

**DESIGN CRITERIA
FOR PUBLIC IMPROVEMENT PROJECTS**

Revised 2024

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DC1 - GENERAL PLAN REQUIREMENTS FOR PUBLIC IMPROVEMENT PROJECTS

DC1-001 - GENERAL

All plans and specifications for public improvement projects within either publicly financed districts or privately financed developments shall be prepared by and sealed by a Professional Engineer licensed in the state of Kansas. The plans shall be reviewed by the City Engineer for compliance with the requirements established in the City of Olathe *Technical Specifications and Design Criteria for Public Improvements* along with all other applicable City codes and standards.

Any Private improvements shown on public improvement plans shall be clearly defined and marked as such. "Private improvements will not be maintained by the City of Olathe" shall be clearly stated on the drawings. The design and construction of private improvements including streets, storm sewers, sanitary sewers, waterlines, streetlights, and related construction shall conform to the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects*.

The Design Engineer may be required to submit additional information and analysis beyond the minimum requirements of these standards and criteria as required by the City Engineer.

The City of Olathe is not responsible for the accuracy and the adequacy of the design, or any dimensions and elevations depicted on the plans. The City of Olathe, through the approval of the plans and/or supporting documents, assumes no responsibility for the completeness and/or accuracy of the public improvement plan and/or supporting documents.

Incomplete plan sets or those not conforming to accepted engineering standards may be rejected without detailed review.

DC1-002 - PLAN SET REQUIREMENTS

Upon completion of the review and approval of the plans by the City Engineer, the following number of sets of approved plans must be submitted for signing and distribution (please note that all PDFs must be printed from CAD and flattened before sending):

Approved for Construction Drawings:

Street and Storm Improvements	3 Sets & Digital Copy (CAD and PDF FORMAT)
Street Lights	2 Sets & Digital Copy (CAD and PDF FORMAT)
Sanitary Sewer	3 Sets & Digital Copy (CAD and PDF FORMAT), 1 Half Sized Set, <u>KDHE Calculations</u> , and KDHE Application
Waterline	3 Sets & Digital Copy (CAD and PDF FORMAT) and 1 Half Sized Set and KDHE Application (if required).
Land Disturbance Permit	Digital copy of erosion control and grading sheets only

Hard copy and digital copies shall be received prior to release of the project for construction. In addition, one set of approved plans shall be sent to each of the utility companies providing service in the proposed construction area.

The suggested plan sheet size is 22" x 34" with all sheets being the same size. Plan and profile shall be drawn to scales of one (1) inch equals fifty (50) feet horizontal by one (1) inch equals ten (10) feet vertical, unless otherwise approved by the City Engineer.

The plans shall consist of:

1. Title Sheet
2. General Layout Sheets
3. Grading Plan
4. Plan and Profile Sheets
5. Erosion and Sedimentation Control Plan Sheets
6. Cross-Section Sheets (for Street Improvement Plans only unless otherwise required by the City Engineer.)
7. Standard and Special Detail Sheets
8. Intersection Details
9. Drainage Map and Calculations

Each sheet should contain an individual sheet number, the total number of sheets, the Engineer's seal, proper project identification, and date.

Where feasible, storm sewer construction details shall be incorporated into street construction drawings.

DC1-003 - TITLE SHEET

The following items shall be included on the title sheet:

1. Name of project
2. City project number and City Permit Number(s)
3. Index of sheets
4. A location map adequately showing project location in relation to major streets
5. A summary of plan quantities of principal items, such as:
 - a. Pipe sizes, number of manholes, etc. (sanitary sewers)
 - b. Length of curb and gutter, square yardage or tonnage of asphaltic concrete pavement, etc. (streets)
 - c. Pipe sizes, number of inlets, etc. (storm sewers)
 - d. Pipe sizes and lengths, number of valves, etc. (water lines)
6. The location of the project benchmark per the Johnson County Horizontal and Vertical Control Network.
7. Name, address and telephone number of the Design Engineer and owner/developer.
8. List containing the name and telephone number of each utility company.
9. Zoning
10. Signature and stamp of Professional Engineer registered in the State of Kansas

A signature block for the City Engineer shall be required on the cover sheet of all plans submitted for review and approval. All plans require the signature of the City Engineer and the date of such signing for formal approval by the City. The general form of the approval block shall be as follows:

APPROVED	
City Engineer	Date
APPROVED FOR ONE YEAR FROM THIS DATE	

DC1-004 - GENERAL LAYOUT SHEET

The following items shall be included on the general layout sheet for all improvement projects:

- A legend of symbols which shall apply to all sheets.
- North arrow and scale. Scale of the general layout map shall be one (1) inch equals one hundred (100) feet, unless otherwise approved by the City Engineer.
- Names of subdivision, block designation, lot designation, all street names, and an accurate tie to at least one quarter section corner. An unplatted tract shall have an accurate tie to at least one quarter section corner.
- Project boundary, survey control and reference ties.
- A list of general notes to the contractor to include at least those notes included in this Section.
- Layout of sidewalks and access ramps.
- Utility and street light layout.

** Construction plan quantities to be included on the sheet immediately following the General Layout Sheet.*

In addition, the following items shall be included on the general layout sheet for the type of improvement shown:

Storm Drainage

- Location of all existing storm sewer within or adjacent to the project area
- City project name and number of any adjacent storm sewer.
- Connection point or points to existing facilities (tied to a known point on existing facility) and the type of connection to be utilized.
- Size and material of any facility being tied into.
- Location of all proposed storm sewer with designation and sheet number on which they appear in plan and profile.
- Preblast survey limits.

Sanitary Sewer and Waterline

- Location of all existing sanitary sewer and waterlines properly designated within or adjacent to the project area
- City project name and number of any adjacent utilities.
- Connection point or points to existing facilities (tied to a known point on existing facility) and the type of connection to be utilized.
- Size and material of any facility being tied into.
- Location of all proposed sanitary sewer and waterlines and appurtenances with designation and sheet number on which they appear in plan and profile.
- Preblast survey limits.

DC1-005 - PLAN AND PROFILE SHEETS

The following items shall be included on the plan and profile sheets for all improvement projects.

- North arrows and scale.
- Existing and proposed streets with names and widths.
- Existing and proposed property lines, lot numbers, block numbers and subdivision names.
- All existing and proposed utilities including, but not limited to: power, gas, oil, water, telephone, sewer, street lights, traffic signals, and other items. The locations shall be in conformance with the best information available from the utility provider and/or field survey.

- All existing and proposed improvements within seventy-five (75) feet each side of the center line. This shall include streets, curbs and gutters, driveways, culverts, fire hydrants, utility poles, trees, shrubs, fences, walls, houses, and other such items, and shall be identified as to type, size, material, etc.
- All existing easement and right-of-way information recorded with the Johnson County Treasury, Taxation, and Vehicles Department.
- Construction notes shall appear on the proper plan and profile sheets.
- Locations and widths of existing and proposed sidewalks and ramps.

In addition, the following items shall be included on the general layout sheet for the type of improvement shown:

Street

- Horizontal curve data, vertical curve data, stopping sight distances, K Values, and design speed.
- Gradient between vertical curves.
- Center line stations.
- Stations and grade at curb returns (at 1/4 points).
- Profile with the existing grade shown as a dashed line and proposed grades shown by solid lines.
- Location of monument boxes.
- Sight triangles.

Storm Drainage

- Detailed alignment of the storm sewer, appurtenances, pipe size, capacity, and other details relating to the storm drainage system including inlet station, top elevation, and invert elevation.
- Proper surveying ties to existing permanent facilities.
- Distances between the storm sewer and other existing or future utilities in the right-of-way or drainage easement.
- Drainage channel, slope, and cross sections.
- Existing and proposed street grades.
- Proper elevations, slopes, and lining for existing outfall ditches.
- Locations of all bends and appurtenances.
- Size, slope, and material of each pipe on the profile.
- Hydraulic grade line for design storm.
- Location, cross-section, and capacity of overflow swales, including the velocity in the swale and erosion protection where necessary.
- Property owner information for all properties directly adjacent to development.
- Results of any rock borings.

Sanitary Sewer

- Detailed alignment of the proposed sewer with ties to property corners or station and angle callouts at each manhole.
- The channel center line of waterways within fifty (50) feet of the sanitary sewer lines.
- All manholes with manhole designation, station, and invert elevations. Drop, shallow and special manholes shall be designated as such. Invert elevations shown shall be the invert of the pipe in and out of the manhole. The proposed top elevation of the manhole shall be shown. Distance between manholes shall be shown as well as the gradient, pipe size, and pipe material.
- Results of all rock borings.

- Accurate elevations of lowest floor for all existing and/or proposed structures. Include minimum serviceable floor elevation (MSFE).
- A uniform system of line and manhole designation as required by the City Engineer.
- Station, slope, and length of each service line.
- Profile of existing grade as a dashed line and the proposed grade by solid lines. The flow line of any drainage channel, either improved or unimproved, within fifty (50) feet of the sewer line shall also be included and properly identified. The proposed sewer shall be shown as double solid lines properly showing the height and flow line of the pipe.
- All utility crossings with approximate elevations provided in the profile.
- Design table with flow depth
- Location of all cleanouts

Water Lines

- Alignment of the proposed water line dimensioned from curb lines or right-of-way lines.
- Designation by station of all fire hydrants, line valves, tees, bends, and crosses.
- Pipe material, size, and length and stationing of required restraint.
- Results of all rock borings.
- All utility crossings with approximate elevations provided in the profile.

DC1-006 - SITE GRADING PLAN

The following items shall be included on the site grading plan sheet(s) for all improvement projects.

- North Arrow and Scale.
- Existing and proposed property lines and lot and block numbers.
- Elevation and location of nearest benchmark per the Johnson County Horizontal and Vertical Control Network.
- Final grading spot elevations shown for all lot corners.
- One-hundred year floodplain line with elevation.
- Property owner information for all properties directly adjacent to development.
- One-hundred year overflow swales with calculations.
- Adequately labeled existing and final contours not to exceed two (2) feet intervals.
- Proposed storm sewer locations
- Proposed low floor elevation and low openings when adjacent to an engineered swale or one-hundred year floodplain.
- Existing and proposed water and sanitary sewer lines.
- Preblast survey limits if applicable.

DC1-007 - EROSION CONTROL

The following items shall be included on the erosion control sheet(s) for all improvement projects.

- North arrow and scale.
- Erosion and sedimentation control measures.
- City of Olathe required erosion control details.
- City of Olathe erosion control general notes.
- Existing and proposed contours.
- Existing and proposed storm sewer.
- Phasing (when applicable)
- One-hundred year floodplain (when applicable).

DC1-008 - CROSS-SECTION SHEETS

The following items shall be included on the cross-section sheets. Cross Section Sheets are not required for privately financed projects unless requested by the City Engineer.

- Street cross-section every 25' showing existing grade as a dashed line and proposed grade as a solid line. Cross-sections shall include existing grade lines a minimum of ten (10) feet beyond right-of-way lines. Show cut and/or fill quantities at each cross-section and tie-in limits by CL offset.
- Center line elevation at top of pavement.
- Cross-sections at all intersecting streets and driveways.
- Channel cross-sections for all drainage channel improvements.
- Additional cross-sections as required to clearly describe the extent of the grading operations.

DC1-009 - INTERSECTION DETAIL SHEETS

The following items shall be included on the intersection detail sheets.

- Sheet will be 10 scale at a maximum.
- Contours will be included for every 0.2' increment.
- Sheet will include drainage arrows to indicate the direction of surface water flow.

DC1-010 - DRAINAGE MAP AND CALCULATION SHEET

The following items shall be included on the drainage map and calculation sheets.

- Map of storm sewer structures with clearly demarcated and labeled drainage areas
- Calculation table based on HEC22 requirements, including the relevant HGL levels for all pipes (10 yr for residential, 25 yr for commercial)

DC1-011 - REQUIRED NOTES

The following general notes will be required as a minimum on all plan submittals for public and private improvement projects. These notes are not intended to be all-inclusive and additional notes may be required by the City Engineer.

WATER MAINS

1. Development plans are approved initially for one (1) year after which they automatically become void and must be updated and re-approved by the City Engineer before any construction will be permitted.
2. The City of Olathe plan review is only for general conformance with City of Olathe design criteria and the City code. The City is not responsible for the accuracy and/or adequacy of the design, dimensions and elevations. The City of Olathe, through approval of this document, assumes no responsibility other than that stated above for the completeness and/or accuracy of this document.
3. The Contractor shall have one (1) signed copy of the plans (approved by the City of Olathe) with a State approval stamp on the title sheet and one (1) copy of the appropriate *Technical Specifications and Design Criteria for Public Improvement Projects* at the job site at all times.
4. Construction of the improvements shown or implied by this set of drawings shall not be initiated or any part thereof undertaken until the City Engineer is notified of such intent, and all required and properly executed bonds and contract agreements are received and approved by the City Engineer.
5. The City of Olathe *Technical Specifications for Public Improvement Projects*, latest edition, shall govern construction of this project.

6. All existing utilities indicated on the drawings are according to the best information available to the engineer, however, all utilities may not be shown. Utilities damaged through the negligence of the Contractor to obtain the location of same shall be repaired or replaced by the Contractor at his expense.
7. Backfill within the right-of-way shall be compacted to ninety-five (95) percent of maximum density at optimum moisture. No fill shall be placed in future rights-of-way under a Land Disturbance permit unless approved by the City Engineer.
8. All trench excavation beneath existing and proposed streets shall be backfilled in accordance with Technical Specification Section 4000. Alternate backfill materials shall require the approval of the City Engineer.
9. Saturday work shall be as approved by the City Engineer. No work shall be permitted on Sunday or a Holiday.
10. Where available, all water required for the construction of this project shall be purchased from the Public Works Department through the use of a fire hydrant water meter. Meters can be obtained from the Public Works Department, Field Operations Division, for a nominal deposit that is refundable upon return of the meter.
11. Relocation of any water line, sewer line or service line required for the construction of this project shall be the responsibility of the Contractor at their expense.
12. Connections to existing water mains shall not be allowed for new water main extension projects until all testing and disinfection requirements have been met and the connection has been approved by the City Engineer.
13. All structural inspections shall be completed by a professional engineer registered in the State of Kansas.
14. The horizontal separation distance between water lines (service lines) and sanitary sewer lines (service lines), and waterlines (service lines) and sanitary sewer manholes shall be a minimum of 10 ft measured from edge to edge.
15. Waterlines (service lines) must always cross over the force mains (service mains) with a minimum vertical separation distance of 2 ft.
16. The proposed waterline improvements shown by this set of drawings have been designed to provide for the following fire flow requirements as determined by the City of Olathe Fire Chief: _____ GPM.
(Included only on development drawings that contain areas zoned for higher densities than R-2).

SANITARY SEWERS

1. Development plans are approved initially for one (1) year, after which they automatically become void and must be updated and re-approved by the City Engineer before any construction will be permitted.
2. The City of Olathe plan review is only for general conformance with City of Olathe Design Criteria and the City Code. City is not responsible for the accuracy and adequacy of the design, or dimensions and elevations. City of Olathe through approval of this document assumes no responsibility other than as stated above for the completeness and/or accuracy of this document.
3. Contractor shall have one (1) signed copy of the plans (approved by the city of Olathe) with a State approval stamp on the title sheet and one (1) copy of the appropriate *Technical Specifications and Design Criteria for Public Improvement Projects* at the job site at all times.

4. Construction of the improvements shown or implied by this set of drawings shall not be initiated or any part thereof undertaken until the City Engineer is notified of such intent and all required and properly executed bonds and contract agreements are received and approved by the City Engineer.
5. The City of Olathe *Technical Specifications for Public Improvement Projects*, latest edition, shall govern construction of this project.
6. All existing utilities indicated on the drawings are according to the best information available to the City Engineer, however, all utilities may not be shown. Utilities damaged through the negligence of the Contractor to obtain the location of same shall be repaired or replaced by the Contractor at their expense.
7. Backfill within the right-of-way shall be compacted to ninety-five (95) percent of maximum density at optimum moisture. No fill shall be placed in future rights-of-way under a Land Disturbance permit unless approved by the City Engineer.
8. All trench excavation beneath existing and proposed streets shall be backfilled in accordance with Technical Specification Section 4000. Alternate backfill materials shall require the approval of the City Engineer.
9. All service lines shall be laid on a 1.00% minimum grade unless approved by the City Engineer.
10. Where available, all water required for the construction of this project shall be purchased from the Public Works Department using a fire hydrant water meter. Meters can be obtained from the Public Works Department, Field Operations Division, for a nominal deposit that is refundable upon the return of the meter.
11. Saturday work shall be as approved by the City Engineer. No work shall be permitted on Sunday or a Holiday.
12. Relocation of any water line, sewer line, or service line required for the construction of this project shall be the responsibility of the Contractor and shall be at their expense.
13. The Contractor shall install and properly maintain a mechanical plug at all connection points with existing lines until such time that the proposed line is tested and approved.
14. To prevent damage to main sewer line, all blasting required for laterals stub lines shall be performed during blasting for the main line.
15. A pre-blast survey shall be approved by the Fire Marshall prior to the initiation of blasting operations.
16. All structural inspections shall be completed by a professional engineer registered in the State of Kansas.

STREETS AND STORM DRAINAGE

1. Development plans and drainage reports are approved initially for one (1) year, after which they automatically become void and must be updated and re-approved by the City Engineer before any construction will be permitted.
2. The City of Olathe plan review is only for general conformance with Olathe design criteria and the City code. City is not responsible for the accuracy and adequacy of the design, or dimensions and elevations. City of Olathe, through approval of this document, assumes no responsibility other than as stated above for the completeness and/or accuracy of this document.
3. Contractor shall have one (1) signed copy of the plans (approved by the city of Olathe) and one (1) copy of the appropriate *Technical Specifications and Design Criteria for Public Improvement Projects* at the job site at all times.

4. Construction of the improvements shown or implied by this set of drawings shall not be initiated or any part thereof undertaken until the City Engineer is notified of such intent, and all required and properly executed bonds and contract agreements are received and approved by the City Engineer.
5. The City of Olathe *Technical Specifications for Public Improvement Projects*, latest edition, shall govern construction of this project.
6. All existing utilities indicated on the drawings are according to the best information available to the City Engineer, however, all utilities may not be shown. Utilities damaged through the negligence of the Contractor to obtain the location of same shall be repaired or replaced by the Contractor at their expense.
7. Backfill within the right-of-way shall be compacted to ninety-five (95) percent of maximum density at optimum moisture. No fill shall be placed in future rights-of-way under a Land Disturbance permit unless approved by the City Engineer.
8. All trench excavation beneath existing and proposed streets shall be backfilled in accordance with Technical Specification Section 4000. Alternate backfill materials shall require the approval of the City Engineer.
9. Ramp construction shall be required when noted on the plans and/or contained in the summary of quantities.
10. Soil sampling and compaction testing shall be performed by a qualified technician at locations determined by the City Engineer. All sampling and testing expenses shall be paid for by the Contractor.
11. Where available, all water required for the construction of this project shall be purchased from the Public Works Department using a fire hydrant water meter. Meters can be obtained from the Public Works Department, Field Operations Division, for a nominal deposit that is refundable upon the return of the meter.
12. Saturday work shall be as approved by the City Engineer. No work shall be permitted on Sunday or a Holiday.
13. Relocation of any water line, sewer line or service line required for the construction of this project shall be the responsibility of the Contractor and shall be at their expense.
14. If precast concrete storm sewer structures are to be used on this project, the Contractor shall, subsequent to review by the Design Engineer, submit shop drawings to the City Engineer prior to fabrication of the structures. Failure to do so may be cause for rejection.
15. Monument boxes conforming to all applicable Standard Details shall be installed when the quarter section corners are located within the limits of the new street.
16. Where a new street is to connect to an existing street, all deteriorated or cracked asphalt within five (5) feet of the connection point shall be removed to a depth where sound material is found. If full depth pavement removal is required, the subgrade shall be recompact to ninety-five (95) percent of maximum density at optimum moisture.
17. All structural inspections shall be completed by a professional engineer registered in the State of Kansas.

EROSION AND SEDIMENT CONTROL

1. All earth disturbance activities shall proceed in accordance with the approved plan. Each stage shall be completed and immediately stabilized before any subsequent stage is initiated. Clearing, grubbing, and

topsoil stripping shall be limited only to those areas described in each stage. No fill shall be placed in future rights-of-way under a Land Disturbance permit unless approved by the City Engineer.

2. The Contractor or Owner shall obtain a Land Disturbance Permit from the City of Olathe. The permit holder must schedule an initial erosion and sediment control inspection prior to any earthmoving on the proposed site as per the approved plan. Scheduling of initial inspections must be made at least twenty-four (24) hours in advance.
3. All excavation for utility line installation shall be limited to the amount that can be excavated, installed, backfilled, and stabilized within one working day. All excavated material shall be deposited on the upslope side of the trench. Sediment laden water that accumulates in the trenches shall be pumped through a filtration device, or equivalent sediment removal facility, or over non-disturbed vegetated areas. Discharge points should be established to provide for maximum distance to active waterways.
4. Before implementing any revisions to the approved erosion and sediment control plan or revisions to other plans, which may affect the effectiveness of the approved Erosion and Sediment control plan, the Contractor must receive approval of the revisions from the City of Olathe.
5. All building materials and wastes must be removed from the site and recycled or disposed of in accordance with the Kansas Department of Health and Environment's regulations. No building materials or wastes or unused building materials shall be burned, buried, dumped, or discharged at the site.
6. Before disposing of soil or receiving borrow for the site, the Contractor must assure that each spoil or borrow area has an Erosion and Sediment Control Plan approved by the City of Olathe and which is being implemented and maintained according to City of Olathe regulations.
7. Any disturbed area on which activity has ceased must be stabilized immediately. During non-germinating periods, mulch must be applied at the recommended rates. Disturbed areas which are not at finished grade, and which will be re-disturbed before winter, shall be stabilized in accordance with temporary seeding specifications. Disturbed areas that are either at finished grade or will not be re-disturbed before winter must be stabilized with permanent seeding specifications.
8. Planting and seeding dates shall be in accordance with the City of Olathe *Technical Specifications for Public Improvement Projects*. Interim stabilization will be achieved by mulching.
9. Only limited disturbance will be permitted to construct sediment traps, diversion terraces, etc.
10. At the end of each working day, any sediment tracked or conveyed onto a public roadway will be removed and re-deposited onto the construction site. Removal can be completed through use of mechanical or hand tools, but must never be washed off the road using water.
11. Sediment removal from erosion and sediment controls and facilities shall be disposed of in landscaped areas outside of steep slopes, wetlands, floodplains, or drainage swales and immediately stabilized or placed in topsoil stockpiles.
12. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the Contractor shall implement appropriate best management practices to eliminate the potential for accelerated erosion and/or sediment pollution.
13. A copy of the approved erosion and sediment control plan and Stormwater Pollution Prevention Plan (SWPPP) must be available at the project site at all times.
14. Stabilization is defined as a minimum uniform 70% perennial vegetated cover or other permanent non-vegetated cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements.

15. An erosion control blanket will be installed on all disturbed slopes steeper than 3:1 and all areas of concentrated flows.
16. Until the site is stabilized, all erosion and sediment control BMPs must be maintained properly. Maintenance must include inspections of all erosion and sediment control BMPs after each runoff event and on a weekly basis. All preventative and remedial maintenance work, including clean out, repair, replacement, regrading, reseeding, remulching, and renetting must be performed immediately. If erosion and sediment control BMPs fail to perform as expected, replacement BMPs or modifications of those installed will be required.
17. Any sediment removed from BMPs during construction shall be returned to upland areas on site and incorporated into site grading.
18. Upon completion of all earth disturbance activities and permanent stabilization of all disturbed areas, the Owner and or Contractor shall contact the City for a final inspection.
19. Seed mix must be as previously approved. Appropriate fertilizer will be applied per the manufacturer's recommendations.

TRAFFIC AND SIGNALING

1. Existing underground (U/G) utilities and drainage structures have been located from available information and their locations must be considered approximate only. The Contractor is responsible for locating each utility prior to construction.
2. All construction and traffic signal equipment shall conform to the latest edition of the City of Olathe *Standard Specifications for Public Improvement Projects*.
3. Contractor shall stake the location of all traffic signal poles, conduit, controllers, service boxes and junction boxes to be installed. Stations and offsets provided are to the center of the traffic signal equipment. The City Engineer shall inspect the staking prior to any excavation and/or construction. Minor relocation of equipment to avoid conflicts may be allowed with the approval of the City Engineer.
4. All existing curb and gutter, sidewalk, pavement, drainage structures, or ground damaged during the traffic signal construction shall be replaced by the Contractor at their expense.
5. Conduit entering service boxes, junction boxes and/or pole bases shall be continuous in the service boxes, junction boxes and/or pole base.
6. Traffic Signal Turn-On shall be coordinated with the City of Olathe Public Works Department, Traffic Operations Division.

DC1-012 - STANDARD AND SPECIAL DETAIL SHEETS

Detail sheets shall be included to show all details of appurtenances, materials, and construction whether or not covered by the City's *Technical Specifications and Design Criteria for Public Improvement Projects*. Details shall conform to the City of Olathe standards and are to be drawn clearly and neatly with proper identifications, dimensions, materials, and other information necessary to ensure the desired construction.

DC1-013 - AS-BUILT DRAWINGS

As-Built Drawings shall be submitted to the City Engineer upon completion of the project and prior to final acceptance of the project by the City of Olathe. The Design Engineer shall provide the City with prints for all public improvement projects corrected to show the project as constructed and shall accurately and completely denote all changes made during the course of the work. Each sheet within the plans shall be clearly marked as "As-Built Drawings" and shall include the revision date and certifications by the Design

Engineer. The horizontal and vertical location of the storm sewer structures and pipe, sanitary sewer structures and pipe, and all lot corners provided on the As-Built Drawings shall be based upon field survey data.

All As-Built Drawings shall be delivered in CAD and Flattened PDF format.

DC1-014 - DIGITAL DRAWINGS

All digital drawings shall use the NAD 1983 Kansas State Plane North 1501 feet coordinate system.

One multi-page PDF of all project sheets must be at a readable resolution.

Prior to the release of the project for construction, both digital and hard copies of the approved plans shall be submitted. If a change in the hard copy prints is requested, then the digital drawings shall be revised and resubmitted to ensure that all changes are reflected in both mediums.

Prior to the Project Completion Certificate (PCC) being issued, the digital As-Built Drawings shall be submitted.

DC2 - PROCEDURE FOR PUBLIC IMPROVEMENT PROJECT PLAN SUBMITTAL

DC2-001 - GENERAL

All developers and Design Engineers submitting plans for public improvement projects to the City Engineer for review are required to follow the procedures outlined in this Section. No public improvement projects may be constructed in the City of Olathe without prior approval by the City Engineer.

All private development submittals should be uploaded on the City of Olathe's online permitting portal. The portal can be found at: https://energov.olatheks.org/EnerGov_Prod/SelfService/#/home

All public improvement submittals will be sent to the City's Project Manager.

DC2-002 - PLAN REVIEW PROCESS

The initial submittal should contain the plans and any required draft easements. The normal time for review of the first submittal is ten (10) working days. In the case of large sets of plans (greater than 20 sheets) or complicated projects, a longer review time may be required.

The plans will be reviewed by the appropriate City departments for conformance with the City of Olathe's *Technical Specification and Design Criteria for Public Improvement Projects* and City of Olathe *Standard Details*. In each review, comments and necessary revisions will be noted and the Design Engineer will be notified of any revisions required via email.

The Design Engineer will be required to make all necessary corrections and/or revisions as noted. Upon completion of the corrections and/or revisions the Design Engineer will upload the revised plans to the online permitting portal. Revised sheets shall contain a revision block with identifying notations and date of revisions, as well as revision clouds surrounding all changes in the drawings. Review time is approximately five (5) working days.

The City Engineer will then verify that all necessary plats and easements are filed and recorded before signing the cover sheet for the plans. This cover sheet with the City Engineer's signature and date shall be utilized for all further cover sheets in bid documents sent out for proposals. Sets of approved for construction plans and digital copy in a single, multi-page pdf shall be submitted in the quantity defined above.

Public improvement plans and engineering reports are approved initially for one (1) year from the date they are signed by the City Engineer. After one (1) year, the plans and/or report shall become null and void and must be re-submitted prior to being released for construction. Such plans and/or supporting documents shall be re-submitted to the Infrastructure Department in accordance with the requirements outlined in this Section.

The Design Engineer shall send one (1) set of plans to each of the private and public utilities companies having territorial jurisdiction upon notification that the plans have been approved.

DC2-003 - PLAN RELEASE FOR CONSTRUCTION

Once the plans have been approved, the developer or the developer's representative shall provide all supporting documentation and fees as identified in the submittal packets, which will be available through the City's online permitting portal (and on the City's website). The submittal packet shall be submitted in its entirety.

Partial submittals will not be reviewed.

DC3 - DESIGN CRITERIA FOR SANITARY SEWERS AND APPURTENANCES

DC3-001 - GENERAL

Sanitary sewers shall be designed for the ultimate development conditions within the tributary area. The ultimate development conditions shall be estimated using current zoning regulations, land use master plans, and approved planning and zoning reports where applicable. Sewer capacities shall be adequate to convey the anticipated peak flow in accordance with the Design Criteria in this Section.

DC3-002 - SEWER DESIGN

Sewers shall be designed for the total tributary area using the following minimum criteria:

An Equivalent Dwelling Unit (EDU) is a standard quantity of water usage as required for one single family residence. The 25-year design flow rate per EDU shall be as follows:

1 Equivalent Dwelling Unit (EDU) = 300 gpd

Table DC3-002-1 – 25-Year Design Flow Rates shall be used to determine the total EDUs for an area. Extrapolations to determine design flow rates for Industrial zonings, or zonings not listed below in Table DC3-002, shall be submitted to and approved by the City Engineer. Table DC-003-2 – 25-Year Design Peak Flow Rates per Acre Based Upon Land Use shall be used to determine design flow rates for sites tributary to the proposed sewer design.

Table DC3-002-1 – 25-Year Design Flow Rates

Type of Development	Olathe Zoning	EDUs per Unit	Peaking Factor
Single-Family	R1/R2	1.0 EDU per Living Unit	3.7
Multi-Family	R3, R4	0.8 EDU per Living Unit	3.7

Table DC3-002-2 - 25-Year Design Peak Flow Rates per Acre

Commercial/Industrial	
Acreage	cfs/acre
Up to 100	0.0101
101-200	0.0079
201-500	0.0062
501-1000	0.0047
1001-1500	0.0036
1501-2000	0.003

Peak Flows can be increased by outside circumstances, such as other watershed contributions into the design watershed, and shall be considered in the design.

Sanitary sewer pipes 18 inches and larger in diameter shall be designed with a maximum flow depth of **three-fourths** of the pipe diameter. Pipes smaller than 18 inches in diameter shall be designed with a maximum depth of flow equal to **two-thirds** of the pipe diameter. All sewers shall be designed to convey the 25-year design peak flow rate. Design calculations shall be included on the General Layout Sheet of the plans within a table for approval.

DC3-003 - MAXIMUM SIZE

The diameter of proposed sewers shall not exceed the diameter of the outlet pipe, unless otherwise approved by the City Engineer.

DC3-004 - MINIMUM SIZE

No public sewer main shall be less than eight (8) inches in diameter. The minimum diameter for gravity service connections shall be six (6) inches and low-pressure service connections shall not be less than one and a quarter (1.25) inches.

DC3-005 - PIPE MATERIAL

Sanitary sewer pipes shall be resistant to or protected from bacterial degradation, acid and alkaline solutions, temperature variation, abrasion, industrial wastes, or other materials which may be transmitted by the collection system.

Unless otherwise specified or approved by the City Engineer, the following types of pipes are approved for proposed gravity sanitary sewer systems:

- Polyvinyl Chloride Pipe (PVC) with a minimum thickness of SDR 26
- HDPE (gray and de-beaded) with a minimum thickness of DR 13.5

All pipe material shall be in accordance with the City of Olathe *Technical Specifications for Public Improvement Projects*, Section 3000.

DC3-006 - MINIMUM SLOPE

All sewers shall be designed to provide a minimum velocity of 2.0 feet per second.

All velocity and flow calculations shall be based on the Manning’s Formula using an N value of 0.013. Table DC3-006-1 outlines the minimum slope based upon pipe diameter.

Table DC3-006-1 – Minimum Design Slope Based Upon Pipe Diameter

Pipe Diameter (in)	Minimum Slope (%)
8	1.01
10	0.28
12	0.22
15	0.15
18	0.12
21	0.1
24	0.08

1. The minimum slope for 8-inch sewer mains may be reduced to a minimum slope of 0.40 if flow calculations can demonstrate that a velocity of 2.0 fps is achieved.
2. Minimum slope for pipes larger than 24 inches in diameter shall be approved by City Engineer.

DC3-007 - MAXIMUM SLOPE

Slopes shall not exceed 14%, unless approved by the City Engineer

DC3-008 - INCREASING PIPE SIZE

When a sewer pipe joins a larger sewer pipe, the invert of the larger sewer should be lowered sufficiently to match the crown elevation of the smaller pipe.

DC3-009 - HIGH VELOCITY PROTECTION

In situations where flow is continuous and grit is a concern, velocities are greater than 10 feet per second, or after the first five (5) manholes downstream of a lift station or a low-pressure sewer system, special provisions shall be made to protect against abrasion damage to the pipe and manhole.

Pipe and manhole protection shall be achieved using a protective coating included on the Approved Materials List. The protective lining shall cover all interior surfaces, including the adjustment rings, casting, and lid.

Installers of the protective coating must be trained and certified according to the manufacturer's specifications. Installer certification shall be submitted to the City Engineer for approval prior to commencement of any work.

DC3-010 - ALIGNMENT AND GRADE

All sewers shall be laid with straight horizontal alignment, with no deflections in vertical grade between manholes.

DC3-011 - MANHOLE LOCATION AND SPACING

Manholes shall be installed at the end of each line, at all changes in grade, size, or alignment, and at all main line intersections. The maximum spacing between manholes shall be less than four hundred (400) feet for sewers eighteen (18) inches or less in diameter, and not greater than five hundred (500) feet for larger sewers.

DC3-012 - MANHOLES

Manholes shall conform to the applicable Standard Details and the City of Olathe *Technical Specifications for Public Improvement Projects*, Section 3100. The maximum depth of any manhole shall not exceed eighteen (18) feet unless approved by the City Engineer.

The minimum barrel diameter of standard manholes should not be less than four (4) feet. The minimum clear wall space between any penetrations shall not be less than six (6) inches. Manholes with two or more connecting pipe diameters greater than eighteen (18) inches shall have a minimum barrel diameter of five (5) feet. Manholes with three or more connecting pipe diameters of twenty-four (24) inches or greater shall have a minimum barrel diameter of six (6) feet.

Drop manholes should be avoided as much as possible. However, an outside drop pipe shall be provided for a sewer entering a manhole at an elevation of twenty-four (24) inches or more above the manhole invert. The outside drop pipe shall conform to the applicable Standard Detail, and the drop pipe shall have the same nominal diameter of the incoming sewer pipe.

Without utilizing drop manholes, the difference in elevation between the invert of any incoming sewer and the invert of the outgoing sewer shall be less than twenty-four (24) inches, except where required to match crown elevations. When a sewer joins a larger sewer connection, the crown of the smaller sewer shall not be lower than the crown of the larger pipe. The minimum drop through manholes shall be 0.2 feet for manholes with greater than 45° turns, and 0.1 feet for up to 45° turns.

Cored connections into brick manholes are not allowed. When connections to brick manholes are necessary,

said manholes shall be replaced with a pre-cast manhole. If brick manhole has been epoxy lined, the replacement pre-cast manhole must be epoxy lined for acceptance.

Manholes located in close proximity to streets shall have the top of the manhole elevation set within the following tolerances:

- Minimum Elevation 1/4" per foot rise above top back of curb
- Maximum Elevation 1/2" per foot rise above top back of curb

Manholes located in unimproved areas and stream corridors shall have the top elevation of manholes set one (1) foot above the existing ground elevation or one (1) foot above the 100-year floodplain whichever is greater. Manhole lid must be (gasketed and locking type) anchored to grade rings. The maximum top of manhole elevation shall not be more than three (3) feet above finish grade.

Any variation from the above top of manhole criteria is subject to approval by the City Engineer.

The invert of dead-end manholes shall be constructed, shaped, and sloped to match anticipated extensions and/or service lines in the future. All connections shall meet requirements of this Section and all stubs shall be properly plugged to prevent any groundwater from entering the manhole. No service line connections to existing manholes shall be allowed except into dead end manholes that will not be extended in the future. All service line connections to new dead-end manholes shall be pre-formed by the manhole manufacturer and the stub line shall be plugged.

DC3-013 - SEWER LOCATIONS

Sanitary sewers shall be located within sewer or utility easements dedicated to the City of Olathe or street or alley rights-of-way. When the sewer is located in an easement or on private property, access shall be provided to all manholes. A manhole shall be provided at each street or alley crossing. End lines shall be extended to provide access from street or alley rights-of-way where possible. Street and alley crossing shall have a minimum overburden depth of eight (8) feet. The minimum overburden depth for sanitary sewer outside the right-of-way shall be five (5) feet, unless otherwise approved by the City Engineer. All trenches shall be backfilled in accordance with the City of Olathe *Technical Specifications for Public Improvement Projects*, Section 4000.

Easement width shall be based on the flow line for sanitary sewer lines. The easement width shall not vary between manholes in sanitary sewer lines. Using the greatest depth between manholes, easement width is to be determined from the table below:

DC3-013-1: Easement Widths

LINE DEPTH	EASEMENT WIDTH
0 - 12 ft	20 ft
12 - 16 ft	25 ft
16 - 20 ft	30 ft

DC3-014 - PROTECTION OF WATER SUPPLIES

There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto, which would permit the passage of any wastewater or polluted water into the potable water supply.

When potable water pipes and sanitary sewer systems, including gravity mains, force mains, and manholes, are installed parallel to each other, the minimum horizontal separation shall be ten (10) feet measured from

the nearest points. Sanitary sewer pipes and waterlines shall not be installed in the same trench, regardless of the width of the trench. In cases where it is not practical to provide ten (10) feet of separation, alternate designs which provide equivalent protection shall be submitted to the City Engineer and KDHE for approval.

The minimum vertical clearance between waterlines and sanitary sewer lines shall be two (2) feet and the waterline shall always cross above the sanitary sewer main.. Crossings with less than two (2) feet of vertical separation shall be in accordance the material and jointing requirements of B.1 of Chapter VIII of KDHE's *Policies, General Considerations and Design Requirements for Public Water Supply Systems in Kansas* and pressure tested to assure water tightness pursuant to the most recent revision of KDHE's *Minimum Standards of Design of Water Pollution Control Facilities*. If concrete encasement is the selected alternative when two (2) feet of vertical separation between the gravity sanitary sewer and the waterline is not possible, the encasement for the sanitary sewer shall have a minimum thickness of six (6) inches and extend a minimum of 10 feet on each side of the crossing.

Joints in the sewer pipe shall be located as far as practical from the intersected water main.

The vertical clearance between sanitary sewer mains and storm sewer pipes shall be a minimum of two (2) feet

DC3-015 - AERIAL CROSSINGS

Adequate support shall be provided at all exposed pipe joints in aerial crossings. The design and materials for all aerial crossings shall require the approval of the City Engineer.

DC3-016 - MAXIMUM SLOPE

All sewers which are designed to flow at seven (7) feet per second or greater shall be reviewed and approved by the City Engineer.

DC3-017 - STUB LINES

Stub lines for mains or services shall not be permitted in manholes, except for dead-end manholes. Stub lines for future sewer main extensions in the temporary dead-end manholes shall be permitted only if the stub line connection is formed by the precast manhole manufacturer using the proper cast-in-place pipe connector.

Stub lines shall be provided for all private service lines. Tees shall be installed in all sewer mains. The service stub line shall be extended from the tees using a 45-degree riser and shall be extended to the edge of the utility easement or right-of-way, whichever extends furthest onto the property to be served. The stub line shall be installed to provide a minimum slope in the service line of 1%, taking into account at least a three (3) feet Minimum Serviceable Floor Elevation (MSFE) at the structure to be served. All stub lines provided for future connection shall be marked by placing a 2"x4" wood post with metal cap or #4 rebar directly over the end of the stub. Markers shall extend vertically from the top of the stub to one foot (1') below existing grade for the purpose of locating the stub line upon future connection.

DC3-018 - GROUNDWATER BARRIERS

Groundwater barriers shall be provided to impede the conveyance of groundwater along the pipe at approximately the midpoint of the pipe when the distance between manholes exceeds 280 feet.

DC3-019 - LIFT STATIONS AND FORCE MAINS

Contact the City Engineer for lift station and force main Design Criteria.

DC3-020 - LOW PRESSURE SEWER SYSTEMS (LPSS)

Low pressure sewer systems are not recommended. If a low-pressure sewer system is necessary, refer to Technical Specifications Section 3000 for material and installation of force mains.

Valve Junction Box

All service line connections shall be made in a Valve Junction Box with a minimum diameter of 36-inches. Connection shall include a shut-off valve on all three sides of the connection tee. The service line shall also have a check valve immediately upstream from the shut-off valve. Valves shall be as specified per the Olathe Approved Materials List. All fittings shall have a minimum of 6-inches of clearance to the structure walls to allow for access and maintenance. Stamped aluminum tags shall be attached to each shut-off valve. Service line tags shall include the address of the property or properties being serviced. Sewer main tags shall indicate whether the valve is the upstream or downstream side of connection.

Clean-Out & Emergency Truck Connection

Clean-out and emergency truck connections shall include a 2-inch shut-off valve and a quick connect coupling in a minimum 36" pit. The quick coupling shall be oriented to aim upward and be centered under the opening for easy access. Fittings shall include 45 degree or less bends to connect the vertical quick coupling and shut-off valve assembly to the horizontal sewer main. Clean rock shall be brought up to the bottom of the shut-off valve to provide stability for the coupling-valve assembly. Clean-out connections shall be placed every 300-400 feet along the low pressure force main.

Connection to Collection System

LPSS mains shall connect to the gravity collection system at a manhole by means of an approved flexible seal. The sides and bottom of the receiving manhole and a minimum of five (5) manholes downstream of the connection point shall be epoxy coated in accordance with Section 3100. The point of connection shall be no more than one foot above the flow line of the receiving manhole. Inside drops will not be permitted.

Service Lines

The minimum service line diameter shall be 1-1/4 inch.

DC4 - DESIGN CRITERIA FOR STREET IMPROVEMENTS

DC4-001 - GENERAL

Proposed street improvements within the City shall conform to the criteria established in the Olathe Comprehensive Plan as well as this Section and the City of Olathe *Technical Specifications for Public Improvements*. The major transportation goal stated in the plan is to "provide an efficient transportation system which facilitates the movement of people and goods within the City."

Street improvements within the City of Olathe shall be designed to conform to all applicable codes, regulations, and ordinances as established by the City. Plans for said improvements containing all information specified or requested shall be submitted to the City Engineer for approval.

DC4-002 - FUNCTIONAL CLASSIFICATION OF STREETS

In achieving the goal of creating an "efficient transportation system," the City defines geometric design standards for streets and highways which result in adequate traffic mobility and suitable access to abutting property.

The street design standards included in this section are based upon the street functional classifications outlined in the Major Street Map, latest edition. The Major Street Map and the Transportation Master Plan also define the minimum right-of-way width for each street functional classification as well as the minimum right-of-way width at street intersections.

The development of a street system based on functional classes has the following benefits:

- Traffic control and detour routing is simplified.
- The pavement of designated streets can be designed to carry the appropriate traffic volumes and gross vehicle weight load. Consequently, construction and long-term maintenance costs are reduced.
- Residential areas are not subject to through traffic, which makes them more desirable places to live.
- Commercial office and retail land uses are concentrated, and the resulting higher traffic volumes are better controlled with limited points of access.

Implementation of design criteria based on functional classification will help ensure that adequate traffic capacity and level of service is maintained. This will help preserve the regional accessibility for private development and help stabilize land use patterns and property values. Thus, preservation of the levels of service on all functional classes of the City's street system is mutually advantageous to the public and private sectors.

Typical cross-sections of these classifications are shown on applicable Standard Details. A summary of the functional classifications is provided below.

Expressway

Expressways are properly classified as arterials since their main purpose is to carry through traffic; however, due to their unique geometric design, high operating speeds and controlled or limited access, they are not typical arterial streets. Geometric design shall conform to the criteria defined by the agency providing funds for construction or this Design Criteria, whichever is more stringent.

Arterial

An arterial is a street or highway that provides rapid and efficient movement of large volumes of through traffic between sections of the city and across the urbanized area. They are not primarily intended to

provide land access service. Therefore, the number of curb cuts on an arterial shall be held to a minimum where they can be controlled and adequately protected. The Access Management Plan, latest edition, outlines the required separation between curb cuts and intersections.

In general, the arterial has full or partial access control. Arterials, once improved, can be four to six lanes wide, with or without medians, and commonly can be found on the mile section lines of the City. Signalized intersections along arterials should be spaced far enough apart to permit efficient two-way progressive movement of traffic between intersections at the desirable off-peak and peak hour operating speeds.

Collector Street

Collector streets provide traffic circulation within residential and commercial areas. Land access is a secondary function of a collector. A collector distributes trips from the arterials to the local street network. Collectors penetrate, but should not have direct continuity, through residential areas.

Since speeds are slower and turning movements are anticipated, closer intersection/access spacing can be used, which are outlined in the Access Management Plan, latest edition. The number of residential lots fronting onto a collector should be restricted.

The spacing of collector streets shall generally be 1/4 or 1/3 mile and shall be in accordance with the Major Street Map. Collector streets shall be constructed throughout the entire length of a development project, regardless of natural barriers, including streams and waterways, unless otherwise approved by the City Engineer. Collector streets shall be constructed by the Developer at no cost to the City.

Industrial Service Road

Industrial Service Roads provide traffic circulation within commercial and industrial areas from the arterial street system. Service streets should not have direct continuity with residential areas.

Since speeds are slower and turning movements are anticipated, closer intersection/access spacing can be used. The Access Management Plan, latest edition, outlines the required separation between curb cuts and intersections.

Because industrial service roads facilitate truck-related land uses, the special provisions associated with truck accessibility shall be considered within design. Wider turning radii, turning lanes and pavement thickness and material shall be considered. Industrial service roads shall not be utilized for backing or loading maneuvers. All such trucking maneuvers shall be handled on-site.

Local Street

The primary purpose of the local street is to provide driveway access to adjacent parcels. Trip length on the local street is short, resulting in lower traffic volumes and operating speeds. Generally, through traffic is deliberately discouraged.

The design criteria for each street functional classification are summarized on Table DC4- 002-1.

TABLE DC4- 002-1

Designation¹	Expressway	Arterial	Collector	Industrial or Service	Local⁷
Number of Traffic Lanes ²	4-6	2-6	2-3	2-3	2
Width of Traffic Lanes ²	12'	12' - 14' ³	12' - 14' ³	12' - 14' ³	12'
Left Turn Lanes	Double at Signals	Double at Signals ⁴	As needed from TIS	As needed from TIS	N/A
Right Turn Lanes	Yes	Yes	Yes	Yes	As needed from TIS
Bike Lanes	Prohibited	As Shown in TMP	As Shown in TMP	As Shown in TMP	N/A
Minimum R/W Width ⁵	200'	120'	60' - 80'	60' - 80'	50'
Minimum Design Speed	50 MPH	50 MPH	40 MPH	40 MPH	30 MPH ⁷
Posted Speed	45 MPH	40-45 MPH	30-35 MPH	30-35 MPH	25 MPH ⁷
Stopping Site Distance	425'	425'	305'	305'	200' ⁷
K Value ⁶ (Crest / Sag)	84 / 96	84 / 96	44 / 64	44 / 64	19 / 37 ⁷
Minimum Radii Horizontal Curve ⁷	1,050'	1,050'	330'	330'	200' ⁷
Sidewalks - Sidepaths (SP)	10' SP - Both Sides	5' Sidewalk + 10' SP	5' Sidewalk - Both Sides	5' Sidewalk - Commercial Both Sides, Industrial One Side	5' Sidewalk - Both Sides in Multi- Family
On Street Parking	Prohibited	Prohibited	Permitted	Permitted	Permitted
Min./Max. Grade	0.8%/5%	0.8%/6%	1%/8%	1%/8%	1%/10%
Curb Radii	50'	50'	30'	30'	25'
Minimum Spacing of Similar Roadways	3 miles	1 mile	400'	400'	300'
Minimum Street Spacing	1/2 Mile	1/3 Mile	300'	300'	300'
¹ As defined on the Major Street Map, latest edition					
² Denotes fully improved condition					
³ Denotes width of outside lane with no shoulder or bike lane					
⁴ Double at Arterial/Arterial intersections, all other intersections as defined in TIS					
⁵ See Transportation Master Plan for R/W width at intersections					
⁶ Per AASHTO Green Book Table 3.34					
⁷ Multi-Family Local Street minim design speed may be reduced to 15 MPH					
TIS = Traffic Impact Study					
TMP = Transportation Master Plan					

DC4-003 - RIGHT-OF-WAY GRADING

Within the limits of the right-of-way, the finished grade shall slope toward the curb with grades varying from two (2) percent to four (4) percent. These gradients may be varied only upon written approval of the City Engineer.

DC4-004 - TANGENT LENGTH

The minimum tangent length between curves shall be fifty (50) feet for local streets. No tangent will be required for radii larger than five hundred (500) feet.

DC4-005 - OFF-CENTER STREET INTERSECTIONS

Off-center street intersections and commercial drive entrances shall be separated by a minimum centerline to centerline dimension of one hundred-fifty (150) feet.

DC4-006 - CONNECTIONS TO EXISTING PAVEMENTS

Where new street construction connects to an existing street, a minimum of five (5) feet of the existing pavement shall be saw cut and removed to subgrade. The exposed subgrade shall be re-compacted or replaced with aggregate base in accordance with the Standard Details and repaved with the new construction.

DC4-007 - ANGLE OF INTERSECTION

All intersections shall meet at a 90° angle, unless otherwise approved by the City Engineer.

DC4-008 - SIDEWALKS

Sidewalk construction shall conform to the requirements in the applicable Standard Details. The sidewalk width shall be a minimum of seven (7) feet when it abuts a retaining wall. Decorative form liners meeting the specifications and applicable Standard Details shall be used for retaining walls located along arterial roadways and at all other locations specified or as required by the City Engineer.

DC4-009 - STORM DRAINAGE

All storm drainage facilities constructed in connection with street improvements shall be designed in accordance with the City of Olathe *Design Criteria for Storm Drainage Facilities*.

DC4-010 - CUL-DE-SACS

At locations where streets are to be terminated and a vehicular connection between adjacent streets is not required, a cul-de-sac shall be constructed. The minimum radius for cul-de-sacs shall be 39 feet (BOC).

DC4-011 - TEMPORARY TURNAROUNDS

At locations where streets are to be temporarily terminated which will be extended at a later date, and said street extends beyond the intersection of an adjacent street more than one hundred-fifty (150) feet measured from the edge of pavement, a temporary cul-de-sac shall be constructed with a minimum radius of thirty-nine (39) feet. The temporary cul-de-sac shall be constructed of asphaltic concrete with a minimum thickness of six (6) inches. Curb and gutter are not required. The cul-de-sac shall be constructed within the limits of a permanent easement.

DC4-012 - MONUMENT BOXES

Monument boxes conforming to applicable Standard Details shall be installed at all quarter section corners during street construction.

DC4-013 - SIGHT DISTANCES

Stopping Sight Distance

Sight distance is the length of roadway ahead visible to the driver. The minimum sight distance available on a roadway should be sufficiently long to enable a vehicle driving at the design speed to stop before reaching a stationary object in its path.

Stopping sight distance represents the sum of the brake reaction distance and the braking distance. These distances are measured from the height of the driver's eye to the height of the object, 3.5 feet and 2.0 feet above the road surface, respectively. Design controls for stopping sight distances vary slightly for crest vertical curves and sag vertical curves and are dependent on the algebraic difference in the grades as well as the design speed. Table DC4-002-1 includes the stopping sight distances to be used in the design of roadways.

Intersection Sight Distance

Sight distances at intersections vary from stopping sight distance. The intersection sight distance should be sufficient to permit a vehicle on the minor leg of the intersection to cross the traveled way without requiring the approaching through traffic to slow down. To achieve this, an area free of visual obstruction is required at every corner of an intersection.

An obstruction to vision shall be defined as an obstacle (i.e., a parked vehicle, a wall or commercial sign, bush or hedge, guardrail, or fence, etc.) which forms a restriction to an assumed line of sight measured from the driver's eye height to a target some distance along the cross street.

Every effort shall be made to select intersection locations which maximize the sight distance. The location of intersections shall always consider the grade changes along the adjacent street in terms of possible sight obstructions.

Sight Triangle

Sight triangle requirements vary based on the type of intersecting streets and are summarized in Table DC4-013-1. All measurements are taken from the point of intersection of the extended curb lines of each intersecting street. The values in the table are dependent on the travel speed of the vehicles on the intersecting street and on the typical vehicle which will approach the intersection. The standard assumed height of the driver's eye for a passenger vehicle is 3.5 feet above the roadway surface (7.6 feet above the pavement for a single unit truck or large semi). This relates to the line of sight required to detect an approaching vehicle on the cross street (regarded as a point 3.5 feet above the roadway surface).

Table DC4-013-1 - Minimum Sight Triangle Requirements

Major Road Classification	Required Distance (ft)
Arterial	215
Collector	170
Industrial Service	170
Residential	130

All corner lots within the City of Olathe (except those in the Central Business District) shall have a sight triangle free of visual obstructions from a point twenty-five (25) feet back along the minor leg as measured from the point of intersection of the extended curb lines of each intersecting street to a point that varies

with the street type and is stated in Table DC4-013-1. This area shall remain free of visual obstructions higher than three (3) feet and lower than ten (10) feet above the roadway surface. Within the Central Business District, the sight distance triangle shall conform as closely as possible to the above specification, as approved by the City Engineer.

DC4-014 - UNDERDRAINS

Underdrains shall be required for all islands, roundabouts, and at all dry curb locations. The Design Engineer shall plan for underdrains in all additional areas where subsurface moisture is existing or likely to occur. Underdrains shall be designed as shown in applicable Standard Details.

All projects that are being designed and constructed with public funds shall have a line item for 100 linear feet of underdrain. This will provide an established unit price for underdrain should it become necessary during construction. The plans shall note that the underdrain line item is a contingency which may not be constructed with the project if it is not necessary. Projects not constructed with public funds will not be required to have a contingency underdrain line item.

If it becomes apparent that underdrain is required in a location that was not identified in the plans, the City Engineer may require the Design Engineer to submit a revised plan including underdrains that will provide for subsurface drainage. The Standard Detail is a minimum. Upon approval of the City Engineer, alternate details for increased capacity may be allowed.

DC4-015 - PRIVATE STREETS

All streets and roadways within any development which are classified as "Private Streets" shall conform the *Technical Specifications and Design Criteria for Public Improvement Projects* for the City of Olathe.

DC4-016 - SIDEPATHS AND BIKE LANES

Sideways and bike lanes shall be provided at locations identified in Table DC4-002-1. Sideways constructed as part of this system shall be between eight (8) and ten (10) feet in width. If they are to be located within street right-of-way, they shall be constructed of concrete conforming to Section 2000 *Concrete* and be a minimum of four (4) inches thick. All joints shall be saw cut instead of tooled.

DC4-017 - EMERGENCY ACCESS ROADS

Emergency access roads connecting to public streets shall only be permitted at locations approved by the City Engineer.

DC4-018 - DEVELOPMENT ADJACENT TO UNIMPROVED ARTERIAL ROADS

A vertical profile, horizontal limits of future arterial roadway improvements, and elevations at the future right of way shall be established for all developments adjacent to an unimproved arterial roadway. The elevation of the proposed development shall match the elevation at the future right of way. An unimproved arterial road shall be defined as an arterial road which has not been constructed to its ultimate typical section as defined by the Major Street Map or as required by the City Engineer.

DC5 - DESIGN CRITERIA FOR STORM DRAINAGE FACILITIES

The City of Olathe design criteria shall conform to American Public Works Association (APWA) *Section 5600 – Storm Drainage Systems & Facilities*, latest edition, with the following amendments and modifications:

SECTION 5601 - ADMINISTRATIVE

5601.1 - INTRODUCTION

This section shall be modified to include the following paragraph:

The City Engineer reserves the right to modify the criteria set forth in this Section in order to accommodate unique or innovative projects, such as low impact developments, conservation developments, and redevelopment projects.

5601.3 - GENERAL REQUIREMENTS AND APPLICABILITY

This section shall be modified to include the following paragraph:

All proposed projects meeting the definition of a development as stated in Title 17 of the Olathe Municipal Code shall submit a stormwater management system design in accordance with this Section. Generally, developments that meet any of the following conditions must follow the criteria set forth in this Section:

- All land disturbances of 1 acre or more.
- Expansions or modifications to existing developments that increase the site impervious area by 5,000 square feet or more.

5601.5 - SYSTEM TYPES AND APPLICATIONS

5601.5A – General Guidelines – The following sentence shall be omitted from the fourth paragraph:

Generally, a drainage system shall be engineered and constructed when the drainage area exceeds 2 acres and shall consist of the following components.

5601.5A-1- Open Systems – This section shall be modified to include the following paragraphs:

When the tributary area is contained on-site and is less than 40 acres and provided that: a) the swale does not receive off-site runoff and b) the swale is situated on a single property or tract and routine maintenance is performed by that single property owner. Examples include, but are not limited to, large lot commercial, industrial or office developments. These swales shall be privately owned and maintained.

Roadside drainage ditches on large-lot single family developments as allowed by the City Engineer. Drainage easements shall be provided outside the public right-of-way where required to accommodate the swale section.

5601.8 - LEVELS OF SERVICE

5601.8A – Protection of Property – Sub-section 5601.8A-2 shall be modified to include the following paragraphs and table:

Refer to City of Olathe Chapter 18.30.100 of the Unified Development Ordinance, for additional freeboard requirements for structures adjacent to the FEMA 100-year floodplain.

All final development plans shall indicate building minimum low opening elevations that meet or exceed these freeboard requirements.

Table 5601.8-1 - System Design Capacity Requirements

Land Use	Minimum Design Storm
Residential (single-family and duplex)	10-year
Commercial, Multi-Family	25-year
Industrial	25-year
Parks and Greenbelts	10-year

The following Sub-Section shall be added:

5601.8A-3 – System Design Capacity

Enclosed systems and engineered swales shall be designed to convey the peak discharge from the storm events outlined in Table 5601.8-1. Engineered swales shall be provided at all sump locations and shall be designed to convey the 100-year peak runoff without consideration of the inlet capacity. The physical depth of an engineered swale shall not be less than twelve (12) inches, regardless of the depth of flow.

5601.8D Adjoining Property

Subsection 5601.8D-1 shall be replaced with the following paragraph:

Drainageways not designated as a Special Flood Hazard Area (Zone AE, Zone A or Zone X- Shaded): Where construction of a storm drainage system, including grading and filling within a natural drainage way, causes a rise in the ultimate development conditions 100-year flood stage on upstream properties, the Designer Engineer shall provide detailed hydraulic calculations verifying that all entries of upstream buildings are at least 1-foot above the proposed 100-year flood elevation. This analysis shall extend to the point where the pre- and post-project flood levels converge.

Subsection 5601.8D-2 shall be replaced with the following paragraph:

Drainageways designated as a Special Flood Hazard Areas (Zone AE, Zone A or Zone X-Shaded): When impacting adjoining properties, refer to Section 18.30.100 of the City of Olathe Unified Development Ordinance.

SECTION 5602 HYDROLOGY

5602.5 - UNIT HYDROGRAPHS

This section shall be replaced with Table 5602.5-1 (below):

Table 5602.5-1 - 24-Hour Rainfall Depth for Design Storm Frequencies

Storm Event	24-Hour Rainfall Depth(inch)
1-year	2.93
2-year	3.60
5-year	4.59
10-year	5.29
25-year	6.27
50-year	7.04
100-year	7.80

SECTION 5606 - ENCLOSED PIPE SYSTEMS

5606.5 – VELOCITY WITHIN THE SYSTEM

The following paragraph shall be added to this section:

Pipe slopes shall not be greater than 15%. Pipe runs with slopes greater than 12% will be required to have concrete collars. The City Engineer will review spacing calculations from the Design Engineer for these conditions. Proof of proper abrasion resistance in pipe and the receiving storm sewer structure must also be provided.

5606.7 - PIPE SIZE TYPE, COVER AND LOCATION

This section shall be added to Section 5606:

Minimum pipe size for stormwater conveyance systems shall be 15 inches inside diameter. All pipes shall be reinforced concrete pipe, except for pipes located outside the right of way and utility easements adjacent to the right-of-way which may be high-density polyethylene (HDPE). All pipes shall have a minimum cover of 18 inches, unless otherwise approved by the City Engineer.

All changes in pipe material must be at a structure (junction box, manhole, inlet, etc)

On single family or two (2) family residential lots, the enclosed system shall be extended to the back or side lot line, as appropriate. The maximum length of overland flow in the rear and side yards shall be 300 feet. In other locations, existing open swales, natural or improved, may remain along the rear or side of properties when the design provides the stream setback requirements in accordance with Title 17 of the Olathe Municipal Code.

SECTION 5607 - ENGINEERED CHANNELS

5607.2A – ROADSIDE CHANNELS

This section shall be modified to include the following statement:

Permanent easements for roadside drainage swales shall extend from the right-of-way to 10-feet beyond the outside bank of the swale.

5607.2B-EASEMENTS

The following sub-section shall be added:

5607.2C - Permanent easements shall be dedicated to the City of Olathe for operation and maintenance of swales that will be publicly maintained. The minimum width of permanent easements for overflow swales shall be the calculated 100-year flow width, with a minimum width of ten feet (10’).

SECTION 5608 - STORMWATER DETENTION AND RETENTION

5608.1 – RELEASE RATES

This subsection shall be replaced with the following paragraph and table:

The allowable release rates from detention facilities shall conform to Title 17 of the Olathe Municipal Code and are summarized in Table 5608.4-1.

Table 5608.4-1 - Allowable Release Rates from Detention Facilities

Design Storm	Allowable Post Development Release Rate
1-Year	Pre-developed 1-year storm
10-Year	Pre-developed 10-year storm
100-Year ¹	Pre-developed 100-year storm

¹Only required when downstream building and/or street flooding issues have been identified

5608.2 CONNECTIONS TO EXISTING PUBLIC STORMWATER STRUCTURES

Connections to existing public stormwater structures with proposed public or private storm sewer pipe is only allowed if the existing public stormwater structure is made of reinforced concrete. Existing public stormwater structures constructed of any other material must be replaced with new structures meeting all the requirements of the City of Olathe Specifications and Standard Details

DC6 - DESIGN CRITERIA FOR WATER LINE CONSTRUCTION

DC6-001 - GENERAL

Hydraulic calculations shall be submitted for review with all commercial and industrial plans. Upon request by the City Engineer, hydraulic calculations shall be submitted for residential plans. Typically, these calculations shall be shown on a drawing sheet included in the plans.

All commercial and industrial water lines shall be designed with a minimum of two (2) feed lines (looped system). Dead end lines will not be allowed without approval from the City Engineer.

No public water line shall be constructed less than eight (8) inches in diameter. Where water lines less than eight (8) inches exist, it shall be upgraded to a minimum diameter of eight (8) inches, unless otherwise approved by the City Engineer. Public water lines along arterial streets shall have a minimum size of twelve (12) inches.

DC6-002 - LOCATION OF WATER MAINS AND APPURTENANCES

Proposed water mains shall be located in a dedicated ten (10) foot public utility easement adjacent to the right of way, in a fifteen (15) foot stand-alone public utility easement or, with the City Engineer's approval, within the street right-of-way. Street grades and elevations of proposed main shall be taken into consideration so relocation of the water line will not be required.

Combination air release valves are required at high points of water transmission mains where no services exist or are planned. The profile of the water main shall be designed to limit high points in the line where practical, particularly where mains are installed within the right-of-way.

DC6-003 - DEPTH

All water mains shall have a minimum cover of forty-two (42) inches.

DC6-004 - MATERIALS OF CONSTRUCTION

Ductile iron pipe or High-density Polyethylene (HDPE) shall be used for water mains constructed in the City of Olathe, unless approved otherwise by the City Engineer. Based upon soil conditions, HDPE may be required as directed by the City Engineer.

The ductile iron shall conform to AWWA C151. The nominal pressure class for ductile iron pipe shall be 350 for 3" – 12", 250 for 14" – 20", 200 for 24" and 150 for 30" – 64", unless otherwise designated by the City Engineer. All ductile iron water mains shall be polyethylene encased and shall conform to AWWA C105.

HDPE water mains shall conform to AWWA C906. The HDPE pipe shall be Ductile Iron Pipe Size (DIPS) with a minimum Dimension Ratio (DR) of 11. HDPE pipe shall be NSF 61 product certified.

DC6-005 - FIRE HYDRANTS

Fire hydrants shall conform to AWWA C502.

Hydrants shall be traffic models with breakaway flanges and shall have one 4-1/2 inch pumper nozzle and two 2-1/2 inch nozzles. All hydrants shall be furnished with a six (6) inch auxiliary gate valves.

Hydrants shall be placed at or near street intersections, at the end of dead-end lines and at intermediate points when block lengths exceed 500 feet. Under no circumstances shall the spacing of fire hydrants exceed 500 feet in residential areas or 300 feet in commercial areas. Fire hydrant spacing in industrial areas shall be determined by the Fire Marshal.

Tapping of extended fire hydrant lines for water service lines, irrigation lines, and private fire lines in commercial and industrial areas shall not be allowed.

Fire hydrant installations shall conform to all applicable Standard Details.

If the line to the fire hydrant exceeds 100', a valve must be placed at the tee to the water main.

DC6-006 - LINE VALVES

Gate valves shall be of the resilient-seated configuration and shall conform to the applicable requirements of AWWA C509 and C515.

Gate valves shall be used in all water mains less than sixteen (16) inches in diameter.

Butterfly valves shall conform to AWWA C504 and shall be used in all mains sixteen (16) inches and larger in diameter.

Valves shall be placed in all straight runs of pipe at intervals not to exceed 800 feet. Where two lines intersect, a valve should be placed in each pipe on each side of the intersection. Valves should be so placed that any pipe two (2) blocks long can be cut out of the general circulation without interrupting service in the rest of the system.

DC6-007 - CONNECTIONS TO EXISTING WATER MAINS

Connections to existing water mains shall be made in such a manner as to provide the least amount of interruption to water service. In the event closing of valves to make a connection will affect a customer who requires continuous service, temporary tap(s) shall be scheduled and made for temporary service.

Temporary water service shall not be permitted from a fire hydrant. Where possible, connections to existing mains shall be made using tapping sleeves and valves as approved in the City of Olathe *Technical Specifications for Public Improvement Projects*.

DC6-008 - PROVISIONS FOR FUTURE EXTENSIONS OF WATER MAINS

At the termination of all water mains or at locations as specified by the City Engineer, a fire hydrant in accordance with Standard Details shall be provided.

DC6-009 - THRUST RESTRAINT

All fittings shall be restrained joint unless otherwise approved by the City Engineer. The Design Engineer shall determine the locations and lengths of restrained joint piping required. The Design Engineer shall tabulate the extent of the restrained joints on the plan and profile sheets. This requirement shall apply to horizontal and vertical bends, tees, reducers, and dead ends. Using the calculated distance on both sides of a fitting, the minimum requirements of the table shall include stationing on both sides of the fitting, the stationing of the fitting, type of fitting, angle of deflection, and diameter of pipe or fitting. The factor of safety used in the calculations should not be less than 1.5. The design pressure for calculations should be 180 psi, with a minimum depth of 3-1/2 feet.

Where there are combinations of bends to provide for vertical as well as horizontal situations, the total distance requiring restraint shall be inclusive of distance on both sides of the extreme fittings plus the distance between the interior fittings. The calculation for these combinations shall not be calculated individually. Where the combination includes different bends, the calculation shall be based upon the highest degree bend. It is recommended that the DIPRA Model be used for these determinations, with a Type 4 Laying Condition and Clay 1 Soil Designation, unless otherwise approved by the City Engineer.

Tables DC6-009-1 and DC6-009-2 outline the waterline design criteria for the City of Olathe.

Table DC6-009-1 - Design Criteria for Limits of Ductile Iron Pipe Thrust Restraint

Design Criteria
Horizontal fittings only, without combination bends
Type No. 4 Laying Conditions, gravel backfill to 1/8 diameter above pipe
Clay No. 1 Soil Conditions, Clay of medium to low plasticity
All mains to be poly-wrapped
Depth of cover 3.5 feet
Design Pressure 180 psi
Factor of Safety of 1.5

Any trench, soil depth or pressure conditions which deviate from the above listed criteria should be reviewed by the Design Engineer for an alternate solution.

Table DC6-009-2 -Footage of Restrained Joints for Bends and Fittings

Table Thrust Restraint for Fittings (footage is for each side of fitting)							
Fitting	4"	6"	8"	10"	12"	14"	16"
11 1/4° Bend	2'	3'	4'	5'	6'	7'	8'
22 1/2° Bend	4'	6'	8'	10'	12'	14'	16'
45° Bend	9'	13'	17'	21'	25'	29'	33'
90° Bend	22'	32'	42'	51'	61'	70'	79'
Dead End	23'	33'	44'	54'	64'	74'	84'
Table of Thrust Restraint for Tees (restraint is on branch only)							
Branch Size	4"	6"	8"	10"	12"	14"	16"
Restraint Length	23'	33'	44'	54'	64'	74'	84'

Table of Thrust Restraint for Reducers						
	4"	6"	8"	10"	12"	14"
16"	-	71'/178'	61'/118'	50'/78'	36'/47'	19'/22'
14"	-	59'/130'	48'/81'	35'/19'	19'/22'	-
12"	55'/152'	46'/88'	34'/49'	19'/22'	-	-
10"	43'/100'	33'/53'	18'/22'	-	-	-
8"	31'/59'	18'/24'	-	-	-	-
6"	17'/25'	-	-	-	-	-

Example: 16" x 12" reducer requires the following: 36'/47'

Length of restrained joint piping for the large side of reducer 36 feet

If the straight run of pipe on the small side of reducer exceeds 47 feet, then no restrained joints are necessary. Note: It will be an unusual situation when a tee or dead-end assembly does not control the length

of restraint required on the reduced pipe side (the 47 ft. in the example above); however, the situation should be reviewed.

DC6-010 - SEPARATION OF WATERLINES AND SANITARY SEWERS

There shall be no physical connection between a public or private water supply system and a sewer, or appurtenance thereto, which would permit the passage of any wastewater or polluted water into the potable water supply.

When water pipes and sanitary sewer systems, including gravity mains, force mains, and manholes, are installed parallel to each other, the minimum horizontal separation shall be ten (10) feet. Waterlines and sanitary sewer pipes shall not be installed in the same trench, regardless of the width of the trench. In cases where it is not practical to maintain a ten (10) foot separation, alternate designs which provide equivalent protection shall be submitted to the City Engineer and KDHE for approval.

The minimum vertical clearance between waterlines and sanitary sewer lines shall be two (2) feet and the waterline shall always cross above the sanitary sewer main.. Crossings with less than two (2) feet of vertical separation shall be in accordance the material and jointing requirements of B.1 of Chapter VIII of KDHE's *Policies, General Considerations and Design Requirements for Public Water Supply Systems in Kansas* and pressure tested to assure water tightness pursuant to the most recent revision of KDHE's *Minimum Standards of Design for Water Pollution Control Facilities*. If concrete encasement is the selected alternative when two (2) feet of vertical separation between the gravity sanitary sewer and the waterline is not possible, the encasement for the sanitary sewer shall have a minimum thickness of six (6) inches and extend a minimum of 10 feet on each side of the crossing.

Joints in the sewer pipe shall be located as far as practical from the intersected water main.

DC6-011 - SEPARATION OF WATER MAINS AND OTHER POLLUTION SOURCES

It is of the utmost importance that potable water lines be protected from any source of pollution. The following shall pertain to instances where septic tanks, absorption fields, waste stabilization ponds, feedlots, or other sources of pollution are encountered.

- a) A minimum distance of 25 ft. (7.6 m) shall be maintained between all potable water lines and all pollution sources, e.g., septic tanks, septic tank absorption fields, waste stabilization ponds, sewage contamination, wastewater, landfill leachate, and all CAFO facilities.
- b) Under no circumstances shall a water line be extended through an area that is a real or potential source of contamination to the water line or water supply.

Under no conditions shall the encasement of a water line be considered as adequate protection of a water line or a water supply for the purpose of extending the water line through a real or potential source of contamination.

DC6-012 - WATERMAIN EASEMENT WIDTH REQUIREMENTS

Easement width shall be based on the depth to the centerline for watermains. The easement width shall not vary within the same parcel for watermains. Using the greatest depth within a parcel, easement width is to be determined from the table below:

DC6-012-1: Easement Widths

LINE DEPTH	EASEMENT WIDTH
0 - 12 ft	20 ft
12 - 16 ft	25 ft
16 - 20 ft	30 ft

DC6-013 - HIGHWAY AND RAILROAD CROSSINGS

All crossings of highways or railroads shall be made by boring or tunneling. Casing pipe shall be greater than or equal to the strength and integrity of the carrier pipe (casing pipe shall conform to the City of Olathe *Technical Specifications for Public Improvement Projects*, Section 4000). The installation shall comply with all federal, state, and local regulations. The work shall be in conformance with all requirements and regulations of the entity having jurisdiction of the right-of-way.

DC6-014 - STREET CROSSINGS

Open cutting of streets shall be allowed only where permitted by the City Engineer. At locations where open cutting is not permitted, the crossing shall be made by boring or tunneling. All work and materials shall be in accordance with the requirements of the City of Olathe *Technical Specifications for Public Improvement Projects*.

Casing is required for all watermains crossing an arterial roadway.

DC6-015 - STREAM CROSSINGS

Waterlines crossing navigable streams, as determined by the US Army Corps of Engineers, are to be buried at a minimum depth of seven (7) feet beneath the streambed. Waterlines crossing non-navigable streams are to be buried at a minimum depth of five (5) feet beneath the streambed.

DC6-016 - FIRE FLOW REQUIREMENTS

Public improvement plans for water line projects serving development sites other than single family or duplex sub-divisions shall be reviewed for fire protection sufficiency by the Fire Marshal. The Fire Marshal shall determine the required rate of flow for fire protection based on I.S.O. guidelines. The Design Engineer shall obtain the flow requirements and then determine if the existing and proposed water lines can provide the minimum flow rate. Calculations verifying the flows shall accompany the drawings when submitted for approval.

DC6-017 - END OF CUL-DE-SAC

All waterlines terminating within cul-de-sacs shall be designed in conformance with the applicable Standard Details. The waterline shall be extended to a point where water service lines will not be located under the cul-de-sac bulb.

DC6-018 - PRIVATE FIRE LINES

A private fire line shall be defined as a fire protection main which only has connections to private on-site fire hydrants and/or building fire sprinkler systems. All water lines and hydrants within a development which are classified as a "private fire line" shall conform to the design and specifications of water mains, as stipulated in the *Technical Specifications and Design Criteria for Public Improvement Projects* for the City of Olathe.

Construction of all private water lines requires installation of an isolation valve and a double check detector assembly (DCDA). The DCDA shall be located at the point of connection to the main. Variances from this policy shall be approved by the City Engineer. Maintenance of the backflow prevention device and private water line shall be the responsibility of the property owner.

Public water service lines shall not be connected to private water lines. Private fire lines are for fire protection only and are considered non-potable.

Cross connections between a private water line used for fire protection and a public water main shall be prohibited.

DC-7 DESIGN CRITERIA FOR PRIVATE IMPROVEMENTS

DC7-001 - GENERAL

Private improvement construction in the City of Olathe shall conform to all applicable codes, regulations and ordinances as established by the City of Olathe. The design and construction of private improvements including streets, storm sewers, sanitary sewers, waterlines, streetlights, and related construction shall conform to the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects*.

Plans for private improvements associated with building construction shall be submitted to the Building Codes. Plans for private improvements not associated with new building construction or an addition to an existing building shall be submitted for review and approval to Engineering Services.

DC7-002 - PARKING LOT CONSTRUCTION

Parking lot construction shall conform to the following design criteria and all City of Olathe ordinances:

Materials for Construction

The acceptable materials and thicknesses for parking lot pavement sections are outlined in Table DC7-002-1.

Table DC7-002-1 -Parking Lot Pavement Material and Minimum Thickness

Material	Minimum Thickness (in)
Full Depth Asphaltic Concrete Section	
Asphalt Surface (BM-2)	2
Asphalt Base (BM-2B)	4
Asphaltic Concrete with Aggregate Base	
Asphalt Surface (BM-2)	4
Aggregate Base (AB-3 OP Modified)	6
Portland Cement Concrete Pavement	
Portland Cement Concrete Pavement ¹	5

¹ Portland Cement Concrete Pavement shall be air-entrained with a 28 day compressive strength of 4,000 psi and include 10-gauge welded wire mesh on six (6) inch centers each way, embedded two (2) inches from the bottom of the slab

Driveway entrances and concrete curbs within the right-of-way shall meet the requirements of Sections 1400, 2000, and 2100 of the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects*. Parking lot curbs shall be air-entrained with a minimum 28-day compressive strength of 4,000 psi.

Curb and Gutter

Concrete curbing shall be provided along the perimeter of parking areas and along drives connecting parking areas with public streets. Curbing shall be in accordance with the Standard Details, unless otherwise approved by the City Engineer.

All work within public right-of-way shall conform to applicable City of Olathe *Technical Specifications for Public Improvement Projects* and applicable Standard Details. Transitions to existing curb and gutter shall be made at saw joints in existing curb or at existing expansion joints. Expansion joints shall be placed where new curbing abuts existing curbing.

Drainage Facilities

All parking areas shall be provided with adequate drainage facilities as approved by the City Engineer. Enclosed storm sewers shall be used to collect and convey drainage to the public storm sewer system or detention/bmp facility as needed. Stormwater runoff exiting through driveway entrances shall not be allowed unless otherwise approved by the City Engineer and shall conform to the City of Olathe *Design Criteria for Public Improvement Projects*, Section 5. If the flow exceeds the capacity of the gutter, it shall be collected by a curb inlet prior to entering public right-of-way.

Runoff calculations shall be in accordance with the City of Olathe Design Criteria for Storm Drainage Facilities. All calculations shall be submitted to the City Engineer for review and approval. Detention facilities shall be required unless otherwise approved by the City Engineer. Drainage structures located in the public right-of-way which are constructed or modified with parking lot improvements shall be in accordance with the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects*.

Driveway Entrances

All driveway entrances within the public right-of-way shall be constructed in accordance with the Standard Details and Section 18.30.50 of the City of Olathe Uniform Development Code. In addition to the above design criteria, Table DC7-002-2 outlines geometric design criteria.

ADA detectable warning devices shall be installed at all traffic signal controlled commercial drives in accordance with the Standard Details.

Table DC7-002-2 -Driveway Widths and Radii per Driveway Type (BOC-BOC)

Driveway Type	Maximum Width ¹ (ft)	Minimum Width ¹ (ft)	Minimum Radii ² (ft)
Commercial			
2-Way without median	35	28	25
2-Way with median ³	52	32	25
1-Way In-bound	20	16	25
1-Way Out-bound	24	20	25
Industrial			
2-Way without median	65	28	35
2-Way with median ³	65	32	35
1-Way In-bound	24	20	35
1-Way Out-bound	24	20	35

¹ Width shall be measured at the property line parallel to the roadway

² As requested by the City Engineer, the Design Engineer shall provide truck turning movement diagrams to verify the adequacy of the curb radii

³ Minimum width of median shall be 4 feet

Driveways which are shared by adjacent property owners require an access easement be recorded at the Johnson County Treasury, Taxation, and Vehicles Department.

All construction within right-of-way under the control or jurisdiction of the State of Kansas shall be reviewed and approved by the appropriate state agency prior to submitting plans to the City of Olathe. Plans submitted to the City of Olathe for review shall reflect all changes or corrections as required by that state agency as outlined on the approved state permit.

DC7-003 - PRIVATE DRAINAGE FACILITIES

When a public storm sewer system is located adjacent to the lot, the private drainage facility shall be extended to the public system by the property owner and connected to storm sewer system by the City of Olathe Infrastructure Department. All other private drainage facilities, including inlets, sump pumps, outfalls, end sections, pop-up drains, or other discharge devices, shall be located a minimum of four (4) feet from all property lines, including the Right-of-Way (ROW). If the private drainage facilities cause a hazardous condition to surrounding lawns, sidewalks or other improvements, the line shall be relocated to a location designated by the City Engineer, at the private drainage facility owner's expense.

Pipe size and type can only change at a storm sewer structure.

DC7-004 - CONVERTING PRIVATELY OWNED INFRASTRUCTURE TO PUBLICLY OWNED INFRASTRUCTURE

Requests for converting privately owned infrastructure to public owned infrastructure shall be made in writing to the City Engineer. Privately owned infrastructure must comply with the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects*. All costs associated with evaluating the suitability of privately owned infrastructure shall be the responsibility of the requestor.

DC8 - PRIVATE IMPROVEMENT PLAN PREPARATION

DC8-001 - INTRODUCTION

The following criteria have been established to provide a uniform system of plan preparation for work within the City of Olathe related to private improvements. The plan preparation criteria should be used for plans being developed for parking lot expansion permits and grading permit applications.

DC8-002 - GENERAL

All plans for private improvements shall be prepared by a Professional Engineer licensed in the State of Kansas and submitted to Engineering Services for review. After the review, the Design Engineer will be notified of the approval of the plans as submitted, or of any necessary changes.

Private improvement plans that involve public water lines, sanitary sewer lines, storm sewer lines, or street construction shall be prepared in accordance with the plan preparation requirements detailed in Section 1 of the Design Criteria (DC1).

Private improvements involving parking lot construction shall meet the requirements outlined in Section 7 of the Design Criteria (DC7).

A digital set private improvement plans shall be submitted through the City's online permitting portal. Typically, the plans will be reviewed within five (5) working days from the date received; however, large or complicated projects may require longer review times. Once the plans are approved, three (3) sets of plans must be delivered to the Engineering Services Group for signature by the City Engineer. One set of plans stamped Approved by the Engineering Services will be returned and will serve as the permit for construction.

DC8-003 - PLANS

The following items shall be provided on the plans submitted for the construction of a new parking lot, addition to an existing parking lot, building, structure, etc.

- A. A location map, with north arrow, adequately showing project location in relation to major streets.
- B. General site layout to include:
 - Building location (if applicable)
 - Street names, lot, and block designation
 - Parking lot setback dimension from property lines
 - Landscaping
 - Lighting
 - Erosion control
 - Storm Sewer
- C. All existing property lines, lot lines, street right-of-way lines, and temporary and permanent easement lines shall be shown at their proper location. Street right-of-way lines and existing driveways shall be shown on both sides of the street adjacent to the perimeter of the lot.
- D. All existing and proposed utilities such as electric, gas, oil, water, telephone, sanitary sewer, storm sewer, and other applicable items shall be shown in conformance with the best information available from the owner of such facilities, or by field surveyed location. The plan shall identify the size, material, and type of construction.

- E. Existing and proposed site contours for the site shall be shown. Proposed contours shall be supplemented with spot elevations at critical locations.
- F. Limits of paving, perimeter curbing, and parking stalls, including handicapped parking, and all dimensions shall be shown, including radii and other significant geometric details.
- G. A legend for the site layout detail and a sheet(s) that includes both Standard Details and project specific details. The project specific details shall include a profile view of the proposed curb(s), a section through the proposed pavement detailing pavement composition, a driveway entrance detail in accordance with the Standard Details, proposed drainage structures, and any other appropriate details as required by the City Engineer.
- H. Storm drainage facilities in both plan and profile view. These views shall show inlet and pipe locations, size, material, gauge, slope of pipe, design storm hydraulic grade line, and all invert and top of structure elevations. The plan sheets shall include a drainage calculation summary table identifying the pipe size and slope, pipe capacity, velocities, time of concentration, runoff coefficient, incremental and accumulated tributary acreage, rainfall intensity, the total rainfall runoff, and design storm hydraulic elevation.
- I. General construction notes as required.
- J. Erosion control designed in accordance with the latest edition of the City of Olathe's *Technical Specifications Section and Design Criteria for Public Improvement Projects*, including the City of Olathe Standard Erosion Control Notes (section DC1-009).
- K. Parking lot lighting designed in accordance with the latest edition of the City of Olathe's Unified Development Ordinance (U.D.O.).
- L. Landscape plans designed in accordance with the latest edition of the City of Olathe's Unified Development Ordinance (U.D.O.).

DC9 - DESIGN CRITERIA FOR STREET LIGHTING CONSTRUCTION

DC9-001 - GENERAL

Proposed street lighting construction in the City of Olathe shall conform to the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects* and all applicable Standard Details. Plans shall be submitted through the City's online permitting portal for approval and shall include all required information as outlined in this Section. Street Light plans shall be submitted concurrently with the Street plans as a standalone plan set bearing the same City of Olathe project number.

DC9-002 - CATEGORIES OF STREETS AND PROCEDURES

For all street classifications, streetlights shall be installed in accordance with Chapter 18.30.230 of the City of Olathe Unified Development Ordinance, unless otherwise approved by the City Engineer.

DC9-003 - DESIGN PROCESS

The illumination design process involves the selection of the proper lighting equipment and the establishment of the geometry of the system in order to provide the most effective lighting system. The major steps of the design process are outlined as follows:

- **Existing Conditions** - Determination of roadway facility and land use area classifications.
- **Selection of Illumination Level** - The recommended average intensity of horizontal illumination may be determined based upon the classifications of roadway facility and area type.
- **System Characterization** - Detailed calculations using selected light source types and sizes and luminaire mounting height and spacing locations are utilized in order to determine the average intensity of horizontal illumination. Based upon the selected equipment and geometrics, an isocandle diagram or computer program equivalent is utilized to determine the minimum illumination level. The uniformity of illumination is checked by comparing the ratio of average maintained illumination to minimum maintained illumination, commonly referred to as the uniformity ratio, with the recommended criteria in order to determine optimal effectiveness of lighting system.

DC9-004 - DESIGN CONDITIONS

The number of luminaires shall be minimized and shall be placed 3' behind the curb, unless otherwise approved by the City Engineer. Breakaway pole bases are required for Collector, Industrial/Service and Arterial Street installations.

Determination of light source size, type, mounting height and spacing shall at least conform to the requirements outlined below based upon the required illuminance levels when the luminaires are at their lowest output. This condition occurs just prior to lamp replacement and luminaire washing. Therefore, formulas calculating average illuminance shall include light loss factors relating lamp lumen depreciation and luminaire dirt depreciation.

Local Streets:

- Luminaires will be located at intersections of local residential streets, equally spaced along cul-de-sacs longer than 200 feet, at changes of alignment of 60° or more which are 200 feet or more from an intersection, and/or a minimum number of mid-block lights such that the spacing between lights is approximately 200 ft.
- In conformance with the current City of Olathe Approved Materials List

Collector and Industrial/Service Streets:

- In conformance with the current City of Olathe Approved Materials List
- The collector standard streetlights shall be used at the intersection of collector and residential streets.

Arterial Streets:

- In accordance with the current City of Olathe Approved Materials List
- The collector standard streetlights shall be used at the intersection of collector and residential streets.

Expressways:

- LED Luminaires
- In accordance with the City of Olathe Approved Materials List
- Round galvanized steel or aluminum poles for 40' mounting height

DC9-005 - PEDESTRIAN CONFLICT AREA CLASSIFICATION

The classification of urbanized areas shall be generally defined as follows:

- **High.** High pedestrian use areas are generally densely developed business districts, which attract a heavy volume of nighttime vehicular and/or pedestrian traffic.
- **Medium.** Medium pedestrian use areas are characterized by multi-family residential and commercial land uses, such as libraries, recreation centers and neighborhood retail buildings.
- **Low.** Low pedestrian use areas are generally single family and duplex residential developments with minimal nighttime pedestrian traffic.

DC9-006 - ROADWAY FUNCTIONAL CLASSIFICATION

The functional classification of roadways is defined in American National Standards Institute (ANSI) Illuminating Engineering Society (IES) RP-8.

DC9-007 - RECOMMENDED AVERAGE MAINTAINED ILLUMINATION

The average illumination design criteria for roadways and intersections are outlined in Table DC9-007-1 and DC9-007-2, respectively.

Table DC9-007-1 -Illuminance Requirements for Roadways

Roadway Functional Classification	Average Maintained Illumination at Pavement, fc			Illuminance Ratio ¹
	Pedestrian Use Classification			
	High	Medium	Low	
Freeway	0.6	0.6	0.6	3
Expressway	1.4	1.2	0.9	3.0
Arterial	1.7	1.3	0.9	3.0
Collector and Industrial/Service	1.2	0.9	0.6	4.0
Local	0.9	0.7	0.6	6.0
Alley	0.6	0.4	0.4	6.0

¹ Illumination Ratio equals Average Illuminance divided by Minimum Illuminance

Table DC9-007-2 -Illuminance Requirements for Intersections

Intersection Type	Average Maintained Illumination at Pavement, fc			Uniformity Ratio ¹
	Pedestrian Use Classification			
	High	Medium	Low	
Arterial/Arterial	3.4	2.6	1.8	3.0
Arterial/Collector	2.9	2.2	1.5	3.0
Arterial/Local	2.6	2.0	1.3	3.0
Collector/Collector	2.4	1.8	1.2	4.0
Collector/Local	2.1	1.6	1.0	4.0
Local/Local	1.8	1.4	0.8	6.0

¹ Uniformity Ratio equals Average Illuminance divided by Minimum Illuminance

DC9-008 - DESIGN CALCULATIONS

All calculations shall conform to the standard practice of the Illuminating Engineering Society of North America and shall be included with the plan submittal. The required calculations are summarized below.

Spacing - The spacing between the luminaires is the longitudinal distance if spaced in staggered or one-sided arrangement. This distance is one-half the longitudinal distance if luminaires are arranged in opposite spacing.

Light Loss - The light loss factor represents the luminaire conditions at their lowest output level. The total factor is based upon the contribution of individual light loss factors such as lamp lumen

depreciation, luminaire dirt depreciation, ambient temperature, in-service voltage, ballast, lumen component depreciation, physical surroundings, and burnouts. The light loss factor can be determined by tables from the equipment manufacturer for the given luminaire type.

Coefficient of Utilization - The coefficient of utilization is equal to the total of street side and house side coefficients of utilization as determined from the equipment manufacturer coefficient of utilization curves for the given luminaire type, placement, and mounting height.

Minimum Illumination -Minimum illumination is determined from the isofootcandle diagram or computer program equivalent from the equipment manufacturer for the given luminaire type, placement, and mounting height.

Uniformity Ratio – The uniformity ratio shall not exceed 4:1 and preferably not exceed 3:1, except on residential streets where 6:1 may be acceptable.

Cutoff - The control of candlepower distribution shall be a true 90° cutoff.

DC9-009 - ELECTRICAL SYSTEM

The electrical system shall comply with the American National Standard Practice for Roadway Lighting, the National Electrical Code (NEC) and the National Electrical Safety Code (NESC) as summarized below:

- At signalized intersections, a 200-amp switch load street light cabinet shall be installed on the same concrete pad as the traffic signal cabinet, in accordance with the City of Olathe Approved Materials List and applicable Standard Details.
- Conduits and junction boxes for streetlight and traffic signals shall remain separate except for streetlights located on traffic signal poles.
- Wiring for streetlights shall be copper. Aluminum wire will not be permitted.
- All junction boxes shall be Type II at a minimum.

DC10 - DESIGN CRITERIA FOR TRAFFIC SIGNALS

DC10-001 - GENERAL

These criteria are established to provide uniform procedures to aid the Design Engineer in preparing traffic signal improvement plans for projects in the City of Olathe. The traffic signal system shall consist of the signal controller, signal poles, signal heads, cable, conduit, vehicle detectors, and any other appurtenances required to provide a complete, operable traffic signal system. Components of the system shall conform to the City of Olathe *Technical Specifications for Public Improvement Projects*, including Section 9200. The traffic signal Standard Details are available through the City of Olathe Infrastructure Department, Traffic Operations Division or at www.olatheks.org.

DC10-002 - DESIGN CRITERIA

In addition to the following requirements, all work shall conform to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD), latest edition.

Standard Phasing:

The following standard phasing shall be utilized, unless otherwise approved by the City Engineer:

- Phase 1 – eastbound left
- Phase 2 – westbound through
- Phase 3 – southbound left
- Phase 4 – northbound through
- Phase 5 – westbound left
- Phase 6 – eastbound through
- Phase 7 – northbound left
- Phase 8 – southbound through

Signal Heads:

Traffic signal heads shall be placed in accordance with the MUTCD. Additional guidelines are provided below to standardize the placement of signal heads:

1. A standard three-section head should be centered over each exiting lane for all through lanes of traffic.
2. When a left-turn lane is provided without left-turn phasing, no separate signal head should be provided for the left-turn movement.
3. When protected left-turn phasing is specified, the three-section head shall be centered over the left-turn lane. When dual left-turn movements are specified, a separate indication should be centered over each left-turn lane.
4. When protected/permissive left-turn phasing is specified, a four-section head should be centered over the left-turn lane. The head shall be accompanied by a LEFT TURN YIELD ON symbolic flashing yellow arrow.
5. All traffic signal and pedestrian indications shall be LED displays. In addition, backplates shall be provided for all traffic signal heads that are mounted to the mast arm. Signal heads that are mounted to the signal pole should not be equipped with backplates.

Emergency Preemption:

Opticom emergency preemption equipment shall be installed on the signal mast arm for all directions of traffic.

Street Lighting:

Street lights shall be coordinated with the City Engineer to determine the need for combination mast-arm street lights at new or modified signal installations. Luminaire placement shall be in accordance with the City of Olathe *Technical Specifications and Design Criteria for Public Improvement Projects*. All clearances shall be coordinated with overhead utility providers.

Detector Loops:

Stop bar detection loops shall be 6 ft. x 30 ft. Quadrapole detector loops and advanced detector loops shall be 6 ft. x 6 ft.

The front of the stop bar detector loop shall be placed 15 to 20 feet from the nearest edge of the through lane of the intersecting road extended. Stop bar detection loops shall extend a minimum of two (2) feet beyond the stop bar pavement marking.

All stop bar detection loops utilizing 6 ft. x 30 ft. quadrapoles shall also include a 6 ft. x 6 ft. loop 10 ft. from the back edge of the quadrapole to be utilized for count purposes.

When vehicle detector loops are used, advance detector loops shall be placed at the standard distances outlined in Table DC10-002-1. The distances are measured from the back of the stop bar to the back of the loop.

Table DC10-002-1 -Advanced Loop Detector Spacing Based Upon Design Speed

Speed (mph)	Distance (ft)		
	Near	Mid	Far
35	122	209	--
40	163	260	--
45	210	320	--
50	163	260	380
55	210	320	450

Service Boxes:

Service boxes shall be provided whenever conduit changes direction and adjacent to signal poles and controllers. Use type IV double lid junction box on controller corner. Junction boxes shall be used adjacent to detector loop locations for the splicing of loop wire to the lead-in cable. Type I junction boxes shall be used where one or two conduit runs enter/exit the box. Type II junction boxes shall be used where more than two conduit runs enter/exit the box. Service and junction boxes shall be installed at least 2 feet from the back of curb to the center of the box and no closer than 2 feet to any pole. The distance between service and/or junction boxes shall not exceed 200 feet to facilitate the pulling of cable.

Conduit:

All conduit for traffic signal installations shall be high density polyethylene (HDPE) SDR9. Signal conduit that extends from signal poles to adjacent service boxes shall be two (2) 3-inch conduit while signal conduit that extends from the signal controller to the adjacent service box shall consist of four (4) 3-inch conduits. Signal conduit that extends from service box to service box shall be two (2) 3-inch conduits. In all cases, the cables shall not exceed 40 percent of the conduit cross-sectional area. Signal conduit for advance detectors or signal interconnect/fiberoptic cable shall be two (2)-inch conduit.

Street lighting cable is permitted in signal conduit runs and boxes only if the streetlight is attached to the traffic signal pole. The conduit sizes above are typical applications and shall be verified by the Design Engineer to ensure that no more than 40 percent of the conduit cross sectional area is filled by the cables.

Secondary Service:

The Design Engineer shall coordinate and verify the location of the proposed secondary service point with the appropriate utility company to ensure availability of service. A three (3) inch conduit with secondary service wire shall extend from the controller to the secondary service point (KCPL only). A three (3) inch conduit with a pull string shall extend from the controller to the secondary service point (WestStar only).

Signal Poles:

Signal poles shall be located a minimum of 6 feet from the back of curb to the center of the pole. When pedestrian signal heads are used, signal poles with push buttons shall be placed in accordance with ADA Guidelines. Pedestrian poles may be utilized to facilitate ADA compliant pedestrian access needs. Signal and pedestal poles shall be powder coated black per the City of Olathe *Technical Specifications for Public Improvement Projects* at designated intersections as determined by the City Engineer.

Controller Cabinet:

Controller cabinets shall be located adjacent to and behind the sidewalk. In locations where no curb exists, the controller shall be placed as far from the edge of pavement as practical but shall be a minimum of ten (10) feet from the edge of pavement unless otherwise approved by the City Engineer. The controller cabinet shall not be placed on the lowest elevation corner of the intersection, unless otherwise approved by the City Engineer.

Wiring:

The number of conductors required for the various types of traffic signal equipment is summarized below:

Cable for both vehicle signal heads and pedestrian heads shall be 7-conductor cable conforming to International Municipal Signal Association (IMSA) Specification 19-1. One (1) 21-conductor cable shall be installed per mastarm pole for the vehicle signal heads regardless of the quantity of heads on the mast arm. Typical intersection would require four (4) 21 conductor cables. A spare 7-conductor shall be installed with the 21 conductors. One (1) 2-conductor cable per pushbutton shall be provided, from the controller with no splicing.

Detector lead-in cable shall be 4-conductor shielded cable. Detector loop wire shall be single conductor PVC/nylon with tube jacket.

Street lighting distribution cable shall be two (2) 1-conductor No. 8 AWG. Pole and bracket cable shall be No. 10 Thermoplastic High Heat-resistant Nylon-coated (THHN) 2-conductor stranded copper conforming to IMSA Specification 19-1. Street lighting cable for luminaires on signal poles should be spliced inside the signal pole, not the service box adjacent to the pole.

Microwave Detection:

When microwave detection is used, the detection system shall be Wavetronix/Matrix. The microwave detector shall be mounted to the mast arm that is attached to the traffic signal pole. The plans shall include notes requiring coordination with the manufacturer for the proper placement and configuration of the microwave detection system.

Overhead Signs:

Overhead street name signs shall be mounted to the mast arms using Sky-Brackets. There shall be a minimum of two (2) brackets per sign placed no more than three (3) feet apart with a maximum of one (1) foot from the edge of the sign. The overhead street name signs shall be placed between the signal pole and the first vehicle signal head. The power feed shall be continuous from controller to sign.

Traffic Signal Interconnect:

At locations specified by the City Engineer, interconnection of the traffic signals through fiber optics may be required. Fiber optic cable shall be separate from copper signal conductors. A Fiber Optic Pull Box shall be placed outside of the traffic signal cabinet. One hundred (100) feet of spare fiber shall be coiled in each pull box. Fiber Optic boxes shall be installed at least 2 feet from the back of curb to the center of the box and no closer than 2 feet to any pole. The distance between fiber optic boxes shall not exceed five hundred (500) feet to facilitate the pulling of cable. Refer to the City of Olathe Advanced Traffic Management System (ATMS) specifications for additional fiber optic equipment and details.

DC10-003 - PLAN REQUIREMENTS

This section governs the preparation of traffic signal improvement plans.

General:

The improvement plans shall include all information necessary to construct and verify the design of a traffic signal system. For private development projects, the plans shall be submitted as a separate set, which clearly shows other public street and stormwater drainage improvements (and utilities, if applicable) in a de-emphasized manner and shall include appropriate quantity sheets for Contractor provided equipment. The plans shall be arranged as required by the City Engineer. All plan sheets shall be signed and sealed by the Kansas Registered Professional Engineer responsible for preparing the plans. The signed and sealed plans shall be submitted to the Infrastructure Department, Engineering Division for review and approval prior to construction.

Private Improvements:

If any private improvements are shown on the public improvement plans, they shall be clearly differentiated from the public improvements. An appropriate note shall be included on the drawings stating that these private improvements will not be maintained by the City of Olathe.

Sheet Size:

The suggested sheet size for improvement plans is twenty-four inches by thirty-six inches (24" x 36") although sheets twenty-two inches by thirty-four inches (22" x 34") may be used. All sheets in a given set shall be the same size.

Types of Sheets in Plans:

- The improvement plans shall consist of the following:
- Title Sheet
- Traffic Signal Plan Sheet

- Signal Interconnect Plan Sheet(s) (If required)
- Wiring Detail and Timing Plan Sheet
- Summary of Quantities Sheet
- Standard Detail Sheets
- Pavement Marking and Signing Plan and Detail Sheets
- Traffic Control Detail Sheet

Each sheet shall contain proper project identification, the type of sheet, a sheet number, including the individual sheet number and the total number of sheets, and dates of when the plans were originally prepared and all revisions. Copies of the approved standard detail sheets can be obtained from the Infrastructure Department, Traffic Operations Center or at www.olatheks.org.

Street centerline stations shall be marked at one hundred (100) foot intervals and at other pertinent points.

The plans shall clearly show the proposed placement of all traffic signal equipment including, poles, heads, Opticom equipment, cameras, signs, streetlights, junction and service boxes, conduit, loops, and control centers. The items to be constructed or installed for the project shall be legibly noted and located by station and offset. Distances from proposed improvements to the back of curb shall also be provided.

A signal phasing diagram shall be displayed and shall follow the City's standard phasing. A list of general notes shall include at least the following:

GENERAL NOTES:

1. Existing underground (U/G), overhead (OH) utilities and drainage structures have been plotted from available information and therefore, their locations must be considered approximate only. It is the responsibility of the individual contractors to exactly locate each utility before actual construction.
2. All construction methods and traffic signal equipment shall conform to the latest edition of the City of Olathe Technical Specifications.
3. Contractor shall stake the location of all traffic signal poles, conduit, controllers, service boxes and junction boxes to be installed. The stations and offsets provided are to the center of the traffic signal equipment. Traffic Signal staff shall inspect the staking prior to any excavation and/or construction. Minor relocation of equipment to avoid conflicts may be allowed with the approval of the City's Traffic Signal Staff.
4. All existing curb and gutter, sidewalk, pavement, drainage structures or ground damaged during the traffic signal construction shall be replaced to match existing. This work will be considered SUBSIDIARY to the "Traffic Signal Installation" bid item.
5. Conduit entering service boxes, junction boxes and/or pole bases shall be continuous in the service boxes, junction boxes and/or pole base.
6. Coordinate Signal Turn-On with the City of Olathe.
7. All traffic signal indicators shall be Light Emitting Diode (L.E.D.).