HEIGHT IS LESS THAN 4'-0" ELIMINATE VERTICAL BARS AND EXTEND FOOTING DOWELS TO THE FULL HEIGHT OF PIER.



CITY OF WAUKESHA
DEPARTMENT OF PUBLIC WORKS

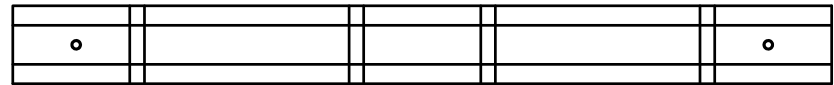
STANDARD CONSTRUCTION DETAILS
--CONCRETE PIER--

APPROVED: ALEX DAMIEN DATE: _____
APPROVED: _____ DATE: _____

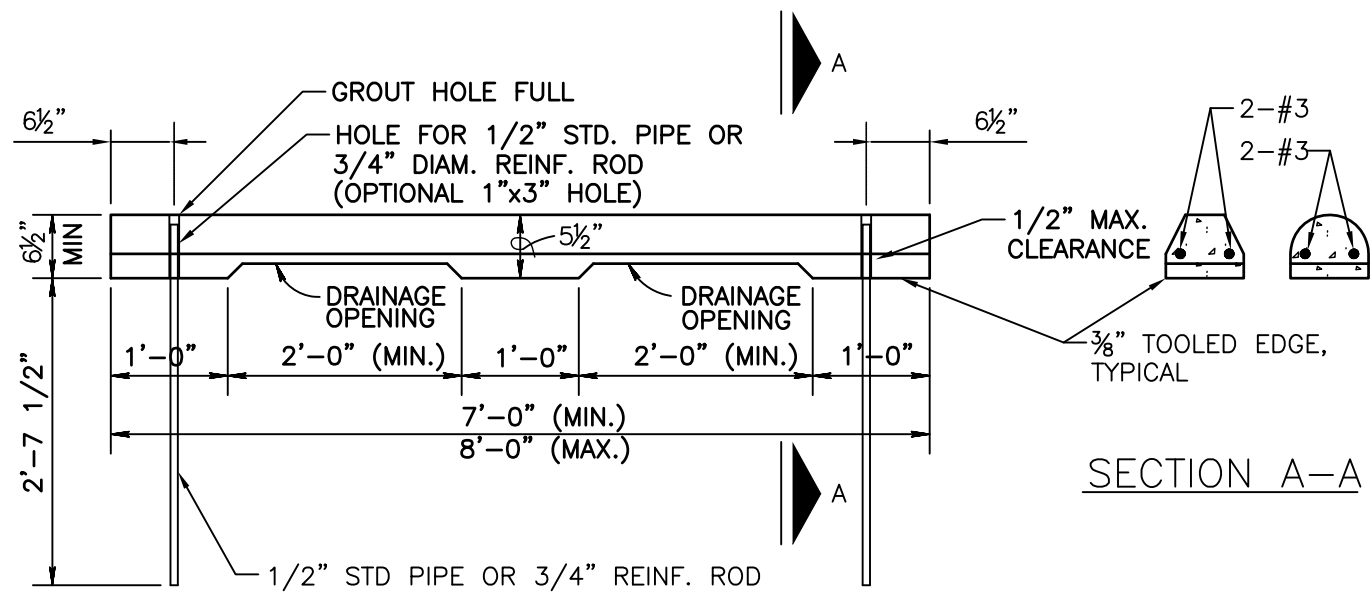
DRAWN BY: DSB DATE: _____
CHECKED BY: _____ DATE: _____

PLOT SCALE : 1" = 1'-0" XREF
PLOT DATE : 11/15/2017 10:43 AM

DETAIL NUMBER: **14-0210**
PROJECT NO:

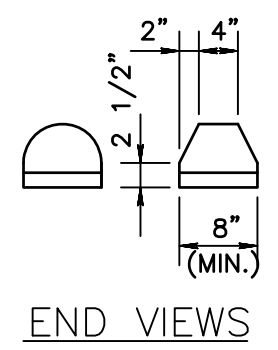
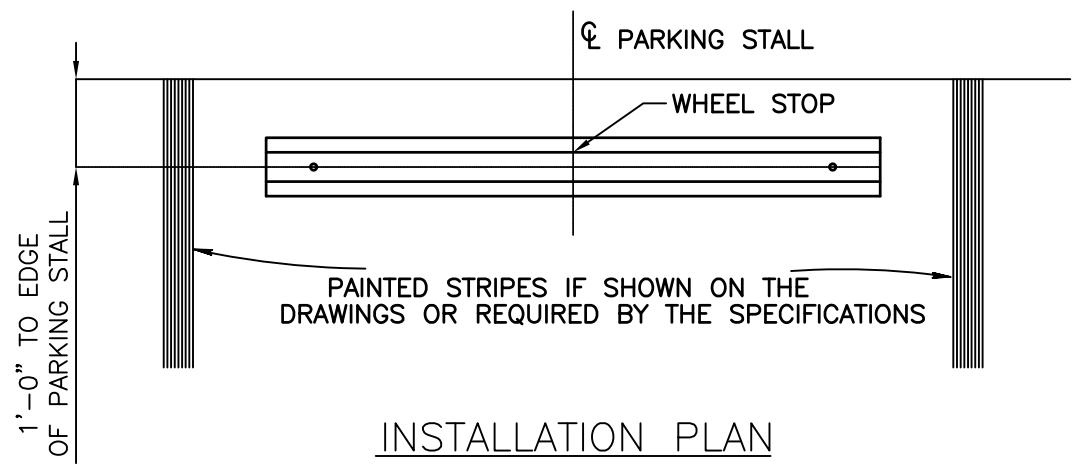
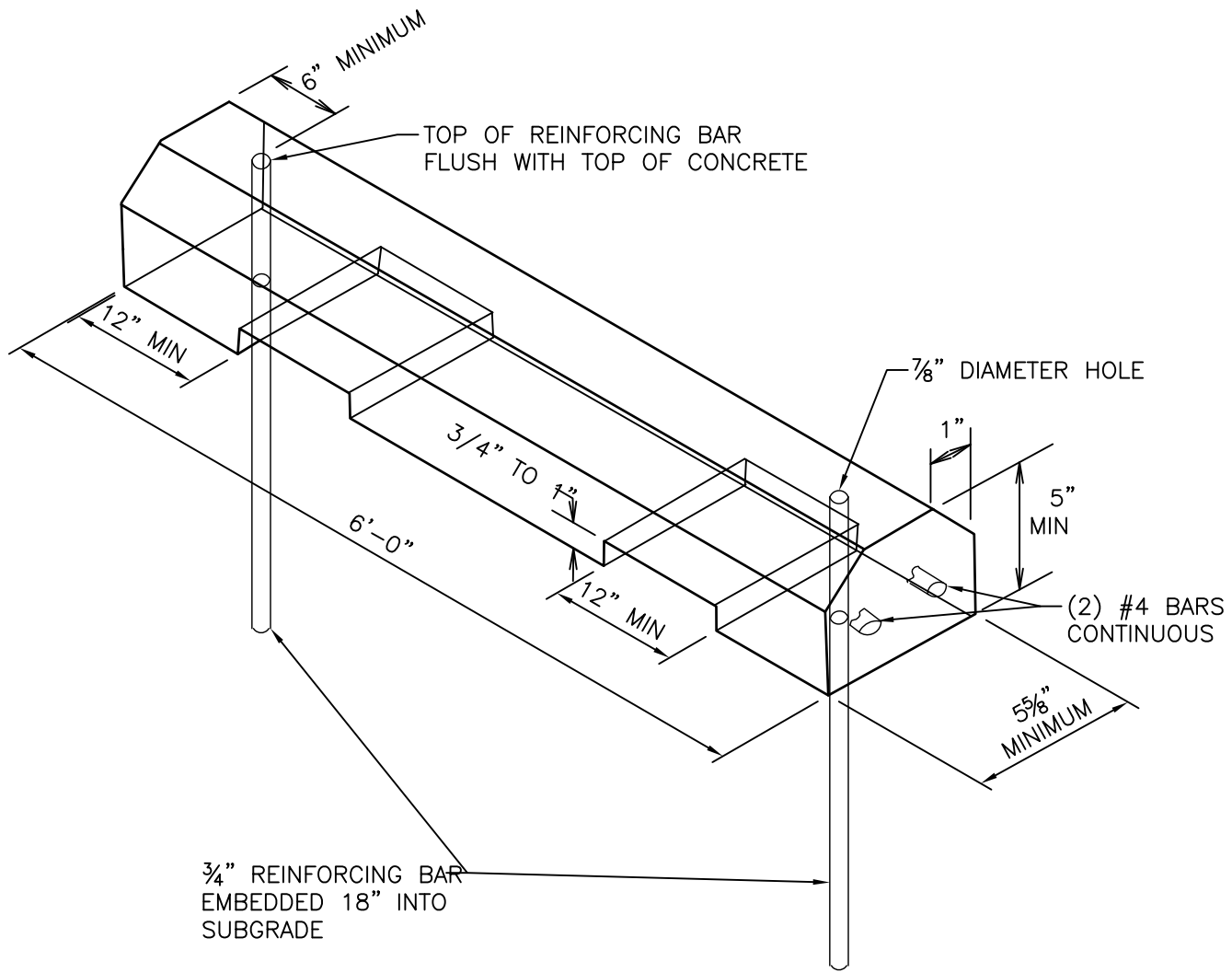


PLAN



1/2" STD PIPE OR 3/4" REINF. ROD SHALL BE PLACED PRIOR TO SURFACING OR IN A HOLE DRILLED IN THE FINISHED SURFACE WITH A TIGHT FIT OBTAINED BY AN APPROVED METHOD, OR DRIVEN INTO THE SURFACING

ELEVATION



City of Waukesha
Department of Public Works

Design and Construction Manual

Division 5
Standard Bid Items

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STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
01000	GENERAL REQUIREMENTS	
01001	TRAFFIC CONTROL	LS
01005	DETOUR ROUTE	LS
01010	MOBILIZATION	LS
01014	TRAFFIC CONTROL SIGN - PORTABLE CHANGEABLE MESSAGE	LS
01015	BUSINESS ACCESS SIGN & MOUNTING SUPPLIED SIGNS	LS
01017	TEMPORARY SAFETY FENCE	LF
01018	TEMPORARY CONCRETE SAFETY BARRIER	LF
01020	FIELD OFFICE	LS
01050	TREE PROTECTION	EACH
01500	CONSTRUCTION SURVEYING & STAKING	LS
01995	(RESERVED FOR SPECIAL PROVISIONS)	
01996	(RESERVED FOR SPECIAL PROVISIONS)	
01997	(RESERVED FOR SPECIAL PROVISIONS)	
01998	(RESERVED FOR SPECIAL PROVISIONS)	
01999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
02000	EROSION CONTROL, STORMWATER MANAGEMENT & WATER RESOURCES	
02002	SILT FENCE	LF
02003	EROSION BALES	EACH
02005	INLET PROTECTION	EACH
02007	SILT SOCK	LF
02008	SILT CURTAIN	LF
02010	CONSTRUCTION ENTRANCE	EACH
02015	TURBIDITY BARRIER	LF
02100	TEMPORARY DIVERSION CHANNEL	LF
02105	TEMPORARY DIVERSION & SETTLING BASIN	EACH
02106	TEMPORARY DITCH CHECK	EACH
02110	CONCRETE WASH-OUT BASIN	LS
02160	STORM SEWER DISCHARGE SPLASHPAD	SY
02165	CLEAR STONE BERM (DITCH CHECK)	EACH
02166	CULVERT PIPE CHECK	EACH
02175	LEVEL SPREADER	EACH
02200	TYPE II DEWATERING	LS
02225	POLYMER STABILIZATION	SY
02501	DETENTION POND OUTFALL STRUCTURE	EACH
02505	DETENTION POND DIVERSION STRUCTURE	EACH
02600	INFILTRATION BASIN	SY
02602	BIOFILTER BASIN	SY
02700	RAIN GARDEN	SF
02990	(RESERVED FOR SPECIAL PROVISIONS)	
02991	(RESERVED FOR SPECIAL PROVISIONS)	
02992	(RESERVED FOR SPECIAL PROVISIONS)	
02993	(RESERVED FOR SPECIAL PROVISIONS)	
02994	(RESERVED FOR SPECIAL PROVISIONS)	
02995	(RESERVED FOR SPECIAL PROVISIONS)	
02996	(RESERVED FOR SPECIAL PROVISIONS)	
02997	(RESERVED FOR SPECIAL PROVISIONS)	
02998	(RESERVED FOR SPECIAL PROVISIONS)	
02999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
03000	EXISTING CONDITIONS, SUBSURFACE INVESTIGATION & DEMOLITION	
03001	CLEARING	LS
03002	GRUBBING	LS
03011	CLEARING	STA
03012	GRUBBING	STA
03021	CLEARING	SY
03022	GRUBBING	SY
03031	CLEARING	ACRE
03032	GRUBBING	ACRE
03041	CLEARING	INCH DIA
03042	GRUBBING	INCH DIA
03055	TREE REMOVAL	LS
03056	TREE REMOVAL STATION TO STATION	STA
03057	TREE REMOVAL INCH DIAMETER	EACH
03060	REMOVE AND REPLACE MAILBOX	EACH
03061	INSTALL TEMPORARY MAILBOX(ES)	LS
03100	REMOVE SEWER MANHOLE	EACH
03101	REMOVE INLET	EACH
03110	REMOVE PIPE	LF
03120	REMOVE PIPE - ASBESTOS	LF
03200	ABANDON SEWER MANHOLE	EACH
03201	ABANDON INLET	EACH
03205	ABANDON PIPE	LF
03225	REMOVE CONCRETE STEPS	SF
03230	REMOVE GUARD RAIL	LF
03250	REMOVE FENCE	LF
03300	REMOVE EXISTING CURB AND GUTTER	LF
03330	REMOVE TREE GRATE	EACH
03331	REMOVE EXISTING SIDEWALK	SY
03500	SAWCUTTING AT PAVEMENT LIMITS	LF
03501	SAWCUT FULL DEPTH	LF
03600	REMOVE EXISTING CONCRETE ROADWAY	SY
03601	PULVERIZE EXISTING CONCRETE ROADWAY	SY
03602	RUBBLIZE EXISTING CONCRETE ROADWAY	SY
03605	REMOVE EXISTING ASPHALT ROADWAY	SY
03650	REMOVE EXISTING ROADWAY	SY
03990	(RESERVED FOR SPECIAL PROVISIONS)	
03991	(RESERVED FOR SPECIAL PROVISIONS)	
03992	(RESERVED FOR SPECIAL PROVISIONS)	
03993	(RESERVED FOR SPECIAL PROVISIONS)	
03994	(RESERVED FOR SPECIAL PROVISIONS)	
03995	(RESERVED FOR SPECIAL PROVISIONS)	
03996	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
03997	(RESERVED FOR SPECIAL PROVISIONS)	
03998	(RESERVED FOR SPECIAL PROVISIONS)	
03999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
04000	EARTHWORK, EXCAVATION & BORING	
04002	EXCAVATION CUT	CY
04005	ROCK EXCAVATION	CY
04010	SHAPING AND GRADING TO SUBGRADE	LF
04011	SHAPING AND GRADING TO SUBGRADE	LS
04012	FROST BREAKING AND REMOVAL	LF
04015	GEOTEXTILE FABRIC TYPE SAS NON-WOVEN	SY
04016	GEOTEXTILE GRID TYPE BX1100	SY
04020	1-1/4" CRUSHED STONE ROADWAY BASE	TON
04021	3" CRUSHED STONE ROADWAY BASE	TON
04022	BREAKER RUN	TON
04025	EXCAVATION BELOW SUBGRADE (EBS)	CY
04050	SOIL BORING - SPLIT-SPOON SAMPLING	EACH
04051	SOIL-BORING - GEOPROBE	VF
04060	MONITORING WELL - GROUNDWATER	VF
04061	MONITORING WELL - GAS	VF
04101	SELECT BACKFILL FOR STORM SEWER	LF
04105	SELECT BACKFILL FOR SANITARY SEWER	LF
04110	ADDITIONAL FILL	CY
04120	SLURRY BACKFILL	CY
04150	REMOVAL OF EXCESS AMOUNTS OF BOULDERS	CY
04165	TUNNELLING - COHESIVE SOILS	LF
04166	TUNNELLING - NONCOHESIVE SOILS	LF
04167	TUNNELLING - ROCK	LF
04175	SOLID ROCK EXCAVATION (IN TRENCHES)	LF
04176	LOOSE ROCK EXCAVATION (IN TRENCHES)	LF
04200	HORIZONTAL DIRECTIONAL DRILL CASING PIPE	LF
04208	HORIZONTAL DIRECTIONAL DRILL 8 INCH PIPE	LF
04210	HORIZONTAL DIRECTIONAL DRILL 10 INCH PIPE	LF
04212	HORIZONTAL DIRECTIONAL DRILL 12 INCH PIPE	LF
04216	HORIZONTAL DIRECTIONAL DRILL 16 INCH PIPE	LF
04220	HORIZONTAL DIRECTIONAL DRILL 20 INCH PIPE	LF
04224	HORIZONTAL DIRECTIONAL DRILL 24 INCH PIPE	LF
04501	CRUSHED AGGREGATE BASE COURSE, 3/4" (INCLUDES EBS)	TON
04502	CRUSHED AGGREGATE BASE COURSE, 1-1/4" (INCLUDES EBS)	TON
04521	CRUSHED AGGREGATE BASE COURSE, GRADATION NO. 1 (INCLUDES EBS)	TON
04522	CRUSHED AGGREGATE BASE COURSE, GRADATION NO. 2 OR NO. 3 (INCLUDES EBS)	TON
04524	CRUSHED AGGREGATE BASE COURSE, GRADATION NO. 4 (INCLUDES EBS)	TON
04525	CRUSHED AGGREGATE BASE COURSE, GRADATION NO. 5 (BREAKER RUN) (INCLUDES EBS)	TON
04990	(RESERVED FOR SPECIAL PROVISIONS)	
04991	(RESERVED FOR SPECIAL PROVISIONS)	
04992	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
04993	(RESERVED FOR SPECIAL PROVISIONS)	
04994	(RESERVED FOR SPECIAL PROVISIONS)	
04995	(RESERVED FOR SPECIAL PROVISIONS)	
04996	(RESERVED FOR SPECIAL PROVISIONS)	
04997	(RESERVED FOR SPECIAL PROVISIONS)	
04998	(RESERVED FOR SPECIAL PROVISIONS)	
04999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
05000	SEWERS AND SEWER STRUCTURES	
05004	4-INCH UNDERDRAIN	LF
05005	4-INCH PERFORATED UNDERDRAIN	LF
05006	6-INCH UNDERDRAIN	LF
05007	6-INCH PERFORATED UNDERDRAIN	LF
05010	PIPE BULKHEAD	EACH
05020	ADJUST SEWER MANHOLE	EACH
05021	ADJUST INLET	EACH
05030	CHIMNEY REPLACEMENT	EACH
05040	8-INCH SANITARY SEWER OUTSIDE DROP	VF
05041	10-INCH SANITARY SEWER OUTSIDE DROP	VF
05042	SANITARY SEWER INSIDE DROP	VF
05050	INTERNAL CHIMNEY SEAL	EACH
05051	EXTERNAL CHIMNEY SEAL	EACH
05055	CLEANOUT	EACH
05056	SANITARY LATERAL CLEANOUT	EACH
05074	SANITARY LATERAL CLEANING AND PRELINING VIDEO INSPECTION	EACH
05075	SANITARY SEWER SPOT REPAIR	EACH
05076	SANITARY SEWER LATERAL SPOT REPAIR	EACH
05080	SANITARY LATERAL REINSTATEMENT	EACH
05082	SANITARY LATERAL CONNECTION TEST & SEAL	EACH
05100	TRACER WIRE AND BOX	LF
05108	8 INCH PVC SANITARY SEWER PIPE	LF
05110	10 INCH PVC SANITARY SEWER PIPE	LF
05112	12 INCH PVC SANITARY SEWER PIPE	LF
05115	15 INCH PVC SANITARY SEWER PIPE	LF
05118	18 INCH PVC SANITARY SEWER PIPE	LF
05121	21 INCH PVC SANITARY SEWER PIPE	LF
05124	24 INCH PVC SANITARY SEWER PIPE	LF
05154	4 INCH SANITARY SEWER LATERAL	LF
05155	4 INCH SANITARY SEWER LATERAL REPLACEMENT (OPEN CUT)	LF
05156	6 INCH SANITARY SEWER LATERAL	LF
05157	6 INCH SANITARY SEWER LATERAL REPLACEMENT (OPEN CUT)	LF
05160	SANITARY SEWER LATERAL CONNECTION AT ROW (PIPE BURSTING)	EACH
05174	4 INCH SANITARY SEWER RISER	VF
05176	6 INCH SANITARY SEWER RISER	VF
05208	8 INCH PVC PRESSURE SANITARY SEWER PIPE	LF
05210	10 INCH PVC PRESSURE SANITARY SEWER PIPE	LF
05212	12 INCH PVC PRESSURE SANITARY SEWER PIPE	LF
05215	15 INCH PVC PRESSURE SANITARY SEWER PIPE	LF
05218	18 INCH PVC PRESSURE SANITARY SEWER PIPE	LF
05221	21 INCH PVC PRESSURE SANITARY SEWER PIPE	LF
05224	24 INCH PVC PRESSURE SANITARY SEWER PIPE	LF

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
05308	8 INCH CIPP SANITARY SEWER PIPE	LF
05309	8 INCH CIPP STORM SEWER PIPE	LF
05310	10 INCH CIPP SANITARY SEWER PIPE	LF
05311	10 INCH CIPP STORM SEWER PIPE	LF
05312	12 INCH CIPP SANITARY SEWER PIPE	LF
05313	12 INCH CIPP STORM SEWER PIPE	LF
05315	15 INCH CIPP SANITARY SEWER PIPE	LF
05316	15 INCH CIPP STORM SEWER PIPE	LF
05318	18 INCH CIPP SANITARY SEWER PIPE	LF
05319	18 INCH CIPP STORM SEWER PIPE	LF
05320	20 INCH CIPP SANITARY SEWER PIPE	LF
05321	21 INCH CIPP SANITARY SEWER PIPE	LF
05322	21 INCH CIPP STORM SEWER PIPE	LF
05324	24 INCH CIPP SANITARY SEWER PIPE	LF
05325	24 INCH CIPP STORM SEWER PIPE	LF
05327	27 INCH CIPP SANITARY SEWER PIPE	LF
05328	27 INCH CIPP STORM SEWER PIPE	LF
05330	30 INCH CIPP SANITARY SEWER PIPE	LF
05331	30 INCH CIPP STORM SEWER PIPE	LF
05336	36 INCH CIPP SANITARY SEWER PIPE	LF
05337	36 INCH CIPP STORM SEWER PIPE	LF
05338	XX INCH CIPP STORM SEWER PIPE	LF
05350	SANITARY LATERAL LINING (CIPP) WITHIN 25 FT. OF SEWER MAIN	EACH
05351	SANITARY LATERAL LINING (CIPP) ADDITIONAL LENGTH OVER 25 FT. FROM SI	LF
05400	48 INCH DIA SANITARY MANHOLE	VF
05401	XX INCH DIA SANITARY MANHOLE	VF
05405	48 INCH DIA SANITARY MANHOLE W/ OUTSIDE DROP	VF
05406	SANITARY MANHOLE FOR LARGE DIAMETER SEWERS	VF
05410	REHABILITATE SANITARY MANHOLE W/ CEMENTITOUS LINER	EACH
05411	REHABILITATE SANITARY MANHOLE W/ CEMENTITOUS LINER	VF
05415	REHABILITATE STORM MANHOLE W/ CEMENTITOUS LINER	EACH
05416	REHABILITATE STORM MANHOLE W/ CEMENTITOUS LINER	VF
05420	SANITARY MANHOLE BENCH / INVERT / TROUGH WORK - MINOR	EACH
05422	SANITARY MANHOLE BENCH / INVERT / TROUGH WORK - MAJOR	EACH
05425	CHEMICAL GROUT SEALING OF SANITARY SEWER SERVICE	EACH
05430	REPLACE SANITARY SEWER COVER	EACH
05431	REPLACE SANITARY SEWER FRAME & COVER	EACH
05432	REPLACE SANITARY SEWER CHIMNEY, FRAME & COVER	EACH
05433	REPLACE SANITARY SEWER CONE, CHIMNEY, FRAME & COVER	EACH
05450	DITCH INLET STRUCTURE	EACH
05475	48-INCH STORM SEWER MANHOLE	EACH
05476	60-INCH STORM SEWER MANHOLE	EACH
05477	72-INCH STORM SEWER MANHOLE	EACH
05478	84-INCH STORM SEWER MANHOLE	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
05479	96-INCH STORM SEWER MANHOLE	EACH
05485	2'X3' STORM INLET	EACH
05486	2'X6' STORM INLET	EACH
05490	FIELD INLET	EACH
05492	CURB OUTLET STRUCTURE	EACH
05495	CAST-IN-PLACE (CIP) STORM SEWER CHAMBER	LS
05503	PVC STORM SEWER SUMP LATERAL PIPE	LF
05504	4 INCH PVC STORM SEWER PIPE	LF
05506	6 INCH PVC STORM SEWER PIPE	LF
05508	8 INCH RCP STORM SEWER PIPE	LF
05509	8 INCH PVC STORM SEWER PIPE	LF
05510	10 INCH RCP STORM SEWER PIPE	LF
05511	10 INCH PVC STORM SEWER PIPE	LF
05512	12 INCH RCP STORM SEWER PIPE	LF
05513	12 INCH PVC STORM SEWER PIPE	LF
05515	15 INCH RCP STORM SEWER PIPE	LF
05516	15 INCH PVC STORM SEWER PIPE	LF
05518	18 INCH RCP STORM SEWER PIPE	LF
05519	18 INCH PVC STORM SEWER PIPE	LF
05521	21 INCH RCP STORM SEWER PIPE	LF
05522	21 INCH PVC STORM SEWER PIPE	LF
05524	24 INCH RCP STORM SEWER PIPE	LF
05525	24 INCH PVC STORM SEWER PIPE	LF
05527	27 INCH RCP STORM SEWER PIPE	LF
05528	27 INCH PVC STORM SEWER PIPE	LF
05530	30 INCH RCP STORM SEWER PIPE	LF
05531	30 INCH PVC STORM SEWER PIPE	LF
05533	33 INCH RCP STORM SEWER PIPE	LF
05534	33 INCH PVC STORM SEWER PIPE	LF
05536	36 INCH RCP STORM SEWER PIPE	LF
05537	36 INCH PVC STORM SEWER PIPE	LF
05542	42 INCH RCP STORM SEWER PIPE	LF
05543	42 INCH PVC STORM SEWER PIPE	LF
05548	48 INCH RCP STORM SEWER PIPE	LF
05549	48 INCH PVC STORM SEWER PIPE	LF
05560	60 INCH RCP STORM SEWER PIPE	LF
05561	60 INCH PVC STORM SEWER PIPE	LF
05572	72 INCH RCP STORM SEWER PIPE	LF
05584	84 INCH RCP STORM SEWER PIPE	LF
05590	STORM SEWER INLET REPAIR	VF
05595	STORM SEWER MANHOLE REPAIR	VF
05601	FLARED END SECTION TRASH RACK	EACH
05612	12 INCH RCP STORM SEWER FLARED END SECTION	EACH
05615	15 INCH RCP STORM SEWER FLARED END SECTION	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
05618	18 INCH RCP STORM SEWER FLARED END SECTION	EACH
05621	21 INCH RCP STORM SEWER FLARED END SECTION	EACH
05624	24 INCH RCP STORM SEWER FLARED END SECTION	EACH
05627	27 INCH RCP STORM SEWER FLARED END SECTION	EACH
05630	30 INCH RCP STORM SEWER FLARED END SECTION	EACH
05633	33 INCH RCP STORM SEWER FLARED END SECTION	EACH
05636	36 INCH RCP STORM SEWER FLARED END SECTION	EACH
05642	42 INCH RCP STORM SEWER FLARED END SECTION	EACH
05648	48 INCH RCP STORM SEWER FLARED END SECTION	EACH
05660	60 INCH RCP STORM SEWER FLARED END SECTION	EACH
05672	72 INCH RCP STORM SEWER FLARED END SECTION	EACH
05684	84 INCH RCP STORM SEWER FLARED END SECTION	EACH
05714	14 INCH X 23 INCH TYPE I HERCP STORM SEWER PIPE	LF
05719	19 INCH X 30 INCH TYPE I HERCP STORM SEWER PIPE	LF
05724	24 INCH X 38 INCH TYPE I HERCP STORM SEWER PIPE	LF
05729	29 INCH X 45 INCH TYPE I HERCP STORM SEWER PIPE	LF
05734	34 INCH X 53 INCH TYPE I HERCP STORM SEWER PIPE	LF
05738	38 INCH X 60 INCH TYPE I HERCP STORM SEWER PIPE	LF
05743	43 INCH X 68 INCH TYPE I HERCP STORM SEWER PIPE	LF
05748	48 INCH X 76 INCH TYPE I HERCP STORM SEWER PIPE	LF
05753	53 INCH X 83 INCH TYPE I HERCP STORM SEWER PIPE	LF
05758	58 INCH X 91 INCH TYPE I HERCP STORM SEWER PIPE	LF
05763	63 INCH X 98 INCH TYPE I HERCP STORM SEWER PIPE	LF
05768	68 INCH X 106 INCH TYPE I HERCP STORM SEWER PIPE	LF
05772	72 INCH X 113 INCH TYPE I HERCP STORM SEWER PIPE	LF
05777	77 INCH X 123 INCH TYPE I HERCP STORM SEWER PIPE	LF
05812	12 INCH TYPE IV DRIVEWAY CULVERT STORM SEWER PIPE	LF
05815	15 INCH TYPE IV DRIVEWAY CULVERT STORM SEWER PIPE	LF
05818	18 INCH TYPE IV DRIVEWAY CULVERT STORM SEWER PIPE	LF
05821	21 INCH TYPE IV DRIVEWAY CULVERT STORM SEWER PIPE	LF
05824	24 INCH TYPE IV DRIVEWAY CULVERT STORM SEWER PIPE	LF
05850	CONCRETE COLLAR	EACH
05875	BOX CULVERTS	LF
05880	BOX CULVERT WINGWALLS	EACH
05881	BOX CULVERT END SECTION W/ TRASHRACK	EACH
05901	LIGHT RIPRAP	CY
05902	MEDIUM RIPRAP	CY
05903	HEAVY RIPRAP	CY
05904	EXTRA HEAVY RIPRAP	CY
05905	RIPRAP FILTER FABRIC, TYPE HR	SY
05951	SANITARY SEWER CLEANING AND TELEVISIONING - PREPAVING	LF
05952	SANITARY SEWER LATERAL TELEVISIONING - PREPAVING	EACH
05955	STORM SEWER CLEANING AND TELEVISIONING - PREPAVING	LF
05956	STORM SEWER LATERAL TELEVISIONING - PREPAVING	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
05990	(RESERVED FOR SPECIAL PROVISIONS)	
05991	(RESERVED FOR SPECIAL PROVISIONS)	
05992	(RESERVED FOR SPECIAL PROVISIONS)	
05993	(RESERVED FOR SPECIAL PROVISIONS)	
05994	(RESERVED FOR SPECIAL PROVISIONS)	
05995	(RESERVED FOR SPECIAL PROVISIONS)	
05996	(RESERVED FOR SPECIAL PROVISIONS)	
05997	(RESERVED FOR SPECIAL PROVISIONS)	
05998	(RESERVED FOR SPECIAL PROVISIONS)	
05999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
06000	CONCRETE & CONCRETE STRUCTURES	
06100	EXTRA BAGS OF CEMENT	EA
06500	TYPE A SLURRY	CY
06502	LOW STRENGTH CONCRETE	CY
06990	(RESERVED FOR SPECIAL PROVISIONS)	
06991	(RESERVED FOR SPECIAL PROVISIONS)	
06992	(RESERVED FOR SPECIAL PROVISIONS)	
06993	(RESERVED FOR SPECIAL PROVISIONS)	
06994	(RESERVED FOR SPECIAL PROVISIONS)	
06995	(RESERVED FOR SPECIAL PROVISIONS)	
06996	(RESERVED FOR SPECIAL PROVISIONS)	
06997	(RESERVED FOR SPECIAL PROVISIONS)	
06998	(RESERVED FOR SPECIAL PROVISIONS)	
06999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
07000	CONCRETE PAVEMENT	
07001	CONCRETE PAVEMENT REMOVAL & REPLACEMENT	SY
07002	CONCRETE CURB AND GUTTER REMOVAL & REPLACEMENT	LF
07003	CONCRETE SIDEWALK REMOVAL & REPLACEMENT	SF
07008	8-INCH CONCRETE PAVEMENT	SY
07009	9-INCH CONCRETE PAVEMENT	SY
07010	10-INCH CONCRETE PAVEMENT	SY
07012	12-INCH CONCRETE PAVEMENT	SY
07050	FULL WIDTH GRINDING	SY
07051	SPOT GRINDING	SY
07055	X-INCH DEPTH MILLING	SY
07108	8-INCH DOWELED CONCRETE PAVEMENT	SY
07109	9-INCH DOWELED CONCRETE PAVEMENT	SY
07110	10-INCH DOWELED CONCRETE PAVEMENT	SY
07112	12-INCH DOWELED CONCRETE PAVEMENT	SY
07118	18" TYPE A CONCRETE CURB & GUTTER	LF
07119	18" TYPE B CONCRETE CURB & GUTTER	LF
07130	30" TYPE A CONCRETE CURB & GUTTER	LF
07131	30" TYPE B CONCRETE CURB & GUTTER	LF
07132	30" TYPE 30G COMBINATION CONCRETE CURB & GUTTER, WDOT 601.0413	LF
07150	18" CONCRETE MOUNTABLE MEDIAN ISLAND NOSE	SF
07151	30" CONCRETE MOUNTABLE MEDIAN ISLAND NOSE	SF
07200	DRILLED TIE BARS	EA
07208	8-INCH CONCRETE PAVEMENT PATCHING	SY
07209	9-INCH CONCRETE PAVEMENT PATCHING	SY
07258	8-INCH CONCRETE PAVEMENT PATCHING W/ HMA OVERLAY	SY
07259	9-INCH CONCRETE PAVEMENT PATCHING W/ HMA OVERLAY	SY
07300	COMMERCIAL DRIVE OPENING	SF
07301	CURB RAMP DETECTABLE WARNING FIELDS	SF
07302	PEDESTRIAN CURB	LF
07303	3-INCH CONCRETE SIDEWALK	SF
07304	4-INCH CONCRETE SIDEWALK	SF
07306	6-INCH CONCRETE SIDEWALK & DRIVE	SF
07307	7-INCH CONCRETE SIDEWALK & DRIVE	SF
07310	4-INCH CONCRETE BUS PAD	SF
07316	6-INCH CONCRETE SIDEWALK	SF
07317	7-INCH CONCRETE SIDEWALK	SF
07326	6-INCH CONCRETE DRIVE APPROACH	SF
07327	7-INCH CONCRETE DRIVE APPROACH	SF
07350	CONCRETE STEPS	SF
07354	4-INCH STAMPED, COLORED CONCRETE SIDEWALK, WDOT SPV0165.02	SF
07355	4-INCH STAMPED, COLORED CONCRETE, MEDIAN	SF
07360	4-INCH CONCRETE MEDIAN	SF

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
07500	SPECIAL WATERWAY FLUME	SF
07505	CONCRETE CURB OPENING FLUME (WDOT XXXX.XXX)	EA
07600	CONCRETE SPEED BUMP	EA
07700	CONCRETE ROADWAY SMOOTHNESS PROFILING	LF
07990	(RESERVED FOR SPECIAL PROVISIONS)	
07991	(RESERVED FOR SPECIAL PROVISIONS)	
07992	(RESERVED FOR SPECIAL PROVISIONS)	
07993	(RESERVED FOR SPECIAL PROVISIONS)	
07994	(RESERVED FOR SPECIAL PROVISIONS)	
07995	(RESERVED FOR SPECIAL PROVISIONS)	
07996	(RESERVED FOR SPECIAL PROVISIONS)	
07997	(RESERVED FOR SPECIAL PROVISIONS)	
07998	(RESERVED FOR SPECIAL PROVISIONS)	
07999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
08000	HMA PAVEMENT	
08010	MILL EXISTING ASPHALT ROADWAY	SY
08012	MILL EXISTING ASPHALT ROADWAY - 2"	SY
08014	MILL EXISTING ASPHALT ROADWAY - 4"	SY
08020	FOUNDATION PREPARATION OF MILLED PAVEMENT	SY
08050	UTILITY TRENCH PATCH - TEMPORARY	SY
08052	HMA PAVEMENT 2" TEMPORARY PATCHING	SY
08054	HMA PAVEMENT 4" TEMPORARY PATCHING	SY
08065	HMA PAVEMENT PATCHING	SY
08103	HMA PAVEMENT TYPE 3MT5828H	TON
08104	HMA PAVEMENT TYPE 4MT5828H	TON
08105	HMA PAVEMENT TYPE 5MT5828H	TON
08120	HMA PAVEMENT 5" TRANSITION	SY
08203	HMA PAVEMENT TYPE 3LT5828S	TON
08204	HMA PAVEMENT TYPE 4LT5828S	TON
08205	HMA PAVEMENT TYPE 5LT5828S	TON
08206	HMA PAVEMENT TYPE 3LT5828H	TON
08207	HMA PAVEMENT TYPE 4LT5828H	TON
08208	HMA PAVEMENT TYPE 5LT5828H	TON
08210	HMA DRIVE & TERRACE, TYPE 4LT5828S	TON
08215	HMA WALK & BIKEPATH, TYPE 4LT5828S	TON
08225	ASPHALT CURB	TON
08300	INFRARED SEAMLESS PATCHING	SF
08400	PAVEMENT CRACK SEALING	LF
08401	PAVEMENT CRACK SEALING	TON
08450	PAVEMENT REPAIR MEMBRANE	LF
08451	PAVEMENT REPAIR MEMBRANE	SF
08500	SPRAY PATCHING	SY
08550	SEAL COAT	GAL
08600	CHIP SEAL	SY
08675	HMA BLEND AREA PAVEMENT	SY
08700	HMA ROADWAY SMOOTHNESS PROFILING	LF
08990	(RESERVED FOR SPECIAL PROVISIONS)	
08991	(RESERVED FOR SPECIAL PROVISIONS)	
08992	(RESERVED FOR SPECIAL PROVISIONS)	
08993	(RESERVED FOR SPECIAL PROVISIONS)	
08994	(RESERVED FOR SPECIAL PROVISIONS)	
08995	(RESERVED FOR SPECIAL PROVISIONS)	
08996	(RESERVED FOR SPECIAL PROVISIONS)	
08997	(RESERVED FOR SPECIAL PROVISIONS)	
08998	(RESERVED FOR SPECIAL PROVISIONS)	
08999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
09000	BRIDGES	
09005	SELF-CONTAINED DECK SURFACE CLEANING	SF
09010	PROTECTIVE DECK SURFACE TREATMENT	SF
09015	PIGMENTED SURFACE SEALER	SF
09025	CONCRETE JOINT EPOXY SEALING	LF
09050	CONCRETE CURB AND GUTTER TYPE I REPAIR	SF
09051	CONCRETE CURB AND GUTTER TYPE II REPAIR	SF
09070	APPROACH SLAB TYPE I REPAIR	SF
09071	APPROACH SLAB TYPE II REPAIR	SF
09075	APPROACH SLAB REMOVE AND REPLACE	SF
09080	DECK SIDEWALK TYPE I REPAIR	SF
09081	DECK SIDEWALK TYPE II REPAIR	SF
09100	2 LAYER POLYMER OVERLAY	SF
09110	POLYMER OVERLAY	SF
09200	CONCRETE DECK OVERLAY	SF
09205	SAWING PAVEMENT DECK PREPARATION AREA	LF
09210	CONCRETE DECK PATCHING	SF
09251	CONCRETE DECK TYPE I REPAIR	SF
09252	CONCRETE DECK TYPE II REPAIR	SF
09253	CONCRETE DECK - FULL DEPTH REPAIR	SF
09300	CONCRETE CHAMFER REPAIR	LF
09500	RAILING CLEANING	LF
09501	RAILING REPAIR	LF
09502	RAILING PAINTING	LF
09510	PARAPET CLEANING	LF
09535	BOLLARD REPAIR / REPLACEMENT	EACH
09550	LANNON STONE WALL TUCKPOINTING	LS
09990	(RESERVED FOR SPECIAL PROVISIONS)	
09991	(RESERVED FOR SPECIAL PROVISIONS)	
09992	(RESERVED FOR SPECIAL PROVISIONS)	
09993	(RESERVED FOR SPECIAL PROVISIONS)	
09994	(RESERVED FOR SPECIAL PROVISIONS)	
09995	(RESERVED FOR SPECIAL PROVISIONS)	
09996	(RESERVED FOR SPECIAL PROVISIONS)	
09997	(RESERVED FOR SPECIAL PROVISIONS)	
09998	(RESERVED FOR SPECIAL PROVISIONS)	
09999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
10000	TRAFFIC SIGNALS	
10001	VERIFY EXISTING UNDERGROUND SIGNAL EQUIPMENT, WDOT SPV.0105.03	LS
10002	REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT	LS
10005	REMOVE, STORE AND RE-INSTALL EXISTING TRAFFIC SIGNALS	LS
10012	CONDUIT RIGID NONMETALLIC SCHEDULE 40 2-INCH. WDOT 652.0225	LF
10013	CONDUIT RIGID NONMETALLIC SCHEDULE 40 3-INCH. WDOT 652.0235	LF
10022	CONDUIT SPECIAL 2-INCH, WDOT 652.0605	LF
10023	CONDUIT SPECIAL 3-INCH, WDOT 652.0615	LF
10025	PULL BOXES STEEL 24x36-INCH, WDOT 653.0135	EACH
10026	PULL BOXES STEEL 24x42-INCH, WDOT 653.0140	EACH
10031	CONCRETE BASE - TYPE 1, WDOT 654.0101	EACH
10032	CONCRETE BASE - TYPE 2, WDOT 654.0102	EACH
10035	CONCRETE BASE - TYPE 5, WDOT 654.0105	EACH
10040	CONCRETE BASE - TYPE 10, WDOT 654.0110	EACH
10043	CONCRETE BASE - TYPE 13, WDOT 654.0113	EACH
10049	CONCRETE CONTROL CABINET BASE, TYPE 9, WDOT 654.0215	EACH
10050	CONCRETE CONTROL CABINET BASE, TYPE 9 SPECIAL, WDOT 654.0217	EACH
10065	CABLE TRAFFIC SIGNAL 5-14 AWG, WDOT 655.0230	LF
10067	CABLE TRAFFIC SIGNAL 7-14 AWG, WDOT 655.0240	LF
10072	CABLE TRAFFIC SIGNAL 12-14 AWG, WDOT 655.0260	LF
10081	CABLE TRAFFIC SIGNAL 21-14 AWG, WDOT 655.0290	LF
10090	CABLE TYPE UF 2-10 AWG GROUNDED, WDOT 655.0320	LF
10110	ELECTRICAL WIRE TRAFFIC SIGNAL 10 AWG, WDOT 655.0515	LF
10115	ELECTRICAL WIRE LIGHTING AWG 10. WDOT 655.0615	LF
10120	TRAFFIC SIGNAL EVP DETECTOR CABLE, WDOT 655.0900	LF
10140	ELECTRICAL SERVICE METER BREAKER PEDESTAL, WDOT 655.0200.01	LS
10141	PEDESTAL BASES, WDOT 657.0100	EACH
10145	TRANSFORMER BASE, BREAKAWAY 11-1/2-INCH BOLT CIRCLE, WDOT 657.0255	EACH
10150	TRAFFIC SIGNAL CONTROLLER AND CABINET, 8-PHASE FULLY ACTUATED	EACH
10152	POLES, TYPE 2, WDOT 657.0305	EACH
10153	POLES, TYPE 3, WDOT 657.0310	EACH
10154	POLES, TYPE 4, WDOT 657.0315	EACH
10155	POLES, TYPE 5 - ALUMINUM, WDOT 657.0322	EACH
10159	POLES, TYPE 9, WDOT SPV.0060.01	EACH
10160	POLES, TYPE 9, WDOT SPV.0060.02	EACH
10163	TRAFFIC SIGNAL STANDARDS, ALUMINUM, 13-FT, WDOT 657.0420	EACH
10165	TRAFFIC SIGNAL STANDARDS, ALUMINUM, 15-FT, WDOT 657.0425	EACH
10170	TRAFFIC SIGNAL STANDARDS, ALUMINUM, 10-FT, WDOT 657.0430	EACH
10206	LUMINAIRE ARM SINGLE MEMBER 4-IN CLAMP, 6-FT, WDOT 657.0609	EACH
10207	LUMINAIRE ARM SINGLE MEMBER 4-1/2 IN CLAMP, 6-FT, WDOT 657.0610	EACH
10258	LUMINAIRE ARM SINGLE MEMBER 4-IN CLAMP, 8-FT, WDOT 657.0614	EACH
10259	LUMINAIRE ARM SINGLE MEMBER 4-1/2 IN CLAMP, 8-FT, WDOT 657.0615	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
10312	LUMINAIRE ARM TRUSS TYPE 4-IN CLAMP 12-FT, WDOT 657.0709	EACH
10313	LUMINAIRE ARM TRUSS TYPE 4-1/2 IN CLAMP, 12-FT, WDOT 657.0710	EACH
10315	LUMINAIRE ARM TRUSS TYPE 4-IN CLAMP 15-FT, WDOT 657.0714	EACH
10316	LUMINAIRE ARM TRUSS TYPE 4-1/2 IN CLAMP, 15-FT, WDOT 657.0715	EACH
10415	TROMBONE ARM, 15-FT, WDOT 657.0585	EACH
10420	TROMBONE ARM, 20-FT, WDOT 657.0590	EACH
10425	TROMBONE ARM, 25-FT, WDOT 657.0595	EACH
10509	MONOTUBE POLES, TYPE 9	EACH
10510	MONOTUBE POLES, TYPE 10	EACH
10512	MONOTUBE POLES, TYPE 12	EACH
10513	MONOTUBE POLES, TYPE 13	EACH
10525	MONOTUBE ARM, 25-FT	EACH
10530	MONOTUBE ARM, 30-FT	EACH
10535	MONOTUBE ARM, 35-FT	EACH
10540	MONOTUBE ARM, 40-FT	EACH
10545	MONOTUBE ARM, 45-FT	EACH
10550	MONOTUBE ARM, 50-FT	EACH
10555	MONOTUBE ARM, 55-FT	EACH
10578	LUMINAIRE ARMS STEEL, 8-FT	EACH
10580	LUMINAIRE ARMS STEEL, 10-FT	EACH
10582	LUMINAIRE ARMS STEEL, 12-FT	EACH
10600	TRAFFIC SIGNAL FACE 1S 8-INCH, WDOT 658.0170	EACH
10601	TRAFFIC SIGNAL FACE 1S 12-INCH, WDOT 658.0171	EACH
10602	TRAFFIC SIGNAL FACE 2S 12- INCH, WDOT 658.0172	EACH
10603	TRAFFIC SIGNAL FACE 3S 12-INCH, WDOT 658.0173	EACH
10604	TRAFFIC SIGNAL FACE 4S 12-INCH, WDOT 658.0174	EACH
10605	TRAFFIC SIGNAL FACE 5S 12-INCH, WDOT 658.0175	EACH
10613	BACKPLATE SIGNAL FACE 3 SECTION 12-IN, WDOT 658.0215	EACH
10614	BACKPLATE SIGNAL FACE 4 SECTION 12-IN, WDOT 658.0220	EACH
10615	BACKPLATE SIGNAL FACE 5 SECTION 12-IN, WDOT 658.0225	EACH
10700	LED MODULES 12-IN RED BALL, WDOT 658.0600	EACH
10701	LED MODULES 12-IN YELLOW BALL, WDOT 658.0605	EACH
10702	LED MODULES 12-IN GREEN BALL, WDOT 658.0610	EACH
10703	LED MODULE 12-IN RED ARROW, WDOT 658.0615	EACH
10721	LED MODULE 12-IN YELLOW ARROW, WDOT 658.0620	EACH
10722	LED MODULE 12-IN GREEN ARROW, WDOT 658.0625	EACH
10730	LED MODULE PEDESTRIAN COUNTDOWN TIMER, 16-IN, WDOT 658.0635	EACH
10731	PEDESTRIAN SIGNAL FACE 16-IN, WDOT 658.0416	EACH
10735	AUDIBLE PEDESTRIAN PUSH BUTTON SYSTEM	LS
10800	SIGNAL MOUNTING HARDWARE, WDOT 658.5069.01	LS
10875	FURNISH AND INSTALL LED LUMINAIRE	EACH
10900	EMERGENCY VEHICLE PREEMPTION SYSTEM	LS
10950	VIDEO VEHICLE DETECTION SYSTEM	LS
10990	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
10991	(RESERVED FOR SPECIAL PROVISIONS)	
10992	(RESERVED FOR SPECIAL PROVISIONS)	
10993	(RESERVED FOR SPECIAL PROVISIONS)	
10994	(RESERVED FOR SPECIAL PROVISIONS)	
10995	(RESERVED FOR SPECIAL PROVISIONS)	
10996	(RESERVED FOR SPECIAL PROVISIONS)	
10997	(RESERVED FOR SPECIAL PROVISIONS)	
10998	(RESERVED FOR SPECIAL PROVISIONS)	
10999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
11000	STREET LIGHTING & COMMUNICATIONS	
11001	CONCRETE BASE - TYPE 1, WDOT 654.0101	EACH
11002	CONCRETE BASE - TYPE 2, WDOT 654.0102	EACH
11005	CONCRETE BASE - TYPE 5, WDOT 654.0105	EACH
11007	CONCRETE BASE - TYPE 7, WDOT 654.0107	EACH
11010	CONCRETE BASE - TYPE 10, WDOT 654.0110	EACH
11012	CONCRETE BASE - TYPE POST TOP	EACH
11015	CONCRETE CABINET BASE - TYPE L24, WDOT 654.0224	EACH
11016	CONCRETE CABINET BASE - TYPE L30, WDOT 654.0230	EACH
11020	METER PEDESTAL - MAIN LUG 480 VOLT	LS
11025	PULL BOX - 15-INCH PVC	EACH
11026	PULL BOX - 24-INCH STEEL, WDOT 653.0140	EACH
11030	CONCRETE BASE - POST TOP	EACH
11050	TRANSFORMER BASE - BREAKAWAY, 12-INCH BOLT CIRCLE	EACH
11051	TRANSFORMER BASE - BREAKAWAY, 15-1/2 -INCH BOLT CIRCLE	EACH
11101	CONDUIT 2-INCH HDPE (EXCAVATED)	LF
11102	CONDUIT 2-INCH HDPE SPECIAL (BORED)	LF
11105	CONDUIT RIGID NONMETALLIC SCH 40, 2-INCH, WDOT 652.0225	LF
11106	CONDUIT RIGID NONMETALLIC SCH 40, 3-INCH, WDOT 652.0225	LF
11110	CONDUIT 2-INCH PVC HDPE	LF
11111	CONDUIT 2-INCH PVC SPECIAL	LF
11112	CONDUIT 3-INCH HDPE	LF
11113	CONDUIT 3-INCH HDPE SPECIAL	LF
11114	CONDUIT 3-INCH STEEL	LF
11115	CONDUIT 3-INCH STEEL SPECIAL	LF
11120	12/2 UF W/GROUND WIRE	LF
11122	#12 XLP USE WIRE	LF
11123	#10 XLP USE WIRE	LF
11124	#8 XLP USE WIRE	LF
11125	#6 XLP USE WIRE	LF
11126	#4 XLP USE WIRE	LF
11127	#2 XLP USE WIRE	LF
11201	REMOVE AND DISPOSE OF EXISTING WIRE AND ABANDON CONDUIT IN PLACE	LS
11202	REMOVE AND DISPOSE OF EXISTING CONCRETE BASE	EACH
11203	REMOVE AND DISPOSE OF EXISTING PULL BOX	EACH
11210	REMOVE AND DISPOSE OF EXISTING STREET LIGHT CONTROLLER, INCLUDES SERVICE	EACH
11300	INSTALL NEW METER PEDESTAL	EACH
11301	INSTALL NEW TYPE L CONCRETE CONTROLLER PAD	EACH
11305	INSTALL NEW STREET LIGHT CONTROLLER	EACH
11401	REMOVE AND SALVAGE EXISTING STREET LIGHT UNIT	EACH
11402	REMOVE AND DISPOSE OF EXISTING STREET LIGHT UNIT	EACH
11403	REMOVE AND REINSTALL EXISTING STREET LIGHT UNIT	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
11450	INSTALL CITY-FURNISHED STREET LIGHTING UNIT	EACH
11500	TEMPORARY STREET LIGHTING	LS
11505	TEMPORARY STREET LIGHTING OVERHEAD WIRING	LS
11600	INSTALL NEW QUAZITE VAULT - FIBER	EACH
11650	COMMUNICATION DUCT (SIZE AND TYPE)	LF
11655	COMMUNICATION PULL BOX (SIZE AND TYPE)	EACH
11990	(RESERVED FOR SPECIAL PROVISIONS)	
11991	(RESERVED FOR SPECIAL PROVISIONS)	
11992	(RESERVED FOR SPECIAL PROVISIONS)	
11993	(RESERVED FOR SPECIAL PROVISIONS)	
11994	(RESERVED FOR SPECIAL PROVISIONS)	
11995	(RESERVED FOR SPECIAL PROVISIONS)	
11996	(RESERVED FOR SPECIAL PROVISIONS)	
11997	(RESERVED FOR SPECIAL PROVISIONS)	
11998	(RESERVED FOR SPECIAL PROVISIONS)	
11999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
12000	PAVEMENT MARKINGS	
12001	PAVEMENT MARKING REMOVAL, 4-INCH	LF
12002	PAVEMENT MARKING REMOVAL, 6-INCH	LF
12003	PAVEMENT MARKING REMOVAL, 8-INCH	LF
12004	PAVEMENT MARKING REMOVAL, 12-INCH	LF
12005	PAVEMENT MARKING REMOVAL, 18-INCH	LF
12006	PAVEMENT MARKING REMOVAL, 24-INCH	LF
12010	PAVEMENT MARKING REMOVAL, 4" DOUBLE LINE	LF
12015	PAVEMENT MARKING REMOVAL, SYMBOL, ARROW	EACH
12016	PAVEMENT MARKING REMOVAL, SYMBOL, WORD	EACH
12057	PAVEMENT MARKING REMOVAL, SYMBOL, BIKE SHARROW	EACH
12058	PAVEMENT MARKING REMOVAL, SYMBOL, BIKE LANE	EACH
12059	PAVEMENT MARKING REMOVAL, SYMBOL, BIKE STRAIGHT ARROW	EACH
12075	PAVEMENT MARKING REMOVAL, SYMBOL, RAILROAD CROSSING	EACH
12076	PAVEMENT MARKING REMOVAL, SYMBOL, DIAMOND	EACH
12101	PAVEMENT MARKING PAINT, LINE, 4-INCH	LF
12102	PAVEMENT MARKING PAINT, DOUBLE LINE, 4-INCH	LF
12103	PAVEMENT MARKING PAINT, LINE, 6-INCH	LF
12104	PAVEMENT MARKING PAINT, LINE, 8-INCH	LF
12105	PAVEMENT MARKING PAINT, LINE, 12-INCH	LF
12110	PAVEMENT MARKING PAINT, RADIUS LINE, 4-INCH (5' LINE, 5' GAP)	LF
12111	PAVEMENT MARKING PAINT, RADIUS LINE, 6-INCH (5' LINE, 5' GAP)	LF
12112	PAVEMENT MARKING PAINT, RADIUS LINE, 8-INCH (5' LINE, 5' GAP)	LF
12115	PAVEMENT MARKING PAINT, DIAGONAL LINE, 4-INCH	LF
12116	PAVEMENT MARKING PAINT, DIAGONAL LINE, 6-INCH	LF
12117	PAVEMENT MARKING PAINT, DIAGONAL LINE, 8-INCH	LF
12118	PAVEMENT MARKING PAINT, DIAGONAL LINE, 12-INCH	LF
12120	PAVEMENT MARKING PAINT, CROSSWALK, 6-INCH	LF
12121	PAVEMENT MARKING PAINT, CROSSWALK, 8-INCH	LF
12122	PAVEMENT MARKING PAINT, CROSSWALK, 12-INCH	LF
12123	PAVEMENT MARKING PAINT, CROSSWALK, 18-INCH	LF
12125	PAVEMENT MARKING PAINT, CURB	LF
12130	PAVEMENT MARKING PAINT, CONTINENTAL CROSSWALK, 18-INCH	LF
12140	PAVEMENT MARKING PAINT, ROUNDABOUT EDGE LINE, 18-INCH	LF
12150	PAVEMENT MARKING PAINT, STOP LINE, 18-INCH	LF
12155	PAVEMENT MARKING PAINT, MEDIAN NOSE	SF
12156	PAVEMENT MARKING PAINT, PARKING STALL	LF
12157	PAVEMENT MARKING PAINT, SYMBOL, BIKE SHARROW	EACH
12158	PAVEMENT MARKING PAINT, SYMBOL, BIKE LANE	EACH
12159	PAVEMENT MARKING PAINT, SYMBOL, BIKE STRAIGHT ARROW	EACH
12160	PAVEMENT MARKING PAINT, SYMBOL, BIKE LEFT ARROW	EACH
12161	PAVEMENT MARKING PAINT, SYMBOL, BIKE LANE & STRAIGHT ARROW	EACH
12162	PAVEMENT MARKING PAINT, SYMBOL, BIKE LANE & LEFT ARROW	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
12163	PAVEMENT MARKING PAINT, SYMBOL, LEFT ARROW	EACH
12164	PAVEMENT MARKING PAINT, SYMBOL, RIGHT ARROW	EACH
12165	PAVEMENT MARKING PAINT, SYMBOL, STRAIGHT ARROW	EACH
12166	PAVEMENT MARKING PAINT, SYMBOL, STRAIGHT & LEFT ARROW	EACH
12167	PAVEMENT MARKING PAINT, SYMBOL, STRAIGHT & RIGHT ARROW	EACH
12170	PAVEMENT MARKING PAINT, WORD, ONLY	EACH
12175	PAVEMENT MARKING PAINT, SYMBOL, RAILROAD CROSSING	EACH
12176	PAVEMENT MARKING PAINT, SYMBOL, DIAMOND	EACH
12201	PAVEMENT MARKING EPOXY, LINE, 4-INCH	LF
12202	PAVEMENT MARKING EPOXY, DOUBLE LINE, 4-INCH	LF
12203	PAVEMENT MARKING EPOXY, LINE, 6-INCH	LF
12204	PAVEMENT MARKING EPOXY, LINE, 8-INCH	LF
12205	PAVEMENT MARKING EPOXY, LINE, 12-INCH	LF
12210	PAVEMENT MARKING EPOXY, RADIUS LINE, 4-INCH (5' LINE, 5' GAP)	LF
12211	PAVEMENT MARKING EPOXY, RADIUS LINE, 6-INCH (5' LINE, 5' GAP)	LF
12212	PAVEMENT MARKING EPOXY, RADIUS LINE, 8-INCH (5' LINE, 5' GAP)	LF
12215	PAVEMENT MARKING EPOXY, DIAGONAL LINE, 4-INCH	LF
12216	PAVEMENT MARKING EPOXY, DIAGONAL LINE, 6-INCH	LF
12217	PAVEMENT MARKING EPOXY, DIAGONAL LINE, 8-INCH	LF
12218	PAVEMENT MARKING EPOXY, DIAGONAL LINE, 12-INCH	LF
12220	PAVEMENT MARKING EPOXY, CROSSWALK, 6-INCH	LF
12221	PAVEMENT MARKING EPOXY, CROSSWALK, 8-INCH	LF
12222	PAVEMENT MARKING EPOXY, CROSSWALK, 12-INCH	LF
12223	PAVEMENT MARKING EPOXY, CROSSWALK, 18-INCH	LF
12225	PAVEMENT MARKING EPOXY, CURB	LF
12230	PAVEMENT MARKING EPOXY, CONTINENTAL CROSSWALK, 18-INCH	LF
12240	PAVEMENT MARKING EPOXY, ROUNDABOUT EDGE LINE, 18-INCH	LF
12250	PAVEMENT MARKING EPOXY, STOP LINE, 18-INCH	LF
12255	PAVEMENT MARKING EPOXY, MEDIAN NOSE	SF
12256	PAVEMENT MARKING EPOXY, PARKING STALL	LF
12257	PAVEMENT MARKING EPOXY, SYMBOL, BIKE SHARROW	EACH
12258	PAVEMENT MARKING EPOXY, SYMBOL, BIKE LANE	EACH
12259	PAVEMENT MARKING EPOXY, SYMBOL, BIKE STRAIGHT ARROW	EACH
12260	PAVEMENT MARKING EPOXY, SYMBOL, BIKE LEFT ARROW	EACH
12261	PAVEMENT MARKING EPOXY, SYMBOL, BIKE LANE & STRAIGHT ARROW	EACH
12262	PAVEMENT MARKING EPOXY, SYMBOL, BIKE LANE & LEFT ARROW	EACH
12263	PAVEMENT MARKING EPOXY, SYMBOL, LEFT ARROW	EACH
12264	PAVEMENT MARKING EPOXY, SYMBOL, RIGHT ARROW	EACH
12265	PAVEMENT MARKING EPOXY, SYMBOL, STRAIGHT ARROW	EACH
12266	PAVEMENT MARKING EPOXY, SYMBOL, STRAIGHT & LEFT ARROW	EACH
12267	PAVEMENT MARKING EPOXY, SYMBOL, STRAIGHT & RIGHT ARROW	EACH
12270	PAVEMENT MARKING EPOXY, WORD, ONLY	EACH
12275	PAVEMENT MARKING EPOXY, SYMBOL, RAILROAD CROSSING	EACH
12276	PAVEMENT MARKING EPOXY, SYMBOL, DIAMOND	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
12501	TEMPORARY PAVEMENT MARKING PAINT, LINE, 4-INCH	LF
12502	TEMPORARY PAVEMENT MARKING PAINT, DOUBLE LINE, 4-INCH	LF
12503	TEMPORARY PAVEMENT MARKING PAINT, LINE, 6-INCH	LF
12504	TEMPORARY PAVEMENT MARKING PAINT, LINE, 8-INCH	LF
12505	TEMPORARY PAVEMENT MARKING PAINT, LINE, 12-INCH	LF
12510	TEMPORARY PAVEMENT MARKING PAINT, RADIUS LINE, 4-INCH (5' LINE, 5' GAP)	LF
12511	TEMPORARY PAVEMENT MARKING PAINT, RADIUS LINE, 6-INCH (5' LINE, 5' GAP)	LF
12512	TEMPORARY PAVEMENT MARKING PAINT, RADIUS LINE, 8-INCH (5' LINE, 5' GAP)	LF
12515	TEMPORARY PAVEMENT MARKING PAINT, DIAGONAL LINE, 4-INCH	LF
12516	TEMPORARY PAVEMENT MARKING PAINT, DIAGONAL LINE, 6-INCH	LF
12517	TEMPORARY PAVEMENT MARKING PAINT, DIAGONAL LINE, 8-INCH	LF
12518	TEMPORARY PAVEMENT MARKING PAINT, DIAGONAL LINE, 12-INCH	LF
12520	TEMPORARY PAVEMENT MARKING PAINT, CROSSWALK, 6-INCH	LF
12521	TEMPORARY PAVEMENT MARKING PAINT, CROSSWALK, 8-INCH	LF
12522	TEMPORARY PAVEMENT MARKING PAINT, CROSSWALK, 12-INCH	LF
12523	TEMPORARY PAVEMENT MARKING PAINT, STOP LINE, 24-INCH	LF
12557	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, BIKE SHARROW	EACH
12558	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, BIKE LANE	EACH
12559	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, BIKE STRAIGHT ARROW	EACH
12560	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, BIKE LEFT ARROW	EACH
12561	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, BIKE LANE & STRAIGHT ARROW	EACH
12562	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, BIKE LANE & LEFT ARROW	EACH
12563	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, LEFT ARROW	EACH
12564	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, RIGHT ARROW	EACH
12565	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, STRAIGHT ARROW	EACH
12566	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, STRAIGHT & LEFT ARROW	EACH
12567	TEMPORARY PAVEMENT MARKING PAINT, SYMBOL, STRAIGHT & RIGHT ARROW	EACH
12568	TEMPORARY PAVEMENT MARKING PAINT, WORD, ONLY	EACH
12601	TEMPORARY PAVEMENT MARKING EPOXY, LINE, 4-INCH	LF
12602	TEMPORARY PAVEMENT MARKING EPOXY, DOUBLE LINE, 4-INCH	LF
12603	TEMPORARY PAVEMENT MARKING EPOXY, LINE, 6-INCH	LF
12604	TEMPORARY PAVEMENT MARKING EPOXY, LINE, 8-INCH	LF
12605	TEMPORARY PAVEMENT MARKING EPOXY, LINE, 12-INCH	LF
12610	TEMPORARY PAVEMENT MARKING EPOXY, RADIUS LINE, 4-INCH (5' LINE, 5' GAP)	LF
12611	TEMPORARY PAVEMENT MARKING EPOXY, RADIUS LINE, 6-INCH (5' LINE, 5' GAP)	LF
12612	TEMPORARY PAVEMENT MARKING EPOXY, RADIUS LINE, 8-INCH (5' LINE, 5' GAP)	LF
12615	TEMPORARY PAVEMENT MARKING EPOXY, DIAGONAL LINE, 4-INCH	LF
12616	TEMPORARY PAVEMENT MARKING EPOXY, DIAGONAL LINE, 6-INCH	LF

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
12617	TEMPORARY PAVEMENT MARKING EPOXY, DIAGONAL LINE, 8-INCH	LF
12618	TEMPORARY PAVEMENT MARKING EPOXY, DIAGONAL LINE, 12-INCH	LF
12620	TEMPORARY PAVEMENT MARKING EPOXY, CROSSWALK, 6-INCH	LF
12621	TEMPORARY PAVEMENT MARKING EPOXY, CROSSWALK, 8-INCH	LF
12622	TEMPORARY PAVEMENT MARKING EPOXY, CROSSWALK, 12-INCH	LF
12623	TEMPORARY PAVEMENT MARKING EPOXY, STOP LINE, 24-INCH	LF
12657	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, BIKE SHARROW	EACH
12658	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, BIKE LANE	EACH
12659	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, BIKE STRAIGHT ARROW	EACH
12660	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, BIKE LEFT ARROW	EACH
12661	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, BIKE LANE & STRAIGHT ARROW	EACH
12662	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, BIKE LANE & LEFT ARROW	EACH
12663	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, LEFT ARROW	EACH
12664	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, RIGHT ARROW	EACH
12665	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, STRAIGHT ARROW	EACH
12666	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, STRAIGHT & LEFT ARROW	EACH
12667	TEMPORARY PAVEMENT MARKING EPOXY, SYMBOL, STRAIGHT & RIGHT ARROW	EACH
12668	TEMPORARY PAVEMENT MARKING EPOXY, WORD, ONLY	EACH
12701	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, LINE, 4-INCH	LF
12702	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, LINE, 6-INCH	LF
12703	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, LINE, 8-INCH	LF
12704	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, LINE, 12-INCH	LF
12705	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, LINE, 24-INCH	LF
12710	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, DOUBLE LINE, 4- INCH	LF
12801	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, LINE, 4- INCH	LF
12802	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, DOUBLE LINE, 4-INCH	LF
12803	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, LINE, 6- INCH	LF
12804	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, LINE, 8- INCH	LF
12805	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, LINE, 12-INCH	LF
12806	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, LINE, 24-INCH	LF
12857	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, BIKE SHARROW	EACH
12858	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, BIKE LANE	EACH
12859	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, BIKE STRAIGHT ARROW	EACH
12860	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, BIKE LEFT ARROW	EACH

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
12861	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, BIKE LANE & STRAIGHT ARROW	EACH
12862	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, BIKE LANE & LEFT ARROW	EACH
12863	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, LEFT ARROW	EACH
12864	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, RIGHT ARROW	EACH
12865	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, STRAIGHT ARROW	EACH
12866	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, STRAIGHT & LEFT ARROW	EACH
12867	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, SYMBOL, STRAIGHT & RIGHT ARROW	EACH
12868	TEMPORARY PAVEMENT MARKING TAPE, REMOVABLE, REFLECTIVE, WORD, ONLY	EACH
12990	(RESERVED FOR SPECIAL PROVISIONS)	
12991	(RESERVED FOR SPECIAL PROVISIONS)	
12992	(RESERVED FOR SPECIAL PROVISIONS)	
12993	(RESERVED FOR SPECIAL PROVISIONS)	
12994	(RESERVED FOR SPECIAL PROVISIONS)	
12995	(RESERVED FOR SPECIAL PROVISIONS)	
12996	(RESERVED FOR SPECIAL PROVISIONS)	
12997	(RESERVED FOR SPECIAL PROVISIONS)	
12998	(RESERVED FOR SPECIAL PROVISIONS)	
12999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
13000	SIGNAGE	
13001	REMOVE SIGNS AND POSTS	EACH
13002	REMOVE SIGN	EACH
13003	REMOVE POSTS	EACH
13005	REMOVE, STORE AND RE-INSTALL SIGNS & POSTS	EACH
13006	REMOVE, STORE AND RE-INSTALL SIGNS W/ NEW POSTS	EACH
13020	SIGN POST, 2-3/8-INCH ROUND	EACH
13021	SIGN	EACH
13022	SIGN	SF
13030	SIGN, REFLECTIVE TYPE II	EACH
13031	SIGN, REFLECTIVE TYPE II	SF
13300	MOVE SIGN	EACH
13301	MOVE SIGN POSTS	EACH
13990	(RESERVED FOR SPECIAL PROVISIONS)	
13991	(RESERVED FOR SPECIAL PROVISIONS)	
13992	(RESERVED FOR SPECIAL PROVISIONS)	
13993	(RESERVED FOR SPECIAL PROVISIONS)	
13994	(RESERVED FOR SPECIAL PROVISIONS)	
13995	(RESERVED FOR SPECIAL PROVISIONS)	
13996	(RESERVED FOR SPECIAL PROVISIONS)	
13997	(RESERVED FOR SPECIAL PROVISIONS)	
13998	(RESERVED FOR SPECIAL PROVISIONS)	
13999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
14000	SITE IMPROVEMENTS & RESTORATION	
14001	TOPSOIL	SY
14002	TOPSOIL, FERTILIZER, SEED & MULCH	SY
14003	TOPSOIL, FERTILIZER, SEED & EROSION MAT	SY
14005	TOPSOIL & SOD	SY
14010	TEMPORARY STABILIZATION	LS
14015	PERMANENT SEEDING	SY
14020	DETENTION BASIN SEEDING	SY
14022	INFILTRATION BASIN SEEDING	SY
14025	TALL GRASS PRAIRIE SEEDING	SY
14026	PRAIRIE WILDFLOWER SEEDING	SY
14027	NO-MOW SEEDING & EROSION MAT	SY
14040	BIOFILTER ENGINEERED SOIL	CY
14041	BIOFILTER PLANTING MULCH	CY
14042	PLANT 'PLUGS'	EACH
14043	PLANT WHIPS	EACH
14045	BIOFILTER SEEDING	SY
14048	INFILTRATION BASIN SEEDING	SY
14050	TREE GRATE	EACH
14052	STRUCTURAL SOIL	CY
14053	ENGINEERED SOIL	CY
14054	PLANTING MULCH	CY
14075	THIN-SET BRICK PAVERS	SF
14076	SALVAGE AND REUSE BRICK PAVERS	SF
14100	GUARDRAIL	LF
14101	SPLIT-RAIL WOOD FENCE	FL
14110	8-FT HIGH CYCLONE FENCE - GALVANIZED	LF
14111	8-FT HIGH CYCLONE FENCE - COATED	LF
14112	8-FT HIGH CYCLONE FENCE - WITH PRIVACY SLATS	LF
14115	12-FT HIGH CYCLONE FENCE - GALVANIZED	LF
14116	12-FT HIGH CYCLONE FENCE - COATED	LF
14117	12-FT HIGH CYCLONE FENCE - WITH PRIVACY SLATS	LF
14120	CYCLONE FENCE GATE	EACH
14122	CYCLONE FENCE VEHICULAR GATE	EACH
14123	CYCLONE FENCE VEHICULAR GATE ACCUATORS	EACH
14124	CYCLONE FENCE VEHICULAR GATE CARD READER	EACH
14130	8-FT HIGH SOUND BARRIER WALL	LF
14132	12-FT HIGH SOUND BARRIER WALL	LF
14150	CONCRETE RETAINING WALL	SF
14151	BOULDER RETAINING WALL	SF
14152	TIMBER RETAINING WALL	SF
14153	SPLIT BLOCK RETAINING WALL	SF
14154	LANNON STONE RETAINING WALL	SF

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
14155	GABION	EACH
14160	PEDESTRIAN BRIDGE	LS
14161	PEDESTRIAN BRIDGE FOOTBOARD REMOVE AND REPLACE	SF
14200	BOLLARD	EACH
14301	EROSION MATTING, CLASS I, URBAN TYPE A	SY
14302	EROSION MATTING, CLASS I, URBAN TYPE B	SY
14303	EROSION MATTING, CLASS I, TYPE A - ORGANIC	SY
14304	EROSION MATTING, CLASS I, TYPE B - ORGANIC	SY
14305	EROSION MATTING, CLASS II, TYPE A - ORGANIC	SY
14306	EROSION MATTING, CLASS II, TYPE C - ORGANIC	SY
4310	EROSION MATTING, CLASS III, TYPE A	SY
14311	EROSION MATTING, CLASS III, TYPE B	SY
14312	EROSION MATTING, CLASS III, TYPE C	SY
14313	EROSION MATTING, CLASS III, TYPE D	SY
14400	CONCRETE WHEEL STOP	EACH
14990	(RESERVED FOR SPECIAL PROVISIONS)	
14991	(RESERVED FOR SPECIAL PROVISIONS)	
14992	(RESERVED FOR SPECIAL PROVISIONS)	
14993	(RESERVED FOR SPECIAL PROVISIONS)	
14994	(RESERVED FOR SPECIAL PROVISIONS)	
14995	(RESERVED FOR SPECIAL PROVISIONS)	
14996	(RESERVED FOR SPECIAL PROVISIONS)	
14997	(RESERVED FOR SPECIAL PROVISIONS)	
14998	(RESERVED FOR SPECIAL PROVISIONS)	
14999	(RESERVED FOR SPECIAL PROVISIONS)	

STANDARD BID ITEM NUMBERS

ITEM NUMBER	BID ITEM	UNIT
15000	WATER MAIN	
15001		

