2026 | Plan Preparation & Design Criteria

Lawrence
KANSAS
Municipal Services & Operations

Table of Contents

SECTION 1 – PLAN SUBMITTAL REQUIREMENTS 4
1.1 INITIAL PLAN SUBMITTAL 4
1.2 INTERMEDIATE SUBMITTALS 5
1.3 FINAL SUBMITTAL REQUIREMENTS 6
1.4 REVIEW PERIOD 6
1.5 CAPITAL PROJECT MANAGEMENT SOFTWARE (CPMS) 7
SECTION 2 – PLAN REQUIREMENTS 8
2.1 GENERAL 8
2.2 TITLE SHEET 11
2.3 GENERAL NOTES, GENERAL LAYOUT, AND QUANTITIES 12
2.4 STREET PLAN AND PROFILE 21
2.5 GRADING PLAN 23
2.6 STORM SEWER PLAN & PROFILE, DRAINAGE AREA MAP, AND DESIGN INFORMATION 24
2.7 SANITARY SEWER PLAN & PROFILE 30
2.8 WATERLINE PLAN & PROFILE 33
2.9 TRAFFIC CONTROL 36
2.10 PERMANENT SIGNING AND STRIPING 36
2.11 INTERSECTION AND DRIVEWAY DETAILS 37
2.12 EROSION AND SEDIMENT CONTROL 37
2.13 CROSS SECTIONS 39
2.14 FIBER OPTICS 40
2.15 ROADWAY LIGHTING 40
2.15.1 PLAN SHEET REQUIREMENTS 40
2.15.2 WIRING DIAGRAM REQUIREMENTS 41
SECTION 3 – TRANSPORTATION 42
3.1 GOVERNING SPECIFICATIONS 42
3.2 CLASSIFICATION OF STREETS 42
3.3 SIDEWALKS 44
3.3.1 APPLICABILITY 44
3.3.2 ACCESSIBILITY STANDARDS 46
3.4 BIKEWAY PLAN 49
3.5 DESIGN CRITERIA TABLE 50
3.6 MAXIMUM AND MINIMUM GRADE 51
3.7 INTERSECTING STREETS 51
3.8 LOCAL STREET LENGTH 51
3.9 PAVEMENT SECTION 51
3.10 PAVEMENT TRANSITION 52
3.11 ON STREET ANGLED PARKING 52
SECTION 4 – ACCESS MANAGEMENT 53
4.1 GENERAL 53
4.2 DEFINITIONS 53

4.3 Access Locations 53
4.4 Number of Access Points 54
4.5 Access Point Width 55
4.6 Access Point Alignment 55
4.7 Throat Length 55
4.8 Sight Distance 56
4.9 Common Drives and Internal Access 56
4.10 Turn Lanes 56
4.11 Median Break Spacing 56
4.12 Special Criteria for Selected Corridors 57
SECTION 5 – ROADWAY LIGHTING 58
5.1 General 58
5.2 Design Standards 58
SECTION 6 – SANITARY SEWER 60
6.1 Design Requirements 60
6.1.1 Design Flow Rates 60
6.1.2 Pipe Requirements 60
6.1.3 Manhole Requirements 62
6.1.4 Service Line Requirements 64
6.1.5 Potable Waterline Separation Requirements 65
6.1.6 General Utility Separation Requirements 66
6.1.7 Abandonments 67
6.2 Alignment and Location 67
6.2.1 General 67
6.2.2 Watercourse Crossings 68
6.2.3 Detention and Retention Basins 68
6.3 Easement Requirements 68
6.3.1 General 68
6.3.2 Easement Width Requirements 69
6.3.3 Standard Easement Forms 69
6.3.4 Platted Easement Requirements 70
6.3.5 Off-Site Easements 70
SECTION 7 – WATERLINES 72
7.1 Scope 72
7.2 General 72
7.3 Location 73
7.3.1 Horizontal 73
7.3.2 Vertical 74
7.3.3 Sanitary Sewer Separation 74
7.3.4 General Utility Separation 76
7.3.5 Watercourse Crossings 76
7.4 Appurtenances 76
7.4.1 Fire Hydrants 76
7.4.2 Valves 77

7.4.3 Flushing Assemblies 78
7.4.4 Thrust Restraint 78
7.4.5 Casing Pipe 78
7.5 Fire Lines 78
7.5.1 General 78
7.5.2 Backflow Prevention 79
7.6 Abandonments 79
7.6.1 Scope 79
7.6.2 General 79
SECTION 8 – FIBER OPTICS 81
8.1 General 81
8.1.1 Contractor Requirements 81
8.1.2 Scheduling of Work 82
8.2 GENERAL REQUIREMENTS FOR EQUIPMENT, MATERIALS AND EVALUATION 82
8.2.1 General 82
8.2.2 Submittals 82
8.2.3 Documentation 84
8.3 CONDUIT 84
8.3.1 General 84
8.3.2 Conduit Installation into Existing Pull Boxes 85
8.4 FIBER OPTIC CABLE 85
8.4.1 General Requirements 86
8.4.2 Fiber Optic Cable 86
8.4.3 Installation 87
8.4.4 Fiber Optic Cable Splicing 88
8.4.5 Fiber Optic Terminations 89
8.4.6 Underground Splice Enclosures 89
8.5 SYSTEM AUXILIARIES 90
8.5.1 Fiber Optic Communications Network 90
8.6 CONSTRUCTION REQUIREMENTS 90
8.6.1 Acceptance Procedures 90
8.7 GUARANTEES 93
APPENDIX A: GENERAL NOTES 95
APPENDIX B: KDOT LPA LETTING INFORMATION 103
APPENDIX C: SIDEWALK INSPECTION CHECKLIST & EXCEPTION DOCUMENTATION 147
APPENDIX D: STANDARD PROPERTY ACQUISITION TEMPLATES 150
APPENDIX E: SANITARY SEWER DESIGN GUIDANCE 163
APPENDIX F: COMPLETE STREETS POLICY & CHECK LIST 171
APPENDIX G: TRAFFIC IMPACT STUDY GUIDELINES 177
APPENDIX H: BICYCLE & PEDESTRIAN DESIGN GUIDELINES 190

SECTION 1 – PLAN SUBMITTAL REQUIREMENTS

1.1 Initial Plan Submittal

The initial plan submittal shall include all the following documentation: one (1) set of plans, the draft final plat or parcel legal description if the property will not be platted, and one (1) copy of the project specifications. In addition, all plan submittal documentation shall be provided in portable document format (pdf), uploaded using e-Builder, the City's Capital Project Management Software (CPMS) or as coordinated with the Municipal Services and Operations contact person assigned to the project.

The submittal will not be reviewed if any of the items listed above are incomplete or omitted from the submittal.

1. Plan Sets: One (1) set of plans shall be submitted with the initial submittal. All plan sheets in the initial submittal shall be submitted by a Professional Engineer (P.E.) licensed in the State of Kansas in accordance with Kansas Board of Technical Professions requirements. Plans will not be reviewed if they are not submitted by a Professional Engineer (P.E.) licensed in the State of Kansas. All references to the Engineer in this document shall be to the Professional Engineer (P.E.) preparing the plans. Initial plans are generally not sealed. A transmittal memorandum is sufficient to show initial plans were developed under the direct supervision of a Professional Engineer (P.E.).
2. Draft Final Plat or Parcel Legal Description: The draft final plat shall be provided with the initial plan submittal. The property legal description shall be included on the layout sheet if the property will not be platted. The legal description shall be signed, sealed, and dated by a Professional Surveyor (P.S.) licensed in the State of Kansas in accordance with Kansas Board of Technical Professions requirements. It is recommended that draft written easements be submitted with the initial plan submittal.
3. Project Specifications: One (1) copy of the draft project specifications shall be provided with the initial submittal. The Engineer shall identify any special conditions that warrant deviation from the current edit of the City of Lawrence Standard Technical Specifications.
4. Comments: The initial submittal and all subsequent submittals shall be reviewed by the City of Lawrence. The City of Lawrence shall provide written comments as well as plan "mark-ups" to the Engineer. The Engineer is encouraged to schedule a meeting with staff to review comments following the initial submittal. The Engineer must address all comments by revisions to the initial submittals or by written

response as applicable. Plans will not be released for construction until all comments have been addressed by the Engineer.

1.2 Intermediate Submittals

Intermediate submittals shall include all of the following documentation: one (1) set of plans, one (1) copy of the draft final plat or parcel legal description if the property will not be platted, one (1) draft copy of any written easements (if required), one (1) copy of the project specifications (if required), one (1) copy of a written response to comments, and original "mark-ups" as provided to the Engineer with the review of the previous submittal. In addition, all plan submittal documentation shall be provided in portable document format (pdf), uploaded using e-Builder, the City's Capital Project Management Software (CPMS) or as coordinated with the Municipal Services and Operations contact person assigned to the project.

The submittal will not be reviewed if any of the items listed above are incomplete or omitted from the submittal.

1. Plan Sets: One (1) set of plans shall be submitted with the intermediate submittal. All plan sheets in the initial submittal shall be submitted by a Professional Engineer (P.E.) licensed in the State of Kansas in accordance with Kansas Board of Technical Professions requirements. Plans will not be reviewed if they are not submitted by a Professional Engineer (P.E.) licensed in the State of Kansas. All references to the Engineer in this document shall be to the Professional Engineer (P.E.) preparing the plans. Intermediate plans are generally not sealed. A transmittal memorandum is sufficient to show intermediate plans were developed under the direct supervision of a Professional Engineer (P.E.).
2. Draft Final Plat or Parcel Legal Description: One (1) copy of the draft final plat shall be provided with intermediate plan submittals. The draft final plat shall fully address all comments from the previous submittal. The property legal description shall be included on the layout sheet if the property will not be platted. The legal description shall be signed, sealed, and dated by a Professional Surveyor (P.S.) licensed in the State of Kansas in accordance with Kansas Board of Technical Professions requirements.
3. Written Easements: One (1) draft copy of all easements required for the project shall be submitted with intermediate submittals. The written easements shall be signed, sealed, and dated by a Professional Surveyor (P.S.) licensed in the State of Kansas in accordance with Kansas Board of Technical Professions requirements.
4. Project Specifications: One (1) copy of the project specifications shall be provided with the intermediate submittal. The Engineer shall fully address all comments from the previous submittal.

5. Written Response to Comments and "Mark-Ups": The engineer shall prepare a written response to all comments received from the previous submittal. The Engineer shall return "mark-ups" received from the previous submittal with corrective actions taken noted on the "mark-up".

1.3 Final Submittal Requirements

Final plan submittal shall include one (1) set of full-size complete plans, four (4) sets of half-size complete plans, two (2) sets of the project specifications, and one (1) electronic copy containing all final plan submittal documentation in portable document format (pdf).

Submit AutoCAD base and design files including:

- Street alignments and profiles (survey compatible format),
- Proposed Water, Storm Sewer, Sanitary Sewer, Fiber alignments and profiles (survey compatible format),
- Existing and proposed ground surface (inclusive of Feature Line edits that define accurate plan elevations of curb inlets, ADA ramps/walks, and other infrastructure in the plan design of a road corridor within public right-of-way/easements),
- Property/easement lines with monuments found used to define them.

All plan sheets shall be sealed, signed and dated by the Professional Engineer (P.E.) preparing the plans. A project summary letter should accompany the final plan submittal, including Project Name and Number, Project Description, Project Schedule and anticipated Completion Date, Owner/Developer contact information, Engineer's Estimate (or signed bid, if applicable), and Project Funding information. See the "Public Improvements Standards" section in the Land Development Code for further requirements of Public Improvement Plan (PIP) submittals, including financial guarantee requirements. For sanitary sewer projects, a Kansas Department of Health and Environment (KDHE) permit application must be submitted (see the Appendix). Project deliverables shall be uploaded using Capital Project Management Software (CPMS) or as coordinated with the Municipal Services and Operations contact person assigned to the project.

1.4 Review Period

Review time for the initial and subsequent submittals shall be ten (10) business days.

1.5 Capital Project Management Software (CPMS)

Capital Project Management Software (CPMS) is a workflow management tool used to manage and track project files, schedules, budgets, invoices and other pertinent information. The City of Lawrence uses e-Builder (www.e-builder.net). See the e-Builder user guide or contact e-builderadmin@lawrenceks.org for additional information.

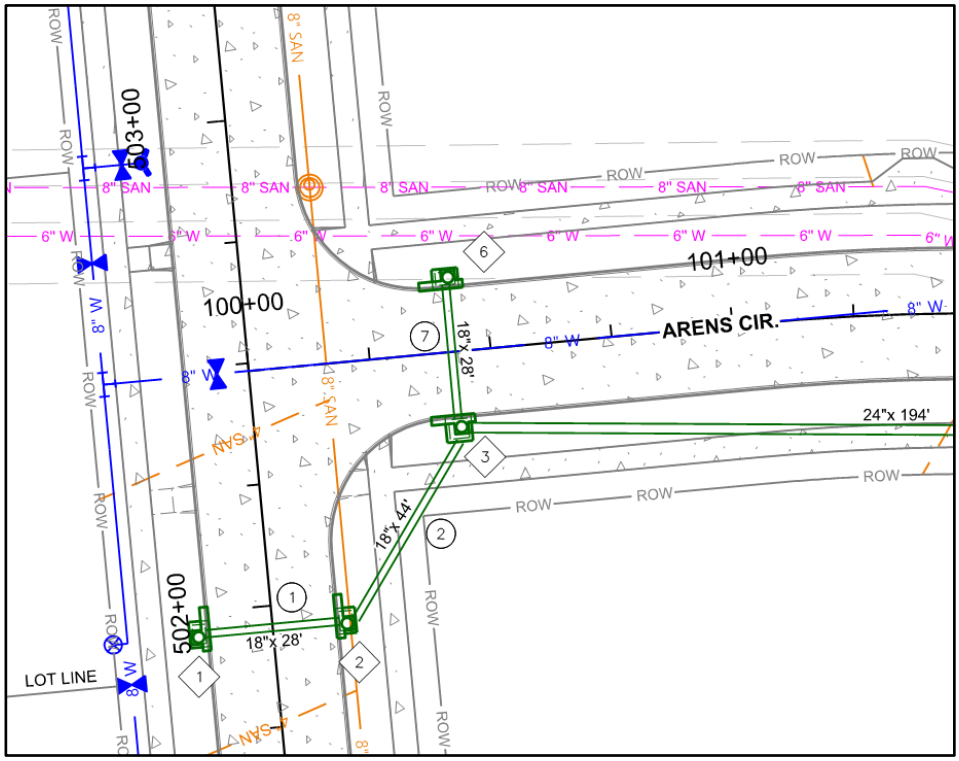
SECTION 2 – PLAN REQUIREMENTS

2.1 General

The following is intended to provide a uniform system of plan preparation that will aid the Engineer in preparing plans for the City of Lawrence.

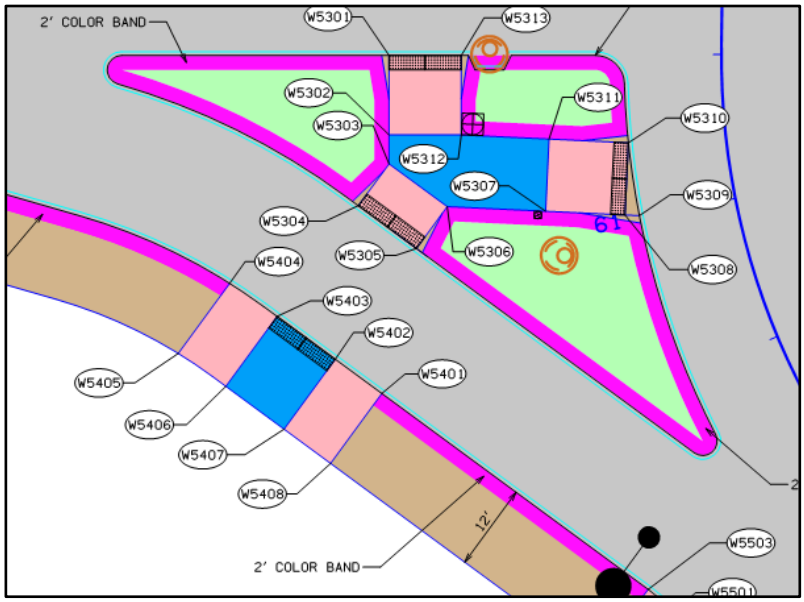
1. All plans shall include all information necessary to build and check the design of streets, storm sewer, sidewalk and bike/pedestrian facilities, and other related work. If any atypical circumstances surround a proposed project, additional information and analysis beyond the minimum requirements set out below may be required.
2. A set of engineering drawings must be submitted to the City Engineer for approval for all improvements in the public right-of-way and for improvements that will be maintained by the City once construction is completed. No public improvement projects may be constructed in the City of Lawrence without approval of the City Engineer.
3. The design and construction of private improvements for development plans including streets, sidewalks, storm sewer, sanitary sewer, and waterlines shall conform to City of Lawrence Plan Preparation and Design Criteria.
4. The City of Lawrence plan review is to check for conformance with City specifications and City code. It is not responsible for the accuracy of the design, dimensions, and elevations of plans after they are approved. All private improvements shown on Public Improvement Plans (PIPs) shall be clearly identified as such and will not be maintained by the City of Lawrence.
5. The project name and project number shall appear on each sheet in a set of plans with the exception of the cross sections and City of Lawrence standard detail sheets. Any special detail sheets showing improvements unique to a particular project shall also have the project name and project number noted on them. All full-size plans shall be 24 inches x 36 inches. All public improvement plans are approved for one year, after which they become void and must be resubmitted for approval by the City Engineer before construction.
6. Color may be used to add clarity to the plans, unless otherwise prohibited by other factors (e.g., KDOT submittals). Line types, regardless of color shall be labeled accordingly (e.g. ---W--- for Water, ---St. S--- for Storm Sewer, etc.). Profile items should be the same color as plan view items. When using color, the following guidelines apply:
    a. Existing Utilities: Magenta
    b. Proposed Storm Sewer: Green
    c. Proposed Sanitary Sewer: Brown

d. Proposed Fiber: Orange
e. Proposed Water: Blue



EXAMPLE COLOR PLANS

f. ADA/Sidewalk Details (detail sheets only, not plan-profile sheets)
    i. Normal Sidewalk: Tan
    ii. Curb Ramps: Pink
    iii. Landing/Turning Space: Blue
    iv. Special Shaping: Grey/Tan



EXAMPLE COLOR SIDEWALK DETAILS

7. The plans shall consist of:
    a. Title Sheet
    b. General Layout, General Notes & Summary of Quantities
    c. Project Control (if not on General Layout)
    d. Typical Sections
    e. Street Plan and Profile Sheets
    f. Side Street Plan and Profile Sheets
    g. Intersection/Entrance/Sidewalk Details
    h. Temporary Traffic Control/Staging
    i. Permanent Signing & Striping
    j. Traffic Signal Details
    k. Grading Plan
    l. Storm Sewer Drainage Area Map
    m. Storm Sewer Plan and Profile
    n. Sanitary Sewer/Forcemain Plan and Profile
    o. Waterline Plan and Profile
    p. Fiber Optics Plan
    q. Erosion and Sedimentation Control Plan Sheets
    r. Standard and Special Detail Sheets
    s. Cross-Sections

2.2 Title Sheet

This section establishes the minimum standards relating to all items that must be included on the title sheet for the project.

1. The City of Lawrence Title Sheet template should be used as a starting place for all plan sets.
2. Project Title: The plat name and phase number, if applicable, shall be included in the project title. If the project will not be platted the physical address shall be used in the project title. For utility relocation only projects, the word "Relocation" must be included in the project title.
3. Project number (provided by Municipal Services & Operations Department).
4. Index of sheets: A numerical list of plan sheets.
5. General Location Map: A general location map shall be included on the cover sheet. The location map shall show the nearest north-south and east-west arterial streets surrounding the section, township, and range and those in the immediate vicinity of the project area must be shown and labeled. The scale of the vicinity map shall be, at a minimum, 1" = 2000'. A north arrow and scale for the map must be noted. The project area shall be labeled and shaded. The section, township, and range where the project is located shall be noted on the general location map.
6. Name and telephone number of the Consulting Engineer and Owner/Developer if not the City of Lawrence.
7. Utility Information: The following information shall be provided for all utilities providing service to the project area:
    a. Utility Name
    b. Address
    c. Phone Number
    d. Fax Number
    e. Contact Person
    f. Contact Email Address
8. Signature and Date Line: Signature and date line shall be provided, as applicable, for the City Engineer.
9. Signature and stamp of a Professional Engineer registered in the state of Kansas.

2.3 General Notes, General Layout, and Quantities

This section establishes the minimum requirements relating to all items that must be included regarding the General Notes, General Layout, and Quantities for the project.

1. General notes. Refer to Appendix A for a list of General Notes.
2. Summary of Quantities: A summary of quantities for the project shall be provided and include all bid items of work for the project. Each bid item shall be numbered and accompanied by a specification, special provision, or plan note with:
    a. DESCRIPTION of the work required,
    b. MATERIALS required to complete the work,
    c. CONSTRUCTION requirements for completion and acceptance of the work,
    d. METHOD OF MEASUREMENT including units, how items will be measured (e.g. plan quantity, placed, etc.), and other factors such as temperature, waste, spillage, etc.
    e. BASIS OF PAYMENT defining pay items needed to complete the work (including incidental items).

    A general list of possible bid items is shown below, a current listing is included in CPMS (see CPMS documentation for more information):

Section	Description	Unit of Measure
General	Contractor Construction Staking	LS
	Mobilization	LS
	Temporary Erosion Control	LS
	Field Office and Laboratory	LS
Site Prep	Clearing & Grubbing	LS
	Demolition & Removal	LS
	Remove Existing Asphalt Pavement (XX")	SY
	Remove Existing Concrete Pavement (XX")	SY
	Remove Existing Curb & Gutter	LF
	Remove and Replace Curb & Gutter	LF
	Remove Existing Sidewalk	LF
	Remove Existing Ramp	EA
	Remove Existing Driveway	SY
	Remove Existing Structure (X' x X')(Structure)	EA
	Remove Existing Pipe (XX") (Material)	LF
	Remove Existing Fence (Material)	LF
	Remove Existing Retaining Wall (X")(Material)	LF
	Remove Existing Trees	LS
	Salvage Existing (Material)	EA
	Salvage Existing (Material)	LS
	Temporary Construction Entrance	LS

	Geotechnical Testing	LS
Earthwork	Earthwork	LS
	Unclassified Excavation	CY
	Common Excavation	CY
	Rock Excavation	CY
	Embankment	CY
	Grading and Compaction of Earthwork	SY
	Aggregate Base (AB-1)(X")	SY
	Aggregate Base (AB-3)(X")	SY
	Fly Ash Treated Subgrade (X")	SY
	Cement Treated Subgrade (X")	SY
	Geotextile (Type)	SY
	Retaining Wall (Segmental Block)	SF
	Concrete Retaining Wall	SF
Traffic	Temporary Traffic Control	LS
	Pavement Marking, Temporary, White (XX")	LF
	Pavement Marking, Temporary, Yellow (XX")	LF
	Pavement Marking, Temporary, Solid Double Yellow Lane Line (XX")	LF
	Pavement Marking Symbol, Temporary, White, Lane Reduction Arrow	EA
	Pavement Marking Symbol, Temporary, LT Arrow	EA
	Pavement Marking Symbol, Temporary, RT Arrow	EA
	Pavement Marking Symbol, Temporary, Through Arrow	EA
	Pavement Marking Symbol, Temporary, Combo Turn/Through Arrow	EA
	Conduit Array (SDR-11)(3 x 1-1/4")	LF
	Fiber Optic Hand Hole (Type 1, Tier 15)	EA
	Street Lighting Wiring & Conduit	LS
	Street Light	EA
	Traffic Signal	LS
	Video Detection System	LS
	Radar Detection System	LS
	Emergency Vehicle Preemption System	LS
	Pedestrian Push Button	EA
	Rectangular Rapid Flashing Beacon System	LS
	Pedestrian Hybrid Beacon System	LS
	Remove Existing Pavement Markings	LS
	Pavement Marking, Patterned Cold Plastic, Solid Yellow (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Solid White (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Solid Double Yellow Lane Line (XX")	LF
	Pavement Marking, Patterned Cold Plastic,	LF

	Solid/Broken Combo Yellow Lane Line (XX")	
	Pavement Marking, Patterned Cold Plastic, Dotted Yellow Lane Line (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Dotted White Lane Line (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Broken Yellow Lane Line (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Broken White Lane Line (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Diagonal Yellow (XX")	LF
	Pavement Marking, Patterned Cold Plastic, Diagonal White (XX")	LF
	Pavement Marking, Patterned Cold Plastic, White Chevron (XX")	LF
	Pavement Marking Symbol, Patterned Cold Plastic, Bike Lane Rider w/ Arrow	EA
	Pavement Marking, Pre-formed Thermoplastic, Solid White (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Solid Yellow (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Solid Double Yellow Lane Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Dotted Yellow Lane Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Dotted White Lane Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Broken Yellow Lane Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Broken White Lane Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Diagonal Yellow Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, Diagonal White Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, White Chevron (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, White Stop Line (XX")	LF
	Pavement Marking, Pre-formed Thermoplastic, White Crosswalk Line (XX")	LF
	Pavement Marking Symbol, Pre-formed Thermoplastic, LT Arrow	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, RT Arrow	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, Through Arrow	EA

	Pavement Marking Symbol, Pre-formed Thermoplastic, Combo Turn/Through Arrow	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, "ONLY"	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, Merge Arrow	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, Yield Line	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, Bike Lane Rider w/ Arrow	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, Sharrow Symbol w/ Chevrons	EA
	Pavement Marking Symbol, Pre-formed Thermoplastic, Railroad Crossing	EA
	Remove Existing Permanent Signage	LS
	Signage (must include a signage summary table)	LS
Pavement	Milling (XX")	SY
	Asphalt Base Course (XX")	TON
	Asphalt Intermediate Course (XX")	TON
	Asphalt Surface Course (XX")	TON
	Asphalt Leveling Course (XX")	TON
	Asphalt Edge Patching (XX")	TON
	Asphalt Driveway Wedging	TON
	Asphalt Pavement Patch (Full Depth)	TON
	Asphalt Pavement Patch (Surface)	TON
	Microsurfacing (Surface, 22 lb.)	SY
	Microsurfacing (Leveling Course, 25 lb.)	SY
	Ultrathin Bonded Asphalt Surface (UBAS)(Collector-Arterial)	SY
	Ultrathin Bonded Asphalt Surface (UBAS)(Residential)	SY
	Concrete Pavement Patch (XX", Reinforced)	SY
	Concrete Pavement Patch (XX", Reinforced, Post Milling)	SY
	Concrete Pavement (XX", NRDJ, 4K)	SY
	Concrete Pavement (XX", Unreinforced, 4K)	SY
	Concrete Pavement (XX", Reinforced, 4K)	SY
	Access Ramp	SY
	Stamped Colored Concrete Pavement (XX", Unreinforced, 4K)	SY
	Stamped Colored Concrete Pavement (XX", Reinforced, 4K)	SY
	Concrete Pavement (XX", NRDJ, 5K)	SY
	Concrete Pavement (XX", Unreinforced, 5K)	SY
	Concrete Pavement (XX", Reinforced, 5K)	SY

	Stamped Colored Concrete Pavement (XX", Unreinforced, 5K)	SY
	Stamped Colored Concrete Pavement (XX", Reinforced, 5K)	SY
	Exposed Aggregate Concrete Pavement (XX")	SY
	Concrete Curb (Type C-1)	LF
	Concrete Curb and Gutter (24", Type CG-1, XX" Toe)	LF
	Concrete Curb and Gutter (24", Type CG-2, XX" Toe)	LF
	Concrete Curb and Gutter (24", Type CG-3, XX" Toe)	LF
	Concrete Curb and Gutter (30", Type CG-1, XX" Toe)	LF
	Concrete Curb and Gutter (30", Type CG-2, XX" Toe)	LF
	Concrete Curb and Gutter (30", Type CG-3, XX" Toe)	LF
	Concrete Sidewalk (4")	SY
	Concrete Recreational Path (6", Fiber Reinforced)	SY
	Integral Concrete Sidewalk and Retaining Wall	LF
	Integral Concrete Recreational Path and Retaining Wall	LF
	Reinforced Concrete Sidewalk (Adjacent to Curb)	SF
	Concrete Median Reinforced Sidewalk Crossing	SF
	Concrete Median Nose	EA
	Manhole Adjustment (Paved)	EA
	Valve Adjustment (Paved)	EA
	Monument Box Adjustment	EA
	Material Testing (Concrete/Asphalt/Aggregate)	LS
	Temporary Surfacing Material	TON
	Temporary Gravel Road	TON
	Concrete Speed Hump (Including Signage and Pavement Markings)	EA
	Asphalt Speed Hump (Including Signage and Pavement Markings)	EA
	Concrete Speed Cushion (Including Signage and Pavement Markings)	EA
	Stamped Colored Concrete Raised Crosswalk (Including Signage and Pavement Markings)	EA
Storm Sewer	XX" Storm Sewer (RCP)	LF
	XX" Storm Sewer (CMP)	LF
	XX" Storm Sewer (PPP)	LF
	XX" Storm Sewer (HDPE)	LF

	XX"xXX" Storm Sewer (RCHE)	LF
	XX" End Section (RC)	EA
	XX" End Section (Metal)	EA
	Riprap	SY
	X'xX' Curb Inlet	EA
	X'xX' Area Inlet	EA
	XX" Diameter Manhole	EA
	X'xX' Junction Box	EA
	Outlet Headwall	LS
	Connect to Existing Storm Sewer	EA
	Connect to Existing Storm Sewer Inlet	EA
	Connect to Storm Sewer to Existing Inlet, Reshape Invert	EA
	Connect to Existing XX"xXX" RCB	EA
Sewer Sanitary	XX" Sanitary Sewer Pipe	LF
	XX" Sanitary Sewer Service Pipe	LF
	XX" Sanitary Sewer Service Connection	EA
	X' Diameter Standard Manhole (6' Depth)	EA
	X' Diameter Drop Manhole (6' Depth)	EA
	X' Diameter Doghouse Manhole (6' Depth)	EA
	X' Diameter Flat Top Manhole (6' Depth)	EA
	Extra Depth (X' Diameter)	VF
	Connect to Existing Manhole	EA
	Manhole Adjustment (Unpaved)	EA
	Concrete Encasement	LF
	Abandon Existing XX" Sanitary Sewer	LS
	Abandon Existing X' Diameter Manhole	LS
	Sanitary Sewer Pipe Cleaning	LS
	Manhole Corrosion Protection Coating	VF
Waterline	XX" Waterline	LF
	XX" Waterline (Restrained Joint) by Boring	LF
	XX" Steel Casing by Boring	LF
	XX" Gate Valve with Valve Box and Cover	EA
	XX" Butterfly Valve with Valve Box and Cover	EA
	XX" MJ Bend and Block	EA
	XX" x XX" MJ Tee and Block	EA
	XX" x XX" MJ Cross and Block	EA
	XX" x XX" MJ Reducer	EA
	XX" Anchor Coupling	EA
	XX" MJ Sleeve	EA
	XX" Plug or Cap and Block	EA
	XX" Blind Flange	EA
	XX" x XX" Tapping Sleeve and XX" Tapping Valve	EA
	Connect to Existing Waterline	EA
	XX" Water Service Installation (Short)	EA
	XX" Water Service Installation (Long)	EA

	XX" Manifold Assembly	EA
	XX" Water Service Relocation	EA
	XX" Tile, Setter, and Ring/Lid	EA
	XX" Meter Tile	EA
	XX" Meter Setter	EA
	XX" Meter Ring/Lid	EA
	Fire Hydrant Assembly	EA
	Fire Hydrant Relocation	EA
	Fire Hydrant Assembly with Swivel 90	EA
	Valve Lid Adjustment (Unpaved)	EA
	XX" Air Release Valve	EA
	Meter Vault	EA
	Backflow Vault	EA
	XX" PIV and Indicator Post	EA
	Abandon Existing Waterline	LS
	Water Meter Removal and Abandonment	EA
	2" Blowoff Assembly	EA
	XX" Tapping Saddle with XX" Corp. Stop	EA
	Concrete Straddle Block	EA
	XX" Corp. Stop	EA
Fiber Optic	Ethernet Cabling	LF
	Patch Cables	EA
	Loose Tube Fiber Optic Cable	LF
	#10 AWG Tracer Wire	LF
	HDPE Conduit	LF
	HDPE Couplings	EA
	Ethernet Switches	EA
	Ethernet Switch Power Supply	EA
	Ethernet SFP Transceivers	EA
	Tracer Cable	LF
	Ground Rods	EA
	Ground Rod Clamps	EA
	Type I Service Box	EA
	Type II Service Box	EA
	Splice Enclosures	EA
	Splice Trays	EA
	Gator Patches	EA
	Conduit Plugs	EA
Landscaping	Seed, Fertilize, and Mulch (Temporary)	LS
	Seed, Fertilize, and Mulch (Permanent)	LS
	Mulching (Temporary)	LS
	Mulching (Permanent)	LS
	Fertilizing (Temporary)	LS
	Fertilizing (Permanent)	LS
	Seeding (Temporary)	LS
	Seeding (Permanent)	LS

	Sodding	SY
	Irrigation (Repair)	FA
	Irrigation (New)	LS
	Fence (Chain Link) (4'-0")	LF
	Fence (Chain Link) (5'-0")	LF
	Fence (Chain Link) (6'-0")	LF
	Fence (Wood) (4'-0")	LF
	Fence (Wood) (5'-0")	LF
	Fence (Wood) (6'-0")	LF
	Gate (Chain Link) (4'-0")	EA
	Gate (Chain Link) (6'-0")	EA
	Gate (Chain Link) (5'-0")	EA
	Gate (Wood) (4'-0")	EA
	Gate (Wood) (5'-0")	EA
	Gate (Wood) (6'-0")	EA
	Trees	EA
	Plants	LS
	Topsoil	CY

3. A General Layout should be included with the following:
    a. A legend of symbols
    b. North arrow and scale. Scale of the general layout map shall be a minimum of one inch (1") equals 100 feet (100'), unless otherwise approved.
    c. Names of subdivision
    d. Block designation and lot designation, or proposed block and lots. If surrounding parcels are unplatted they shall be identified as "Unplatted".
    e. All streets and paved areas with name labels.
    f. Boundary line of project area.
    g. Accurate tie to at least one quarter section corner for platted tract. An unplatted tract shall have an accurate tie to at least two quarter section corners.
    h. Project control benchmarks shall be identified as to location and elevation (may be placed on another sheet as needed).
    i. Location of existing and proposed storm sewer, water main, and sanitary sewer lines, manholes, and easements/rights-of-way.
    j. Location of all existing utilities with pertinent information listed as appropriate.
    k. On site parcels and buildings shall be shown and labeled as appropriate. Buildings not requiring sewer service shall be noted "Service Not Required".
4. Project Control Points:
    a. A minimum of two (2) permanent benchmarks shall be referenced for the project.

b. A minimum of three (3) horizontal control points shall be reference for the project.
c. All benchmarks and control points shall include a verbal description and the location of shall be noted on the General Layout Sheet or specific Project Control Sheet.
d. Methodology of topographic map obtainment must be described (Ground survey, LIDAR, etc.).
e. e. All survey datum shall be NAD83 (2011) using Kansas State Plane North Zone until the release of SPCS2022 or Kansas Regional Coordinate System (KRCS) Zone 11 in US Survey feet for horizontal control and NAVD88 (Geoid Model 12b or 18) for vertical control.

f. The Combined Adjustment Factor (CAF) and scale point (if other than N-0, E-0) shall be published on plans having coordinates based on State Plane Kansas North, NAD83.
g. All benchmarks and control points must be verified by the Municipal Services and Operations Department before construction notice to proceed is issued.

5. Project specific typical section for all cross sections with corresponding stationing, right of way, and lane width. Show also existing pavement depths, where removal is required.

2.4 Street Plan and Profile

1. The plan and profile may be shown on the same sheet with the profile view directly below the plan view. For plan drawings, the minimum scale shall be 1" = 50'.
2. All side roads shall have their own plan and profile, to follow the mainline sheets.
3. Plan sheets shall include the following:
    a. North arrow and scale. North should be up or to the right on the plan sheet unless otherwise approved by City staff.
    b. Stationing and centerline marked at 100-foot increments, side roads and driveways, and at pertinent locations. Mainline stationing should run south to north or west to east. Side road stationing may run left to right with respect to the mainline stationing.
    c. Elevation and location of all applicable bench marks.
    d. Existing and final contours not to exceed 5 (five) feet.
    e. Existing and proposed streets with names and widths.
    f. Horizontal curve data.
    g. All pavement including sidewalks, bikeways, alleys, driveways, and edge of pavement.
    h. Locations and widths of existing and proposed sidewalks and ramps, and dimension from the back of the curb.
    i. Station and grade at curb returns (at 1/4 points), unless detailed on Intersection Detail Sheet.
    j. All existing and proposed public and private utilities.
    k. Location of test borings.
    l. Property lines, Right of way, utility easements, drainage easements, pedestrian easements and, construction limits.
    m. Trees, buildings, retaining walls, structures, fences, bodies of water, landscaping, signs, lights, traffic signals, monuments, and other items of note within 20 feet of the project limits.
    n. All trees, landscaping, storm sewer structures, pavement, curb, and other items to be removed shall be clearly noted on the plan sheets or on a separate demolition sheet showing all demolition and removals.
4. The profile view shall include the following:
    a. Preferred scale of 1" = 20' horizontal and 1" = 5' vertical. The minimum allowable drawing scale is 1" = 50' horizontal and 1" = 10' vertical.
    b. Proposed surface at the centerline of the road.
    c. The grade of proposed surface
    d. Borings (if applicable).
    e. Existing surface (if different than proposed).
    f. Elevations of proposed and existing at a minimum of 50 intervals for new construction or reconstruction with grade changes.

g. For new construction or reconstruction with a new profile show PVI stations, PVI elevations, K values, length of vertical curves, high and low point stations and elevations, and beginning and end of vertical curves.
h. Crossing utilities (existing and proposed).

2.5 Grading Plan

1. Plan sheets shall include the following:
    a. North arrow and scale. North should be up or to the right on the plan sheet unless otherwise approved by City staff.
    b. Existing and proposed property lines and lot and block numbers.
    c. Elevation and location of nearest benchmark (U.S.G.S datum).
    d. Final grading spot elevations shown for all lot corners.
    e. 100-year (1% chance) floodplain line with elevations.
    f. Property owner information for all properties directly adjacent to development.
    g. One-hundred year overflow swales with calculations.
    h. Adequately labeled existing and final contours not to exceed two (2) feet intervals.
    i. Proposed storm sewer locations and drainage areas. Specifically callout locations where overflow swales are located immediately above storm sewer locations.
    j. Proposed low floor elevation and low openings when adjacent to an engineered swale or one-hundred year floodplain.
    k. Existing and proposed water and sanitary sewer lines.
    l. Retaining wall locations, stationing and elevations.
    m. Preblast survey limits if applicable.
    n. All enclosed and improved open channel conveyance system components shall be designed for the 10-year return period peak flow or the capacity of the existing upstream improved system, whichever is greater with the following exceptions:
        i. Facilities located within the floodway of the 100-year flood, as defined by the current Federal Emergency Management Administration (FEMA) flood insurance study, shall be designed for the 100-year (1% chance) peak flow.
        ii. Bridges, pipes and culverts crossing arterial streets shall be designed for the 50-year peak flow, unless subject to the requirements of i, above.

2.6 Storm Sewer Plan & Profile, Drainage Area Map, and Design Information

1. All design, calculation methods, and construction plan requirements must follow the Stormwater Management Criteria.
2. All construction plans shall be prepared as follows:
    a. Storm system plan and profile views may be shown on the same sheet. The profile limits must match the plan limits on each sheet. All construction notes referencing the drainage system must be provided on the storm system plan and profile sheets only. Where junction boxes are located below proposed pavement, show Rim, Top of Lid, and Flowline elevations.
    b. Detailed alignment of the storm sewer along with all appurtenances, sizes of lines, conduit material and wall thickness, and other details relating to the storm drainage system including inlet and junction box (manhole) stations and top and invert elevations.
    c. Proper ties to existing permanent facilities.
    d. Proposed low floor elevation and low openings when adjacent to an engineered swale or one-hundred year floodplain
    e. Distances between storm sewer system components and other existing or proposed utilities within the right-of-way or drainage easement.
    f. The drainage area map must show existing contours, proposed contours, proposed streets, property lines and easements. Drainage areas must be identified for each point of discharge to the drainage system. Drainage areas must be labeled with the receiving structure number. Calculations are not necessary on the drainage area map.
    g. Size, slope and material of each pipe on the profile.
    h. Erosion control and energy dissipation devices.
    i. Location, cross-section, and capacity of overflow swales, including the velocity in the swale and erosion protection where necessary.
    j. Allowable pipe types shall be as follows:

Location	**RCP[A,B]**	**PP[A,B]**	**CMP[A,C]**	**HDPE[A]**
Arterial Street Right-of-Way	X	X		
Collector Street Right-of-Way[B]	X	X		
Residential Street Right-of-Way[B,C]	X	X	X	
Private Storm Sewer outside of Public Right-of-Way	X	X		X

Notes:

A. Definitions:

- RCP – Reinforced Concrete Pipe, Round or Elliptical
- PP – Polypropylene Pipe
- CMP – Corrugated Metal Pipe
- HDPE – High Density Polyethylene Pipe

B. Cross Road Pipe shall be Reinforced Concrete Pipe (RCP)

C. Corrugated Metal Pipe (CMP) may only be used for private driveway culverts in the street right-of-way along residential streets.

D. Changes in pipe material shall only occur at manhole or junction box structures.

k. Design information must be provided per the following format. One table per element shall be provided on the profile view. Additional design information is not required unless specifically requested.

i. Insert this table on the profile near each pipe:

PIPE [Name]					
DA	0.00	ac	n	0.000	
C	0.0		Q_{full}	0.0	cfs
T_c	0.0	m			
Q_{10}	0.0	cfs	V_{10}	0.0	fps
Q_{100}	0.0	cfs	V_1	0.0	fps

NOTES:

DA	total drainage area to pipe
C	composite C for total DA
T_c	T_c for total DA to pipe
Q_{10}	10-year peak (minimum design)
Q_{100}	100-year peak (must be within R/W or D/E)
n	pipe roughness
Q_{full}	pipe full capacity
V_{10}	actual velocity for Q_{10} (used for outlet structure requirements)
V_1	actual velocity for Q_1 (3 fps min or pipe slope min per table)

Size, slope and material must be listed in construction notes.
HGL lines must be plotted on profile for design storm.
Substitute Q_{50} for Q_{10} where 50-year minimum design required.

Insert this table on the profile near each overflow channel:

OVERFLOW CHANNEL [Name]		
Q_{100}	0.0	cfs
n	0.000	
d_{100}	0.0	ft

NOTES:

Q_{100}	total100-year bypass to overflow channel
n	roughness for uniform channel reach
d_{100}	depth for 0100 (verify D/E width)

Cross-section, slope and fining material must be listed in construction notes.

ii. Insert this table on the profile near each curb inlet:

CURB INLET [Name]					
DA	0.00	ac	s road	0.0000	ft/ft
C	0.0		L	0.0	ft
T_i	0.0	m			
Q_{10}	0.0	cfs	Q_{i10}	0.0	cfs
Q_{100}	0.0	cfs	Q_{i100}	0.0	cfs
R_{10}	0.0	cfs	B_{10}	0.0	cfs
R_{100}	0.0	cfs	B_{100}	0.0	cfs

NOTES:

DA	total drainage area to inlet
C	composite C for total DA
T_i	T_i for total DA to inlet
Q_{10}	10-year peak to inlet (add bypass from other inlets)
Q_{100}	100-year peak to inlet (add bypass from other inlets)
R_{10}	allowable 10-year street flow for road slope
R_{100}	allowable 100-year street flow for road slope
s road	road slope or zero for sump
L	inlet length (5' minimum)
Q_{i10}	inlet capacity with 10-year gutter spread
Q_{i100}	inlet capacity with 100-year gutter spread
B_{10}	bypass flow from Q_{10}
B_{100}	bypass flow from Q_{100}

iii. Insert this table on the profile near each field inlet:

FIELD INLET [Name]					
DA	0.00	ac	L	0	ft
C	0.0		Q_i	0.0	cfs
T_i	0.0	m			
Q_{10}	0.0	cfs			
Q_{100}	0.0	cfs	B_{100}	0.0	cfs

NOTES:

DA	total drainage area to inlet
C	composite C for total DA
T_i	T_i for total DA to inlet
Q_{10}	10-year peak to inlet (add bypass from other inlets)
Q_{100}	100-year peak to inlet (add bypass from other inlets)
L	inlet length
Q_i	inlet capacity
B_{100}	bypass flow from Q_{100}

iv. Insert this table on the profile near each open channel reach:

OPEN CHANNEL [Name]					
DA	0.00	ac	n	0.000	
C	0.0		V_{10}	0.0	fps
T_c	0.0	m	d_{10}	0.0	ft
Q_{10}	0.0	cfs	d_{100}	0.0	ft
Q_{100}	0.0	cfs			

NOTES:

DA	total drainage area to channel
C	composite C for total DA
T_c	T_c for total DA to channel
Q_{10}	10-year peak
Q_{100}	100-year peak
n	channel roughness
V_{10}	velocity for Q_{10} (use for lining design)
d_{10}	depth for Q_{10} (use for lining design)
d_{100}	depth for Q_{100} (verify D/E width)

Cross-section, slope and lining material must be listed in construction notes.

Insert this table on the profile near each culvert:

CULVERT [Name]

DA	0.00	ac	K_e	0.0	elev.
C	0.0		n	0.000	
T_c	0.0	m			
Q_{10}	0.0	cfs	h_{10}	0000.00	elev.
Q_{100}	0.0	cfs	h_{100}	0000.00	elev.
TW	0000.00	elev.	h_{road}	0000.00	elev.

NOTES:

DA	total drainage area to culvert
C	composite C for total DA
T_c	T_c for total DA to culvert
Q_{10}	10-year peak
Q_{100}	100-year peak
TW	assumed tailwater elev
K_e	assumed entrance loss coefficient
n	pipe roughness
h_{10}	headwater elevation for Q_{10}
h_{100}	headwater elevation for Q_{100}
h_{road}	lowest elevation for overtopping

Size, slope and material must be listed in construction notes.
Substitute Q_{50} for Q_{10} where 50-year minimum design required

v. A drainage calculations design table providing a stand-alone summery of all information for all items included above is an acceptable alternative to individual design tables.

l. Detention and Retention Basins:
   i. Show and label all existing or proposed water detention or retention facilities including dam structure limits. For retention and detention basins the maximum and normal water surface elevations and elevation outlines must be clearly shown and labeled.
   ii. For detention basins, a note must be included to indicate whether the detention basin will or will not retain water after the storm event routing has been completed, i.e. if it is a “dry” or “wet” basin.

m. Post Construction BMPs and Green Stormwater Infrastructure
   i. Show and label means and methods to incorporate post-development water quality aspects according to stormwater Best Management Practices (BMPs) for water quality and/or KCWater Green Stormwater Infrastructure

ii. Include Level of Service calculation worksheets from the current version of the Mid-America Regional County (MARC)/KC APWA BMP Manual and/or the Kansas City Green Stormwater Infrastructure Activity Plan Template and required design report requirements, drawing requirements and specification requirements as applicable

2.7 Sanitary Sewer Plan & Profile

1. This section governs all information to be shown on the Plan and Profile sheets for the plan set. All sanitary sewers and forcemains are required to be shown in both plan and profile views. The horizontal alignment is examined for conflicts or access restrictions, service availability to all lots and buildings, and the needs of the entire tributary area (watershed or sewershed). The vertical alignment is reviewed for depth, protection of the main at creeks and water courses, minimum and maximum cover, conflicts with other underground utilities, maintaining hydraulic gradients, general location of other sewerage and storm water facilities and other issues. These standards are intended to minimize the need for future extensions or realignments and excessive maintenance of the sanitary sewer.
2. General Drafting Standards: While the construction drawings are used primarily for construction, the project drawing as-builts are the permanent record of the City of Lawrence sewer system. The information provided on these drawings is also used for additional extensions to the system, system modeling, system maintenance, and is used in providing location services under the one call system. This information is used by engineers, developers, contractors, builders, architects, and the public in general. It is critical for long-term management of the system that the information provided on these drawings be accurate and clearly shown.
    a. General Drafting Requirements:
        i. A single plan/profile view format for each sheet shall be used for each plan and profile sheet. A plan view is required for each profile on the same sheet. The profile should be located immediately under the corresponding plan view.
        ii. Preferred scales are 1" = 20' horizontal and 1"=5' vertical. The minimum allowable drawing scale is 1" = 50' horizontal and 1"=10' vertical.
        iii. Stationing shall increase from left to right across the plan sheet and generally run west to east or south to north.
        iv. Stationing shall be indicated at 100-foot intervals in both plan and profile views.
        v. Labels shall be positioned as close as possible to the feature they are identifying without conflicting with other lines. Text overwrites are not permitted.
        vi. Revisions to plans that have been released for construction shall be clouded and checked with an explanation of the change included in the revision. All revisions to previously approved plans shall be approved by the City of Lawrence Municipal Services & Operations Department prior to construction.

3. Plan sheets shall include the following:
    a. North arrow and scale. North should be up or to the right on the plan sheet unless otherwise approved by City staff.
    b. Show and label the proposed and existing sanitary sewer mains, easements, and service line stubs.
    c. Show and label all structures such as retaining walls, trash enclosures, carports, separate garages, signs, subdivision monuments, etc.
    d. Show and label elevation and location of all applicable bench marks.
    e. Existing and final contours not to exceed 5 (five) feet.
    f. Existing and Proposed Streets and Rights-of-Way:
        i. Label all existing and proposed streets. All paved areas must be shown and identified as necessary.
        ii. Show and label all street right-of-way in the vicinity of the sewer. Label the width of the right-of-way for streets and the radius of the right-of-way at cul-de-sacs.
        iii. Label all private drives as "private". The "private" label must be included with the street name as applicable. Drives that are private and will not be named must be labeled as "private drive".
    g. Show and label existing and proposed easements.
    h. Lot or Property Lines:
        i. Label all lot numbers, tracts, and block numbers, if applicable. Property lines and lot lines shall be shown, and a draft copy of the final plat provided for each labeled reference.
        ii. Unplatted parcels shall be labeled as "unplatted".
        iii. For projects other than single family residential, label all buildings with a unique designation or number and where applicable label units within the building.
        iv. Label all surrounding areas with the plat name and lot number or as "unplatted". Do not provide lot numbers for unplatted future lots. Label those lot areas as "unplatted" or "future platting".
        v. Show and label the building setback lines for residential projects.
    i. Plan/Profile view(s) of existing main(s) must be shown and labeled in the plan set for those lots or parcels to be served by existing main(s).
    j. Show and label all proposed and existing utilities.
        i. All existing and proposed utilities (and their appurtenances) shall be shown in the plan and profile views, as applicable. Specific crossing requirements shall be noted on the plans for each affected utility.
        ii. Label the existing and proposed pipe size, slope and length.
        iii. Label the existing and proposed manholes. Existing manholes shall be referenced by the City of Lawrence Facility ID which can be

obtained from the GIS interactive map located at http://gis.lawrenceks.org/viewer/index.html

iv. In the event that the Facility ID is not available, existing manholes may be identified by their original designation as shown on the as-built drawings for the project.

k. Label all concrete encasements as "reinforced concrete encasement".

i. Label the beginning and ending stations of reinforced concrete encasements on the main in the profile view and on the plan view. The stationing of the reinforced concrete encasement may be rounded to the nearest foot.

l. Creek and/or Watercourse Crossings

i. Show and label the centerline and top of banks for all creeks and/or watercourses, existing or proposed, for the project in plan and profile views.

ii. Protection of the sewer, as required, shall be clearly identified on both the plan and profile view.

4. The profile view shall include the following:

a. Show and label the existing and proposed ground profiles along the centerline of the sanitary sewer or forcemain. Show existing profiles as a dashed line and proposed profiles as a solid line.

i. If the proposed grade equals the existing grade, label the grade as "Proposed Grade = Existing Grade".

b. Elevations shall be provided in the profile view at a minimum of 10-foot intervals. The elevation grid label shall be placed on the horizontal grid line instead of in the middle of the grid line.

c. Type, Size, and Depth of existing and proposed crossing utilities.

d. Where the top of the proposed main is three (3) feet or less from the existing ground surface, provide the following note: "Compacted fill must be placed to a minimum height of three (3) feet above the top of the proposed sewer main prior to the installation of the main." Show and label the compacted fill to be placed in the profile.

2.8 Waterline Plan & Profile

1. This section governs all information to be shown on the Waterline Plan and Profile sheets for the plan set. All waterlines are required to be shown in both plan and profile views. The horizontal alignment is examined for conflicts or access restrictions, and service availability to all lots and buildings. The vertical alignment is reviewed for depth, protection of the main at creeks and water courses, minimum and maximum cover, conflicts with other underground utilities, and other issues.
2. General Drafting Standards: While the construction drawings are used primarily for construction, the project drawing as-builts are the permanent record of the City of Lawrence water system. The information provided on these drawings is also used for additional extensions to the system, system modeling, system maintenance, and is used in providing location services under the one call system. This information is used by engineers, developers, contractors, builders, architects, and the public in general, it is critical for the long-term management of the system that the information provided on these drawings be accurate and clearly shown.
    a. General Drafting Requirements:
        i. A single plan/profile view format for each sheet shall be used for each plan and profile sheet. A plan view is required for each profile on the same sheet. The profile should be located immediately under the corresponding plan view.
        ii. Preferred scales are 1" = 20' horizontal and 1"=5' vertical. The minimum allowable drawing scale is 1" = 50' horizontal and 1"=10' vertical.
        iii. Stationing shall increase from left to right across the plan sheet and generally run west to east or south to north.
        iv. Stationing shall be indicated at 100-foot intervals in both plan and profile views.
        v. Labels shall be positioned as close as possible to the feature they are identifying without conflicting with other lines. Text overwrites are not permitted.
        vi. Revisions to plans that have been released for construction shall be clouded and checked with an explanation of the change included in the revision. All revisions to previously approved plans shall be approved by the City of Lawrence Municipal Services & Operations Department prior to construction.
3. Plan sheets shall include the following:
    a. North arrow and scale. North should be up or to the right on the plan sheet unless otherwise approved by City staff.
    b. Show and label elevation and location of all applicable benchmarks.

c. Existing and final contours not to exceed 5 (five) feet.
d. Existing and Proposed Streets and Rights-of-Way:
    i. Label all existing and proposed streets. All paved areas must be shown and identified as necessary.
    ii. Show and label all street right-of-way in the vicinity of the waterline. Label the width of the right-of-way for streets and the radius of the right-of-way at cul-de-sacs.
    iii. Label all private drives as "private". The "private" label must be included with the street name as applicable. Drives that are private and will not be named must be labeled as "private drive".
e. Show and label existing and proposed easements.
f. Lot or Property Lines:
    i. Label all lot numbers, tracts, and block numbers, if applicable. Property lines and lot lines shall be shown, and a draft copy of the final plat provided for each labeled reference.
    ii. Unplatted parcels shall be labeled as "unplatted".
    iii. For projects other than single family residential, label all buildings with a unique designation or number and where applicable label units within the building.
    iv. Label all surrounding areas with the plat name and lot number or as "unplatted". Do not provide lot numbers for unplatted future lots. Label those lot areas as "unplatted" or "future platting".
    v. Show and label the building setback lines for residential projects.
g. Show and label all structures such as retaining walls, trash enclosures, carports, separate garages, signs, subdivision monuments, etc.
h. Show and label all proposed and existing utilities.
    i. All existing and proposed utilities (and their appurtenances) shall be shown in the plan and profile views, as applicable. Specific crossing requirements shall be noted on the plans for each affected utility.
    ii. Label the existing and proposed pipe size and length.
i. Label all concrete encasements as "reinforced concrete encasement".
    i. Label the beginning and ending stations of reinforced concrete encasements on the main in the profile view and on the plan view. The stationing of the reinforced concrete encasement may be rounded to the nearest foot.
j. Creek and/or Watercourse Crossings
    i. Show and label the centerline and top of banks for all creeks and/or watercourses, existing or proposed, for the project in plan and profile views.
    ii. Protection of the waterline, as required, shall be clearly identified on both the plan and profile view.

k. Detention and Retention Basins:
    i. Show and label all existing or proposed water detention or retention facilities including dam structure limits. For retention and detention basins the maximum and normal water surface elevations and elevation outlines must be clearly shown and labeled.
    ii. For detention basins, a note must be included to indicate whether the detention basin will or will not retain water after the storm event routing has been completed, i.e. if it is a "dry" or "wet" basin.

4. The profile view shall include the following:
    a. Show and label the existing and proposed ground profiles along the centerline of the waterline. Show existing profiles as a dashed line and proposed profiles as a solid line.
        i. If the proposed grade equals the existing grade, label the grade as "Proposed Grade = Existing Grade".
    b. Elevations shall be provided in the profile view at a minimum of 10-foot intervals. The elevation grid label shall be placed on the horizontal grid line instead of in the middle of the grid line.
    c. Type, Size, and Depth of existing and proposed crossing utilities.

2.9 Traffic Control

Provide a traffic-sequencing plan or traffic sequencing notes on the plans when a project will impact travel lanes on an arterial or collector street or will necessitate a road closure of any street. This is NOT a traffic barricade plan. The following items must be addressed within the sequencing plans/notes:

1. Identify each phase of work and the work items that will be completed with each phase.
2. Detail traffic impacts for each phase and how traffic will be maintained or obstructed.
3. Provide a time frame for each phase.
4. Include the following notes:
    a. Any deviations from approved sequencing plan/notes require City of Lawrence approval.
    b. Traffic Sequencing Plan intent is to detail the general handling of traffic and does not include every detail or consideration that should be considered in each phase of construction.
    c. Contractor shall obtain all permits required prior to beginning work to include Temporary Traffic Control Permits. Temporary Traffic Control Plans shall be developed and are required for permit approval.

Temporary Traffic Control (TTC) Plans are not required as part of plan approval, however, if provided they will be reviewed and approved with the overall plan approval. If TTC plans are not included in the project plans or if the contractor deviates from the approved plans then the contractor is responsible for TTC plan preparation as part of the Temporary Traffic Control Permit application. See Right of Way (ROW) Administrative Regulations for additional plan requirements.

2.10 Permanent Signing and Striping

Permanent Signing and Striping plans shall show all locations and types of permanent traffic control features, including street name signs. Permanent Traffic Control layout, material, type, and hardware shall be in accordance with the *Manual on Uniform Traffic Control Devices* and City of Lawrence Technical Specifications and Standard Drawings. The designer should coordinate with traffic field operations, through their Municipal Services and Operations contact, to discuss Traffic Signal requirements and special situations, as needed.

2.11 Intersection and Driveway Details

An intersection or driveway detail shall be shown for all reconstructed intersections, approaches to intersections, and for all drives with any grade change. The intersection and drive detail shall include the following:

1. Elevations of all four corners of ramp landings (if applicable).
2. Top of curb elevations (TOC) at a minimum of 15-foot increments and at the beginning and end of curves.
3. TOC elevations at the tie in to the existing pavement, at any point where the grade changes, and any other points that would be needed by the contractor for construction.
4. Jointing pattern including all dimensions needed for construction with the contraction, isolation, and dowel joints shown shall be provided (for concrete).
5. Radius points with station, offset, northing, and easting.
6. Elevation points or contour lines with enough detail to show drainage, crown, flowline, and cross slope for pedestrians in between sidewalk ramps.
7. Curb type shall be clearly labeled including areas of dry curb or transitions from city curb to match private curb.

A profile of the top of curb may be submitted as an alternative for top of curb elevation points.

2.12 Erosion and Sediment Control

1. Stormwater Pollution Prevention Plans (SWP3) and Erosion Control Plans (ECP) shall be developed as follows:
    a. For grading which disturbs more than an acre of ground a stamped approved Notice of Intent (NOI) from the Kansas Department of Health & Environment (KDHE) must be submitted to the City of Lawrence Municipal Services & Operations Stormwater Division as well as the corresponding SWP3.
    b. For grading disturbing less than an acre of ground an ECP must be submitted to the City of Lawrence Municipal Services & Operations Stormwater Division for review and approval.
2. 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.
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. The Contractor must receive approval from the City of Lawrence before implementing any revisions to the approved erosion and sediment control plan.
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. Wasted or unused materials shall not be burned, buried, dumped, or discharged at the site.
6. Before disposing of soil or receiving borrow for the site, each spoil or borrow area must have an approved Erosion and Sediment Control Plan. Implementation and maintenance of the plan shall be according to City of Lawrence approvals and regulations.
7. Any disturbed area on which activity has ceased must be stabilized immediately. During non-germinating periods, mulch must be applied at recommended rates. Disturbed areas which are not at finished grade and 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. Only limited disturbance will be permitted to construct sediment traps, diversion terraces, etc.
9. 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.
10. 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.
11. Immediately upon discovering unforeseen circumstances posing potential for accelerated erosion and/or sediment pollution, the Contractor shall implement appropriate best management practices (BMPs) to eliminate the potential for accelerated erosion and/or sediment pollution.
12. A copy of the approved erosion and sediment control plan and Stormwater Pollution Prevention Plan (SWPPP) or Erosion Control Plan (ECP) must be available at the project site at all times. All pumping of sediment laden water shall be through a sediment removal facility or over undisturbed vegetated areas.
13. 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.

14. An erosion control blanket will be installed on all disturbed slopes steeper than 3:1 and all areas of concentrated flows.
15. 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, re-mulching, and re-netting 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.
16. Any sediment removed from BMPs during construction shall be returned to upland areas on site and incorporated into site grading.
17. 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.
18. Stormwater BMPs shall incorporate methods to address post-construction water quality as prescribed in the current version of the Mid America Regional Council/American Public Works Association Kansas City Metro Chapter Manual of Best Management Practices for Stormwater Quality.

2.13 Cross Sections

Cross sections shall be provided for all new construction projects and other projects with construction limits outside of the existing curb. The cross section shall include a minimum of 10' beyond right-of-way or 10' beyond the construction limits.

Cross sections shall be shown at a minimum of every 50' and at all intersection streets and driveways. Additional cross sections shall be shown as required to clearly describe the extent of construction.

Each cross section shall include:

1. Existing grade shown by dashed lines and proposed grade by a solid line
2. Centerline elevation of top of pavement
3. Existing bottom of pavement and sidewalks shown by dashed lines.
4. Proposed bottom of pavement and aggregate base shown by solid lines.
5. Cross slope of pavement and sidewalk
6. Elevations of top of curb and sidewalk. (Elevations may be shown on another sheet at a minimum of every 50' and at all intersection streets and driveways)
7. Slope of grades and drainage arrows
8. Right-of-way

2.14 Fiber Optics

Fiber Optic plans shall show all locations and types of fiber communications features, including locations and quantities of existing and proposed conduit, cable, hand holes, splices, patches, and other devices that are required as part of the fiber optic communications system. Fiber Optic system layout, material, type, and hardware shall be in accordance with the latest standards and specifications and City of Lawrence Technical Specifications and Standard Drawings. The designer should coordinate with the City of Lawrence Information Technology department and traffic field operations through their Municipal Services and Operations contact, to discuss fiber optic design requirements and special situations, as needed.

2.15 Roadway Lighting

2.15.1 Plan Sheet Requirements

The roadway lighting plan sheets shall include the following information:

1. Symbols from the Streetlight Legend in the City of Lawrence Standard Details shall be used for all sheets.

2. One (1) or more plan sheets adequately showing the roadway lighting system in relation to the streets and adjacent properties, with a north arrow, a bar scale and at a minimum scale of one inch (1") equals fifty feet (50'), unless a larger scale is specified by the City Engineer.

3. All existing and proposed utilities such as power, gas, water, telephone, cable, sanitary sewer, storm sewer, and other items shall be accurately shown according to the best information available in the records of the owner of such facility, or field location, and shall be identified as to type, size, material, etc., as may be applicable.

4. All existing and known proposed improvements within fifty feet (50') each side of the Right-of-Way and one hundred feet (100') beyond the project limits shall be shown at their proper locations unless otherwise approved or required by the Engineer. These improvements shall include items such as street pavement, curbs and gutters, sidewalks and driveways, storm and sanitary sewers, water mains and fire hydrants, utility poles and pedestals, trees and shrubs, fences and walls, buildings, and similar items, and shall be identified as to type, size, material, etc., as may be applicable.

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

6. The plans shall clearly show the proposed placement of all roadway lights, junction and service boxes, and control centers. The items to be constructed or installed for the project shall be legibly noted and located by station and offset. Roadway lights shall be further identified by control center, circuit and fixture numbers.

2.15.2 Wiring Diagram Requirements

The wiring diagram shall include the following information:

1. A schematic wiring diagram of the distribution system for each control center showing size and center-to-center distance of the secondary cable between each roadway light.

2. If requested, a summary table for each circuit shall be included indicating the conductor size, circuit raceway length, input amperage, percent voltage drop, and circuit breaker trip rating

SECTION 3 – TRANSPORTATION

3.1 Governing Specifications

Design shall be in accordance with the latest edition of the following standards, policies and guidance:

1. Manual on Uniform Traffic Control Devices for Streets and Highways. FHWA (MUTCD)
2. A Policy on Geometric Design of Highways and Streets. AASHTO (Green Book)
3. Guide for the Development of Bicycle Facilities. AASHTO
4. Roadside Design Guide. AASHTO
5. Urban Street Design Guide. NACTO
6. Urban Bikeway Design Guide. NACTO
7. Transit Street Design Guide. NACTO
8. Essentials of Bike Parking. APBP
9. Highway Capacity Manual. TRB
10. Kansas Roundabout Guide. Kansas Department of Transportation
11. Public Rights-of-Way Accessibility Guidelines. (PROWAG)
12. City of Lawrence Stormwater Management Criteria

Project development on Capital Improvement Plan (CIP) projects shall also comply with the City of Lawrence Complete Streets Policy (See Appendix F). For projects with oversight by the Kansas Department of Transportation, project development shall comply with the Local Public Authority (LPA) Project Development Manual (https://kart.ksdot.org/). See Appendix for City of Lawrence LPA Certification.

3.2 Classification of Streets

Street classifications are used by the designer to identify design criteria appropriate to the facility being designed. There may be situations where the context of a street would indicate a higher level of criteria should be applied, apart from its base classification. These situations may be as directed by the City Engineer. Street classifications are described as follows:

1. **Principal Arterial:** Principal arterials are streets and highways that serve major activity centers, typically carry the highest traffic volumes, and provide for long-length trips. These roads often define the edges of neighborhoods. They are also often the major roads serving large employment and/or commercial land use

clusters. Examples of principle arterials include 6th Street, Iowa Street, and 23rd Street in Lawrence.

2. **Minor Arterial:** Minor arterials such as 19th Street in Lawrence serve to interconnect with the principal arterial system to provide trips of moderate length and to carry lower traffic volumes. These roads may run through neighborhoods or define neighborhood boundaries, and they may connect major activity centers in neighborhoods (e.g., schools, small commercial centers) to the principal arterial network.
3. **Collector:** Collector streets provide the connection between local roads and the arterial road system. They are the roads that have about half mobility function and about half property access function. These roads may look similar to some minor arterial streets, but collectors usually have more direct access points to adjoining properties. These roads in other cases may look similar to local roads, but collectors often have much higher traffic volumes than nearby local roads. Collectors are divided into two classes (Major and Minor) for Functional classification purposes. Examples of collectors include Harvard Road between Kasold and Wakarusa in Lawrence.
4. **Local Road:** Local roads provide direct access to adjacent property. Through traffic is discouraged. The overwhelming function of this type of road is property access, and many residential and commercial driveways connect to this class of roadway. Frequent long-distance trips made on this road class and/or high-speed travel on these roads often indicates that there is a problem with the network, especially nearby collector and arterial streets. Highways, streets and roads are functionally classified to establish their importance to the overall roadway network, qualification for funding, necessary access control measures, corridor preservation needs, and design standards.

The layout of new streets shall conform to the City of Lawrence Land Development Code.

http://www.lawrenceks.org/assets/pds/planning/documents/DevCode.pdf

A map of Major Thoroughfares can be found at:

https://lawrenceks.org/mpo/t2050/

3.3 Sidewalks

Where sidewalks are provided, they must be accessible. Accessible features shall be as recommended by the Public Rights-of-Way Accessibility Guidelines (PROWAG), https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines.

3.3.1 Applicability

1. New Construction: Newly constructed facilities within the scope of the project shall be made accessible to persons with disabilities, except when it is demonstrable it is structurally impracticable to provide full compliance with these requirements. Structural impracticability is limited to those rare situations when the unique characteristics of terrain make it physically impossible to construct facilities that are fully compliant. If full compliance is structurally impracticable, compliance is required to the extent that is not structurally impracticable.
2. Alterations: Whenever alterations are made to the pedestrian circulation path, the pedestrian access route shall be made accessible to the maximum extent feasible within the scope of the project. If full compliance is technically infeasible, compliance is required to the extent that it is not technically infeasible. Alterations shall not "gap" pedestrian circulation paths to avoid ADA compliance. Alterations which require installation of curb ramps are defined by Department of Justice/Department of Transportation Joint Technical Assistance on the Title II of the Americans with Disabilities Act Requirements to Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing. Original guidance and supplemental guidance can be found at the following locations:
    a. 2013 Joint Technical Assistance: https://www.ada.gov/doj-fhwa-ta.htm
    b. Supplement: https://www.ada.gov/doj-fhwa-ta-supplement-2015.html

    Examples of physical or site constraints that may make it technically infeasible to make an altered facility full compliant include, but are not limited to, the following:
    a. Right-of-way availability. While not mandatory to acquire right-of-way to achieve full compliance, it should be considered. Improvements may be limited to the maximum extent practicable within the existing right-of-way.
    b. Underground structures that cannot be moved without significantly expanding the project scope.
    c. Adjacent developed facilities, including buildings that would have to be removed or relocated to achieve accessibility.
    d. Drainage cannot be maintained if the feature is made accessible.

e. Notable natural or historic features that would have to be altered in a way that lessens their aesthetic or historic value.
f. Underlying terrain that would require a significant expansion of the project scope to achieve accessibility.
g. Street grades within the crosswalk exceed the pedestrian access route maximum cross slopes, provided an engineering analysis has concluded it cannot be done without significantly expanding the project scope (e.g. changing from resurfacing an intersection to reconstructing the intersection).
h. When accessibility requirements would cause safety issues, compliance in required to the maximum extent practicable.

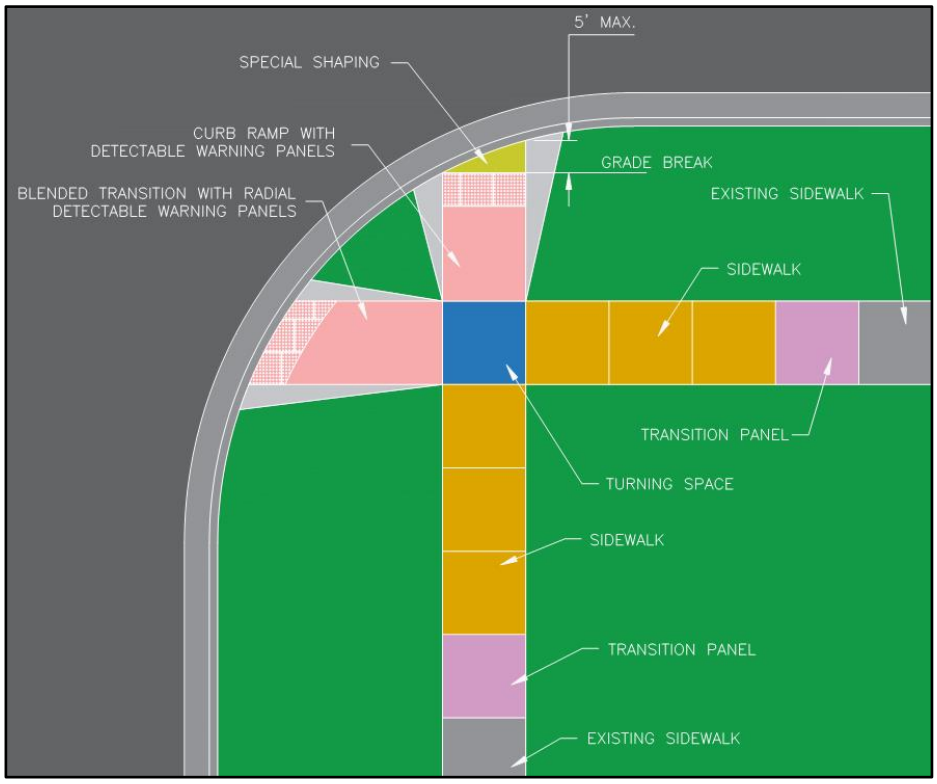
3. Where elements are altered or added to existing facilities, but the pedestrian circulation path is not altered, the pedestrian circulation path is not required to be modified. However, features added shall be made accessible to the maximum extent feasible. For example, benches, signs or utilities added to the right-of-way may be adjacent to an existing sidewalk. While these features to do not necessarily require reconstruction of the sidewalk, they should not cause a situation that violates another accessibility requirement, such as protruding objects or minimum circulation path widths.
4. Maintenance: The following items are considered maintenance and do not require accessibility improvements:
    a. Painting pavement markings, excluding parking stall delineations
    b. Crack filling and sealing
    c. Surface sealing
    d. Chip seals
    e. Slurry seals
    f. Fog seals
    g. Scrub sealing
    h. Joint crack seals
    i. Joint repairs
    j. Dowel bar retrofit
    k. Spot high-friction treatments
    l. Diamond Grinding
    m. Minor patching (less than 50% of the pedestrian street crossing area)
    n. Curb and gutter repair or patching outside of the pedestrian street crossing
    o. Minor sidewalk repair that does not include the turning space and curb ramps
    p. Filling potholes.
5. Documentation: If the project cannot fully meet accessibility requirements because improvements are structurally impracticable, technically infeasible or cause safety issues, an exception document should be developed to describe

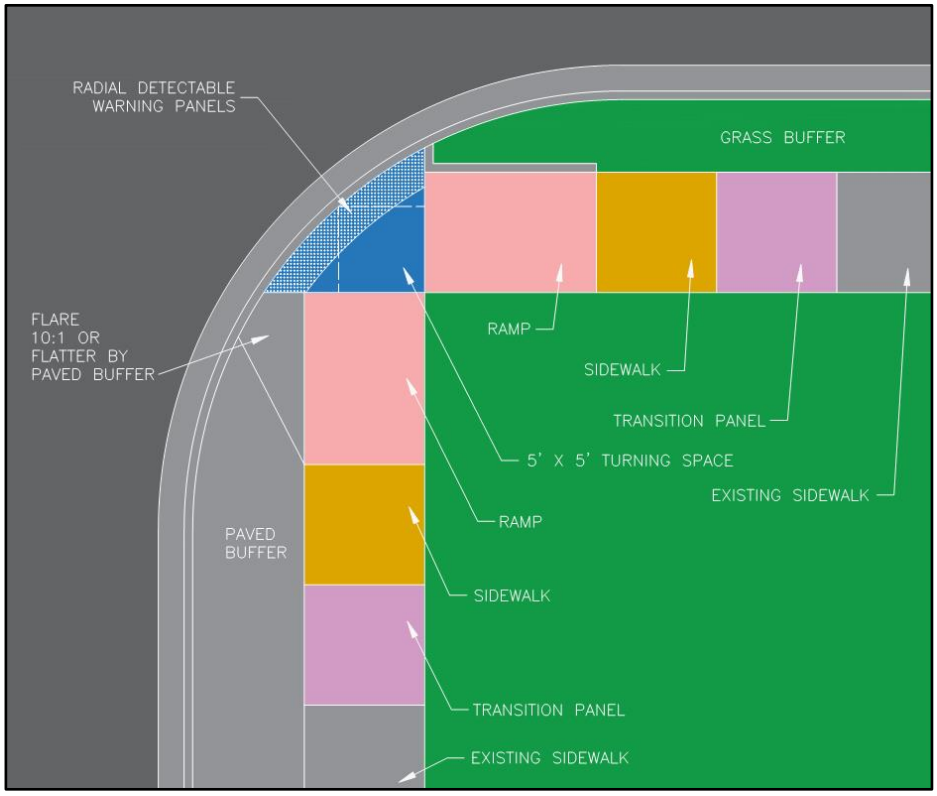
how the existing physical or site constraints or safety issues limit the extent to which facilities can be made compliant. Example documentation is provided in the Appendix. C documented exception does not remove the responsibility to consider making accessibility improvements the next time a facility is altered, as physical, site, or safety constraints may change over time. The determination of exceptions should be made each time a facility is altered, based on existing conditions and the scope of the proposed project.

3.3.2 Accessibility Standards

The following summarizes design features for select elements of an accessible pedestrian access route. Values listed are design targets. Use of these design targets allow minor construction variations to fit actual field conditions. Absolute minimum and maximum values, as well as information on gaps, surfacing, changes in level, and other features can be found in PROWAG. City of Lawrence Standard Drawings also reflect target design values, although PROWAG limits may be used in special design or construction situations. Design exception documentation is only needed where PROWAG limits cannot be feasibly met.

1. The following diagrams depict typical features of sidewalks and curb ramps:





2. Sidewalk cross slope: The design target cross slope is 1.5%.
3. Running slope: Sidewalk running slope shall be 5% or flatter, unless following the grade of the adjacent roadway. For design, the general grade of the adjacent roadway is considered to be within 2% of the profile grade.
4. Width: See design criteria table corresponding to the classification of street.
5. When connecting from new sidewalk to existing sidewalk, transition the width and cross slope over at least one panel (5-ft. minimum) or 1% cross slope change per foot, whichever is greater. Transition panels should be located beyond curb ramps or turning spaces.
6. Pedestrian Street Crossings:
    a. Cross slope: The longitudinal grade of a street becomes the cross slope for a pedestrian street crossing. Pedestrian crossings shall be designed as follows:
        i. Crossings controlled by Stop or Yield Signs: the street grade perpendicular to the crossing shall be 2.0% or flatter.
        ii. Crossings controlled by traffic signals or Uncontrolled crossings: The street grade perpendicular to the crossing shall be 5% or flatter.
        iii. Midblock Crossings: The cross slope of the pedestrian crossing may equal the street grade.
    b. Running slope: The running slope of pedestrian street crossings (i.e. crown or superelevation of roadway crossed) shall be 5% or flatter.
    c. Curb Ramps and Blended Transitions:
        i. Design target cross slope at the top of ramp (adjacent to the turning space) is 1%. Cross slope at the bottom of the ramp shall match the crossing roadway. See above for grade requirements at pedestrian street crossings.
        ii. The minimum width of curb ramp is 4-feet; however, the target ramp width should match the approach sidewalk width.
        iii. Curb ramps have grade breaks perpendicular to the direction of travel while blended transitions have grade breaks which may cross the path of travel at an angle or along a curve (e.g. curb return).
            1. The design target running slope of curb ramps is 7%. However, steeper slopes may be allowable if conditions would require a ramp length longer than 15-feet using flatter slopes. Very short ramps resulting from use of maximum slopes should be avoided where practicable.
            2. Running slopes of blended transitions shall be 5% or flatter (4% design target).

            Generally, curb ramps should be used in lieu of blended transitions when the grade break would be less than 5-feet from the back of curb.

iv. Detectable warnings shall be placed at the grade break of a curb ramp. For blended transitions, radial detectable warnings shall be placed at the back of curb.
v. See City Standard Drawings for details of flared sides. Where located within a pedestrian circulation route, flared sides shall be 10:1 or flatter. Flared sides or curbed sides shall be located outside of the ramp width.
vi. A turning space is required where the pedestrian access route requires a pedestrian to turn. This is a common situation where two sidewalks intersect. The target cross slope and running slope of turning spaces is 1%. The target size of turning spaces is 5' X 5' (or larger if approach sidewalks are wider). Landings which meet turning space requirements are encouraged at the top of ramps, even in the absence of an intersecting walkway. In cases where the sidewalk is adjacent to the back of curb, turning space may be at the bottom of the ramp.
vii. Special Shaping refers to the transition area between the back of curb and the grade break of a curb ramp. The longest side shall not exceed 5 feet and the running slope shall not exceed 5%.
viii. The City of Lawrence has a construction checklist for validating accessibility compliance (see the Appendix). While intended for construction, it is also a useful design aid. However, values listed in the checklist generally follow PROWAG dimensional limitations as opposed to the design targets outlined above.

3.4 Bikeway Plan

Bikeway elements at a minimum must comply with the Lawrence Bikes Plan.

https://lawrenceks.org/mpo/bicycle_planning/

3.5 Design Criteria Table

	Major Arterial	Minor Arterial	Collector	Residential
Number of Through Lanes	4-5	3-5	2-4	2
Minimum Width of Traffic Lanes	11	11	10	10
Minimum R/W Width (Development Code Article 8)	150'	100' (for 3 lane)	80' 60' Residential	50' 60' Cul-de-sac
Minimum Design Speed	35-45 mph	35-45 mph	30-35 mph	25 mph
Minimum Stopping Sight Distance (grades 3% or less)	250' - 360'	250' - 360'	200' -250'	200' - 155'
Minimum K Crest Vertical Curve	29 - 61	29 - 61	19 - 29	12 - 19
Minimum K Sag Vertical Curve	49 - 79	49 - 79	37 - 49	26 - 37
Minimum Radii Horizontal Curve (no super elevation)	510' - 1039'	510' - 1039'	375' - 583'	219' - 375'
Maximum Grade (Land Development Code)	5%	5%	8%	10%
Minimum Grade (Land Development Code)	1.0%	1.0%	1.0%	1.0%
Sidewalk Width (Land Development Code)	6' on one side 10' Shared-Use Path on the other side	6' on one side 10' Shared-Use Path on the other side	5' on one side 10' Shared-Use Path on the other side	5' minimum width. 4' allowed in the Original Townsite area
Curb Return Radius	25' minimum	25' minimum	25' minimum	15' minimum
Minimum Distance from Intersection of R/W to Driveway Curb-cut	300' & in accordance with Access Management Plan	300'	300' Signalized 250' Non-signalized	25'
Intersection Sight Distance	Per AASHTO Requirements			
Maximum Grade at Intersection w/stop			3% within 50'	5% within 25'
Cross Slope	2.0%	2.0%	4.0% (max)	4.0% (max)
Cul-de-sac Radius				39' min

3.6 Maximum and Minimum Grade

The City Engineer, as applicable, shall be authorized to approve minor deviations for short distances from these grade standards when it is determined that compliance with these standards is impracticable. Maximum grade of streets serving industrial areas shall be 5% regardless of street classification.

3.7 Intersecting Streets

Where any two arterial streets intersect, the crowns of both streets shall be uniformly transitioned into a plane at the intersection unless otherwise approved. The changes from one cross slope to another shall be gradual. See A Policy on Geometric Design of Highways and Streets (AASHTO) for superelevation transition guidelines based on width of roadway and design speed for more guidance.

Local street intersections on opposite sides of another local or collector street, when offset, shall be offset 300 feet or more.

Streets should intersect as nearly as possible at right angles.

3.8 Local Street Length

Local streets should be less than 1,320 feet in length. Local streets exceeding 800 feet in length shall include Traffic Calming devices, shown in an adopted City of Lawrence Traffic Calming Policy document.

Cul-de-sac lengths shall not exceed 10 times the required minimum lot width of the base zoning district or 1,000 feet (1,320 feet in Unincorporated Area), whichever is less. More information is available in the City of Lawrence Development Code.

3.9 Pavement Section

Pavement sections shall be installed in accordance with the asphalt street detail sheet or the concrete sheet detail sheet. Any variances form these standard detail sheets must be approved by the City Engineer.

3.10 Pavement Transition

Reduction in pavement width in the direction of traffic flow shall be accomplished by a taper. The minimum desirable length for merging taper shall be determined by the formula $L=WS^2/60$ where posted speeds are 45 mph or less. The formula L= WS should be used for roadways having a posted speed limit greater than 45 mph. Under either formula, L= taper length in feet, W = taper offset in feet, and S = design speed in mph. See the Manual on Uniform Traffic Control Devices, FHWA and A Policy on Geometric Design of Highways and Streets, AASHTO for additional information.

3.11 On Street Angled Parking

On street angled parking is allowed for mixed-use development, USD497 schools, the hospital and downtown. Angled parking shall be constructed with concrete pavement of the same thickness as the through lane.

SECTION 4 – ACCESS MANAGEMENT

4.1 General

This section covers access management to ensure the safe and efficient flow of traffic on its streets and within its developments. The design and construction of vehicular access drives to private developments and the internal arrangement of drives and parking areas impact both safety and efficiency. The following sections establish design standards for private driveways (excluding driveways serving single family homes and duplex units) to minimize the impacts of new developments on both street capacity and safety. It also addresses other issues related to access management.

4.2 Definitions

1. Driveway Throat Length: The distance along a driveway between the edge of the traveled way on the public street and the edge of the first intersecting cross-drive within the parking lot. Refer to Figure 1 for an illustration of driveway throat length.
2. Functional Area of Intersection: The physical area of a public street intersection (defined by the furthest extent of all curb return radii at the intersection), plus the longitudinal limits of any existing or planned auxiliary lanes, including any deceleration tapers. The functional area is determined using the following factors: distance traveled during perception-reaction time, deceleration distance as the drive maneuvers to stop, and queue storage. Refer to Figure 2 for an illustration of the functional area of an intersection.
3. Access Points: An access point shall be considered a full access if traffic movements can occur in any direction to and from the intersection. An access point shall be considered a partial access if traffic movements are restricted in any direction. Refer to Figure 3 for types of access.

4.3 Access Locations

1. A full access point on an undivided Major Arterial should not be closer than 600 feet to a full access point, measured from outside edge of traveled way on the intersecting street to the centerline of the access point, to minimize impacts on safety and the capacity of the roadway.
2. A partial access point on any Major Arterial should not be closer than 400 feet to a full access point, measured from outside edge of traveled way on the intersecting street to the centerline of the access point. The distance between partial access points along a Minor Arterial should not be closer than 300 feet measured as described above. An access point should not be located within the functional area of an intersection to the maximum extent possible.

3. Access points on Minor Arterial and Collector streets should not be located closer than 300 feet to a Major Arterial, Minor Arterial or Collector street, measured from outside edge of the traveled way on the intersecting street to the centerline of the driveway, to permit adequate storage and stacking of automobiles on the public street network. The distance between adjacent access points along a Collector Street should not be closer than 150 feet, measured from the edge of each intersection. An access point should not be located within the functional area of an intersection to the maximum extent possible.
4. Access points on Local streets should not be located closer than 100 feet to an adjacent access point, measured from outside edge of traveled way on the intersecting street to the centerline of the driveway. An access point should not be located within the functional area of an intersection to the maximum extent possible. This requirement does not apply to residential driveways within residential subdivisions.
5. When existing site constraints do not allow access points on arterial, collector, or local streets as outlined in Sections 4.3.1-4 above, the City Engineer may consider closer access spacing based on the following factors:
    a. Roadway frontage
    b. Existing access locations
    c. Topography
    d. Preservation of natural features
    e. Sight distance constraints

    It will be the responsibility of the designer to demonstrate how the development meets the above criteria.

6. No access shall be allowed within the influence area of an intersection
7. No access shall be allowed within the taper or storage area of a turn lane.

4.4 Number of Access Points

1. Access points are essential to provide access to a development, but a balance needs to be struck between the access needs of a site and impacts on the safety and operation of the public street system. The following standards are maximums. The actual number of access points serving a development should be based on the real needs of the proposed land uses.
    a. The following maximum number of access points serving non-residential development shall be permitted on all minor arterial, collector, and local streets:

Length of Frontage (in feet)	Maximum Number of Access Points
Up to 399	1
400-899	2
900-1399	3
1400-1899	4

(for each additional 500 feet of frontage, one additional access point)

b. The following maximum number of access points serving non-residential development shall be permitted on all divided streets and on all unimproved streets expected to contain a raised median when improved in the future:

Length of Frontage (in feet)	Maximum Number of Access Points
Up to 699	1
700-1399	2
1400-2099	3
2100-2799	4

(for each additional 700 feet of frontage, one additional access point)

4.5 Access Point Width

1. Commercial Driveway Approach. The width of commercial driveway approaches shall not exceed thirty (30) feet or be less than twenty-five (25), from back-of-curb to back-of-curb for two-way driveway approaches. The minimum width of a one-way driveway shall be seventeen (17) feet, back-to-back.
2. Industrial Driveway Approach Offset. The width of industrial driveway approaches shall not exceed sixty-five (65) feet or be less than twenty-five (25) feet, from back-of-curb to back-of-curb for two-way driveway approaches. The minimum width for a one-way driveway shall be seventeen (17) feet, back-to-back.

4.6 Access Point Alignment

1. Access points should be either aligned with existing or proposed access points on the opposite side of the street or offset by a minimum distance of 150 feet. If an access point will align with an existing or planned access point on the opposite side of the street, it should be designed so that its geometrics are compatible with those of the opposing access point.

4.7 Throat Length

1. On non-residential driveways sufficient throat length shall be provided to minimize impacts on the public street to which the access points connect and to provide for good internal circulation within the parking lot served by the development. Throat length is generally based upon the number of trips generated by a development and the amount of vehicular stacking that will occur at the access point:

Number of Peak Hour Trips	Throat Length Requirements*
<100	50 feet
101-199	100 feet
>200	250 feet

*Longer throat lengths may be required based on staff review or Traffic Impact Study

4.8 Sight Distance

1. Providing adequate sight distance for vehicles exiting and entering an access point is an important safety consideration. All landscaping and site improvements proposed near site access points shall comply with the intersection design sight distance policies contained within the latest edition of "A Policy on Geometric Design of Highways and Streets" published by the American Association of State Highway and Transportation Officials.

4.9 Common Drives and Internal Access

1. The use of common drives and internal access between properties with compatible land uses is encouraged to minimize direct access off public streets, resulting in improved street capacity and reduced potential for accidents. In cases where access control is especially critical to the safe and efficient flow of traffic under existing or projected conditions, a requirement for the provision of common access easements may be included as a stipulation of approval.

4.10 Turn Lanes

1. The design of turn lanes (location, length, width and geometrics) shall be based on the results of an engineering analysis. The minimum turn lane length required is 150 feet.

4.11 Median Break Spacing

1. In order to balance traffic control and land access, median breaks on divided thoroughfares shall be planned with a one-quarter mile spacing. Requests for

closer spacing of median breaks shall be permitted only when the specific need and feasibility have been clearly documented by a traffic engineering study.

4.12 Special Criteria for Selected Corridors

1. Certain areas of the city are subject to additional access management standards. The following studies should be referenced for any projects located within the study areas:
    a. East 23rd Street Multimodal Corridor Plan: 23rd Street between Learnard Avenue and East Hills Drive
    b. 23rd Street Corridor Study: 23rd Street between Iowa Street and Louisiana Street
    c. US-40/6th Street Area Transportation Plan: US-40/6th Street between E800 Road and George Williams Way
    d. 31st Street Corridor Study: 31st Street between Iowa Street and Haskell Avenue
2. Any additional studies completed for specific corridors not mentioned above shall be considered part of this list and shall be referenced for any projects within the specific study area. Future special planning areas may also be allowed to adopt alternate access management standards and criteria as determined by staff.

SECTION 5 – ROADWAY LIGHTING

5.1 General

The City Engineer shall be responsible for approving the scope of a roadway lighting system in accordance with the Municipal Services & Operations Street Lighting Policy. Roadway lighting systems shall be composed of all electrical equipment required to provide a complete, operable system. This shall include, but is not limited to power supplies, luminaires, poles, distribution cables, conduit, foundations and related appurtenances. Components of the system shall conform to the City of Lawrence Technical Specifications and Standard Details

5.2 Design Standards

Continuous roadway lighting in the City of Lawrence shall meet the design standards established by the current edition of the ANSI/IES RP-8 publications. Roadway lighting at roundabouts shall meet the design standards established by the current edition of the Kansas Roundabout Guide published by the Kansas Department of Transportation.

These standards shall be adhered to for the design of all publicly and/or privately financed roadway lighting systems to be installed in the public street right-of-way under the jurisdiction of the City of Lawrence. It is the intention that these standards provide consistent methodologies and criteria for the design engineer to conform to while preparing improvement plans for the City of Lawrence. These standards are not intended to restrict design innovations that may be beneficial for the project budget, public safety, and/or character of the lighting environment. These standards may be amended only with prior authorization of the City Engineer.

Roadway lighting shall typically consist of LED cobrahead-style luminaires at a 30 foot mounting height. All luminaires shall have a correlated color temperature (CCT) of 3000K. The Designer MUST submit a photometric plan to the City for review before the lighting plans can be approved.

The distribution system shall be underground and installed in conduit. The distribution cable shall be sized so that the voltage drop does not exceed eight percent (8%) at any point in the system. The Designer MUST submit voltage drop calculations to the City for review before the lighting plans can be approved.

The electrical system shall conform to the requirements of the National Electrical Code, the National Electrical Safety Code and service standards issued by Evergy. The Designer shall coordinate and verify the location of proposed feed points with Evergy to ensure availability of service. The Designer shall include the conduit AND the service

cable from the secondary service point to the meter on the controller in the plans as the Contractor is required by EVERGY to install the cable and the conduit.

SECTION 6 – SANITARY SEWER

6.1 Design Requirements

For sanitary sewer projects, a Kansas Department of Health and Environment (KDHE) permit application must be submitted (see the Appendix).

6.1.1 Design Flow Rates

1. Design flow rates shall be calculated based on total acreage of the development, weighted average density, per capita usage, and estimated infiltration and inflow.
2. A spreadsheet is available for download that allows the user to input acreage, density, and interpolation information and calculates the design flow for the development. The spreadsheet can be downloaded from https://lawrenceks.org/mso/development/Per capita usage, infiltration and inflow, time of concentration, flow intensities, and peaking factors are based on data from the City of Lawrence 2003 Wastewater Master Plan. An Example is provided in the Appendix of these criteria.

6.1.2 Pipe Requirements

1. Pipe Size: Pipes shall be sized to provide adequate capacity in accordance with Section 4.1.1 of these criteria. The minimum pipe diameter shall be eight (8) inches.
2. Pipe Slope: Pipe slope shall be as follows for eight (8) inch diameter sewer mains:

Calculated Design Flow (gpm)	Minimum Slope
0-70	1.00%
71-141	0.80%
142 or more	0.64%

For pipe larger than eight (8) inches in diameter the slope shall provide a minimum velocity of two (2) feet per second when flowing half full. The following table indicates the minimum permissible slopes for this condition.

Minimum Pipe Slopes

Pipe Diameter (in)	Hydraulic Radius (ft)	Minimum Slope (%)
10	0.208	0.248%
12	0.250	0.194%
15	0.313	0.144%
18	0.375	0.113%

All public sewers should be designed such that the mean velocity does not exceed ten (10) feet per second when flowing full. The following table indicates the maximum permissible slopes for this condition.

Maximum Pipe Slopes

Pipe Diameter (in)	Hydraulic Radius (ft)	Maximum Slope (%)
8	0.167	8.344%
10	0.208	6.197%
12	0.250	4.860%
15	0.313	3.609%
18	0.375	2.830%

3. Where pipe velocities are greater than ten (10) feet per second special provisions shall be made to protect against erosion. Methods shall be approved on a case by case basis by the Municipal Services & Operations Department.
4. Pipe Anchors: Where pipe slopes exceed 15% and manhole spacing exceeds one hundred (100) feet, special provisions shall be made to anchor the pipe securely as described in the City of Lawrence Construction and Material Specifications – Sanitary Sewer (8" to 18" Mains).
5. Pipe Angles: The interior angle between incoming and outgoing lines for both existing and new mains shall be clearly labeled at all manholes in the plan view in ddmmss format. Interior angles less than ninety (90) degrees shall not be acceptable under any circumstance.
6. Minimum Cover: A minimum of thirty (30) inches of cover is required over the top of the main and service stubs in all locations.

7. Pipe Protection:
    a. Retaining Walls: Where retaining walls are proposed over or near existing or proposed mains or service lines, the main or service line shall be encased in reinforced concrete or installed in a steel casing pipe conforming to the requirements set forth in the City of Lawrence Construction and Material Specifications – Sanitary Sewer (8" to 18" Mains). Encasement or casing pipe protection shall extend a minimum of five (5) feet either side of the retaining wall. Walls, footings, or keys shall not bear directly or indirectly upon the encasement or casing pipe and shall not parallel the main within the easement.
    b. Pipeline and Highway Crossings: Where the sanitary sewer main crosses an existing highway or pipeline, the main shall be installed in a steel casing pipe conforming to the requirements set forth in the City of Lawrence Construction and Material Specifications – Sanitary Sewer (8" to 18" Mains). Casing pipe protection shall extend, at a minimum, to the limits of the pipeline easement or highway right-of-way. Pipe protection requirements as listed above are considered a minimum requirement. When crossing details and specifications are published by the respective governing authority, pipe protection shall conform to the more restrictive requirement.
8. Pipe Depth: The depth of sewers generally shall be limited to twenty (20) feet as measured from flowline of pipe to finished grade. Exceptions to this requirement will be made on a case by case basis and only if no other feasible alternatives exist. In general, exceptions will not be approved if the sole purpose of the extra depth is to provide service to areas outside the watershed or sewershed to be served by the project.
9. Larger Diameter Mains: For gravity mains and force mains greater than eighteen (18) inches and six (6) inches respectively the Design Engineer shall submit type of pipe proposed for approval by the Municipal Services & Operations Department. Along with this submittal the Design Engineer shall evaluate and compare the proposed pipe specifications to the City Technical Specifications and Design Criteria for Sanitary Sewer Mains. Where specifications differ from the City's standard specifications the Engineer shall supply the City with a detailed list of the differences for review.

6.1.3 Manhole Requirements

1. Manholes shall be required at all changes in horizontal and vertical alignment and at all changes in pipe size and pipe material. Curved alignments, cleanouts and lampholes will not be permitted. Existing sanitary sewer cleanouts and

lampholes within the limits of the project shall be removed in design and replaced with a manhole.

2. Typical manhole spacing shall be 400 feet. Greater spacing may be approved by the Municipal Services & Operations Department on a case by case basis.
3. Manholes shall be located a minimum of ten (10) feet beyond the top of bank when adjacent to a watercourse.
4. Wall thickness for manholes less than sixteen (16) feet deep shall be 1/12 of the internal shell diameter or four (4) inches, whichever is greater. For manholes sixteen (16) feet or greater in depth the wall thickness shall be 1/12 of the internal shell diameter plus one (1) inch or five (5) inches, whichever is greater.
5. The minimum diameter for manholes shall be four (4) feet.
6. The minimum depth for manholes, from the rim to the lowest invert, shall be four (4) feet.
7. A minimum drop of 0.20 feet or, at locations where a change in pipe size occurs, the difference in pipe diameter, is required across all manhole inverts.
8. Drop manholes shall be used if the difference in invert elevations is equal to or greater than twenty-four (24) inches. Only inside drop manholes shall be permitted. The minimum diameter of a drop manhole shall be five (5) feet.
9. Manholes located on interceptor sewer lines, force main receiving manholes, or other manholes, as determined by the Municipal Services & Operations Department, shall have the interior surface lined with an epoxy or polyurethane system installed per manufacturers' recommendation, conforming to the City of Lawrence Construction and Material Specifications – Sanitary Sewer (8" to 18" Mains).

Requirements 10 through 12 shall apply to the following:

- Manholes located within the FEMA delineated 100-year floodplain.
- Manholes within the limits of the 100-year water surface elevation of natural watercourses. Manholes adjacent to manmade watercourses may be subject to these guidelines and will be reviewed on a case by case basis by the Municipal Services & Operations Department.
- Manholes adjacent to detention/retention or storm water impoundment areas.

10. Manholes shall be installed with bolt down gasketed lids conforming to the provisions of the City of Lawrence Construction and Material Specifications – Sanitary Sewer (8" to 18" Mains).
11. Manholes shall maintain a rim elevation of at least two (2) feet above the 100-year water surface or flood pool elevation.
12. All joints in manholes shall be sealed. Sealant shall conform to the City of Lawrence Construction and Material Specifications – Sanitary Sewer (8" to 18" Mains).

6.1.4 Service Line Requirements

1. A service connection stub out shall be provided for each lot and/or building. The service stub is provided on the main to accommodate connection of the building service line.
2. The building service line shall generally be less than 200 feet in length. A minimum of five (5) feet of separation shall be provided between the end of the stub and the building.
3. Service lines shall extend a minimum of five (5) feet into the lot to be served. In addition, the service line shall extend through all easements and/or rights-of-way that may contain other utilities.
4. A service line for a lot shall generally not cross another lot to access the sewer main. The service line for a lot may enter another lot only if the other lot is contiguous with or located immediately across the street right-of-way from the lot to be served. The service line entering another lot shall be located only in the sanitary sewer easement or utility easement for the sanitary sewer main.
5. Service lines shall not cross watercourses, wetland areas or any basins including detention or retention areas.
6. If an existing or proposed building will not require sanitary sewer service, provide the following label on the building: SEWER SERVICE NOT REQUIRED. A written explanation of why service is not required must be submitted.
7. When a project includes multi-unit buildings such as duplex, 3-plex, 4-plex buildings, etc. or other commercial buildings located on a common lot, a service line stub shall be provided for each unit. Single service stubs to multi-unit buildings located on a common lot are permissible provided that a homeowners, tenants or other form of community association is formed or in existence and will be responsible for the maintenance of the single service lines.
8. Connections shall be provided for all future lots or buildings. For lots with an existing main and no connection, the connection shall be made utilizing a tee or wye service saddle. Service connections will not be permitted on interceptor sewers or sewers larger than 12" diameter without the approval of the Municipal Services & Operations Department.
9. Manhole stubs are not permitted without the approval of the Municipal Services & Operations Department.
10. Connections shall be a minimum of five (5) feet apart and shall not be installed in the same trench.
11. All tee or wye service connections must be installed at a minimum of 45 degrees from horizontal.
12. The minimum slope for a six (6) inch service line shall be 1.00%. The minimum slope for a four (4) inch service line shall be 2.00%.

13. For stubs to be installed on a sewer main running between two lots, stubs shall be located in front of the front building line or a minimum of fifty (50) feet behind the front building line to avoid connections between foundations.
14. End of stub locations shall be identified by station and offset referenced to the sewer main.
15. The flow line elevation of the upstream end of the service stub shall be labeled in the plan view.
16. Risers are required when the depth of the end of the stub exceeds five (5) feet.
17. For all buildings and/or lots to be serviced by the sewer main minimum serviceable floor elevations (MSFE) shall be provided. A distance of three feet between the floor elevation and the flow line of the main at the connection is considered the minimum vertical clearance provided for connection. This clearance must be increased to account for service line length, depth of the lot, and other site-specific circumstances.

6.1.5 Potable Waterline Separation Requirements

1. Horizontal Separation:
    a. A minimum of ten (10) feet horizontal separation, as measured from the outside edge to outside edge, shall be required between a sanitary sewer main, forcemain, service line, or manhole and potable waterline.
    b. Under no circumstance shall potable waterline and sanitary sewer be placed in the same trench.
    c. Sanitary sewers shall meet the minimum separation requirements from public water supply wells or other water supply sources and resources as set forth by the appropriate reviewing agency.
2. Vertical Separation:
    a. A minimum of two (2) feet vertical separation, as measured from the outside walls of the pipe, shall be required between a sanitary sewer main or service line and potable waterline.
    b. In general, sanitary sewer lines shall be located below potable waterlines.
    c. Sanitary sewer force mains shall always be located below potable waterlines and shall maintain a minimum of two (2) feet of vertical separation, as measured from the outside of the walls of the pipe.
3. Protective Measures: When sanitary sewers and potable waterlines cross with less than two (2) feet of vertical clearance, and in all cases where the potable waterline, is located below the sanitary sewer, additional measures must be employed to protect the potable waterline. Acceptable measures include:
    a. Construction of the sanitary sewer line using one of the following materials:

i. Ductile iron pipe conforming to ASTM A536 or ANSI/AWWA C151/A21.52 with a minimum thickness class 50, and gasketed, push-on, or mechanical joints in conformance with ANSI/AWWA C110/A21.10 or ANSI/AWWA C111/A21.11.
ii. PVC pipe conforming to ASTM D3034 with minimum wall thickness of SDR41, ASTM F679, or ASTM F794, with gasketed push-on joints in conformance with ASTM D3215.
iii. Reinforced concrete pipe conforming to ASTM C76 with gasketed joints in conformance with ASTM C361 or ASTM C443.

Install a minimum twenty (20) foot length of sanitary sewer pipe on the crossing to maximize the joint spacing to a minimum of ten (10) feet from the crossing.

b. Provide concrete encasement of the sanitary sewer line a minimum of six (6) inches in thickness for a minimum distance of ten (10) feet either side of the pipeline crossing.
c. Sanitary sewer service lines may be constructed using schedule 40 PVC pipe with solvent welded joints. Pipe joints shall be located a minimum of ten (10) feet either side of the pipeline crossing.

6.1.6 General Utility Separation Requirements

1. Horizontal Separation: A minimum of five (5) feet of horizontal separation, as measured from outside walls of the pipe, shall be required between all utilities, excluding potable waterlines, and sanitary sewer main, force main, service line or manhole.
2. Vertical Separation: A minimum of two (2) foot of vertical separation, as measured from the outside walls of the pipe, shall be required between all utilities and sanitary sewer main, force main or service line.

6.1.7 Abandonments

1. Gravity and Pressure Pipeline: Gravity and pressure pipeline shall be plugged and filled with flowable fill or cement mortar.
2. Manholes: Manhole cones or the top four (4) feet shall be removed, penetrations shall be plugged and grouted, and the manhole shall be filled with flowable fill if under pavement or sidewalk, otherwise the manhole shall be filled with sand.
3. Manhole Connections: Manhole connections shall be cut, plugged and grouted within two (2) feet of the manhole.
4. Service Lines: Service lines shall be cut and plugged within eighteen (18) inches of the sanitary sewer main and the cap shall be encased in concrete.

6.2 Alignment and Location

6.2.1 General

1. Sanitary sewer alignments shall be designed to minimize pipe depth, length of main and service lines, and the number of manholes required.
2. Sanitary sewer alignments shall be designed such that the requirements of City of Lawrence Code Section 19-214 can be met.
3. Sanitary sewer shall generally be located along rear lot lines within a permanent easement.
4. Sanitary sewer mains shall not be located in public right-of-way unless approved by the Municipal Services & Operations Department.
5. Where sanitary sewers are installed in easements on rear lot lines the sewer shall not terminate after the last shared lot line, but shall extend to the adjacent street right-of-way and terminate with a manhole to provide access for maintenance purposes.
6. All sewers shall be designed on straight alignments between manholes, curved alignments are not permitted.
7. Sanitary sewer shall be located a minimum of fifteen (15) feet from any building structure and a minimum of eight (8) feet from all other structures. Structures of any kind shall not be located within the sanitary sewer easement limits.

6.2.2 Watercourse Crossings

1. Aerial crossings shall not be permitted.
2. Inverted siphons shall not be permitted.
3. Sanitary sewers crossing watercourses shall be designed to cross the watercourse as nearly perpendicular to the flow direction as possible and shall be on a constant grade.
4. Sanitary sewer systems shall be designed to minimize the number of stream crossings.
5. Protection of the sanitary sewer main shall be provided at all watercourse crossings as required to prevent erosion.
6. If the depth of cover over the main is five (5) feet or less, reinforced concrete encasement, casing pipe, or other protective measure as appropriate shall be provided extending the full width of the watercourse crossing to a point ten (10) feet beyond the top of bank.
7. Impervious ditch checks, as detailed on the standard drawings, shall be provided immediately downstream of the watercourse crossing.

6.2.3 Detention and Retention Basins

1. Sanitary sewer mains or service lines shall not run through a detention or retention facility.
2. All existing and proposed sanitary sewer mains or service lines shall be located a minimum of two (2) feet horizontally away from the edge of the maximum water surface elevation for each foot of depth of the sanitary sewer main.
3. An impervious ditch check, as detailed on the standard drawings, shall be provided immediately downstream of any detention or retention basin.

6.3 Easement Requirements

6.3.1 General

1. All sanitary sewer lines must lie in either a platted utility or sanitary sewer easement or a utility or sanitary sewer easement dedicated to the City of Lawrence, Kansas.
2. A standard utility easement is provided in the Appendix of these criteria.

3. A standard temporary construction easement is provided in the Appendix of these criteria.
4. When easements are to be dedicated by separate instrument, draft easements shall be submitted for review with the first intermediate plan submittal. The entire easement form including legal description and an exhibit map shall be provided.
5. Plans will not be released for construction until the signed easements and/or recorded final plat have been received by the City of Lawrence.

6.3.2 Easement Width Requirements

1. Permanent easements for sanitary sewer mains shall be centered on the main.
2. Permanent easements for sanitary sewer mains shall be a minimum of fifteen (15) feet in width.
3. Permanent easements shall increase in width according to pipe depth as follows:

Depth to Invert	Easement Width
0 to 10 feet	15 feet
11 to 15 feet	20 feet
16 to 20 feet	30 feet

4. Sewer depths generally shall not exceed twenty (20) feet per section 5504.2 of these criteria. In such cases where the pipeline depth exceeds twenty (20) feet, easements shall be submitted for review and approval by the Municipal Services & Operations Department.
5. Easements shall extend beyond the center of a terminating manhole a distance equal to one half of the required easement width as determined from the above table.

6.3.3 Standard Easement Forms

1. Permanent Utility Easement:
    a. The permanent easement form is included as Attachment D of these criteria.
    b. The easement form shall be completed and executed prior to the release of plans for construction.
    c. A written legal description shall be included with the easement form as Exhibit "A".
    d. An easement exhibit shall be included with the easement form as Exhibit "B".

e. The grantor signature line must be completed by an individual owner, a president, vice president, or authorized representative of a corporation, or a member or manager for a limited liability company or by trustee(s) of a trust. The grantor's ownership name must be accurate in all aspects as would be required for a deed transfer.

2. Temporary Construction Easement:
    a. The temporary construction easement is included as Attachment C of these criteria.
    b. The easement form shall be completed and executed prior to the release of plans for construction.
    c. A written legal description shall be included with the easement form as Exhibit "A".
    d. An easement exhibit shall be included with the easement form as Exhibit "B".
    e. The grantor signature line must be completed by an individual owner, a president, vice president, or authorized representative of a corporation, or a member or manager for a limited liability company or by trustee(s) of a trust. The grantor's ownership name must be accurate in all aspects as would be required for a deed transfer.

6.3.4 Platted Easement Requirements

1. Easement dedication of platted easements to the City of Lawrence shall be included on the plat.
2. Utility easements shall be clearly delineated on the plat and shall be clearly labeled throughout. Irregular easement shapes shall require dimensional labeling sufficient to clearly determine the easement limits such that any land surveyor can locate and stake the easements in the field.

6.3.5 Off-Site Easements

1. Projects may require the acquisition of temporary and/or permanent utility easements. It is the responsibility of the Developer or Engineer to obtain all required easements.
2. Efforts to acquire any required off-site easements must commence as soon as the alignment of the pipeline is set and draft easements have been approved.
3. All offers to the affected property owner shall be made in writing and sent to the property owner as certified mail with return receipt requested. The City of

Lawrence should be copied on all correspondence with affected property owners.

4. If the developer has demonstrated reasonable effort to acquire an off-site easement and the affected property owner refuses to execute the easement, the following remedies may apply:
    a. If the main extension is to service the adjoining property exclusively, the affected property owner must deny the easement in writing and specifically decline their right to direct sanitary sewer access. Full documentation of all acquisition efforts must be presented to the City of Lawrence before this option may be considered.
    b. If the main extension must cross an off-site property to serve the project property, the use of eminent domain (condemnation) may be proposed. The use of eminent domain is the method of last resort when all efforts to negotiate/purchase the offsite easements have been unsuccessful. Full documentation of all acquisition efforts must be presented to the City of Lawrence before eminent domain (condemnation) may be considered. All costs associated with eminent domain proceedings shall be paid by the developer. Payment of these costs may need to be secured by an escrow account, non-revocable letter of credit or other means.

SECTION 7 – WATERLINES

7.1 Scope

This section establishes the minimum standards of design for water main extensions and relocations within the jurisdiction of the City of Lawrence, Kansas. The following requirements are minimum requirements.

7.2 General

1. Pipe Size: Minimum pipe size shall generally be eight (8) inches in diameter. Pipe shall be PVC or ductile iron for water mains. Pipe shall be type K soft copper or polyethylene tubing (PE pipe) for all water mains or service lines two (2) inches or less in diameter.
2. Phasing: Project phasing is permitted within a single set of improvement plans. Phase lines shall be delineated on the plans with consideration given to ensure that the phasing plan will permit all requirements of these design criteria to be met. Plan quantities shall be itemized for each phase of the project.
3. System Sources: Water mains shall generally be designed with a minimum of two feed sources. Dead end lines will not be allowed without the approval of the Municipal Services & Operations Department.
4. Connection to Existing Mains: Connections to existing mains shall be made in such a manner as to provide the least amount of interruption to water service. In the event that closing of valves to make a connection will affect a customer who cannot be without service, provisions shall be made on the plans for a temporary service. Where possible, connections to existing mains shall be made using tapping sleeves and valves as noted in the City of Lawrence Construction and Material Specifications – Waterlines. When connections are made to an existing system under normal conditions, the exposed pipe and fittings shall be disinfected per the City of Lawrence Construction and Material Specifications – Waterlines.
5. Customer Service: Water mains shall generally be designed such that not more than twenty-five (25) customers will be without service when sections of the water main are isolated for service or emergency repairs.
6. Easements: Where required, easements shall be provided for the installation and maintenance of the public water line. Permanent easements shall be a minimum of ten (10) feet in width when adjacent to right-of-way or access easements. Permanent easements shall be a minimum of fifteen (15) feet in width if not adjacent to right-of way or access easements. Temporary easements shall be of

sufficient width to allow the installation of the waterline as shown on the plans. Consideration should be given to size of equipment, materials storage, and trench spoils stockpiling when establishing temporary construction easement widths.

   a. A standard utility easement is provided in the Appendix of these criteria.
   b. A standard temporary construction easement is provided in the Appendix of these criteria.

7. Cross Connection: There shall be no physical connection between the public water main and any pipe, pump, hydrant, tank, or non-potable water supply whereby unsafe water or other contaminating material may be discharged or drawn into the system.

7.3 Location

7.3.1 Horizontal

1. Waterlines shall generally be located three (3) feet from the back of curb.
2. Waterlines, if located within dedicated easements, shall generally be centered within the easement and maintain a minimum separation of five (5) feet from the centerline of the pipe to the edge of the easement.
3. Waterlines shall be located a minimum of fifteen (15) feet from a building structure and eight (8) feet from all other structures.
4. Waterlines shall generally be located to minimize special engineering conditions and to provide adequate separation from other utilities.
5. Allowable joint deflection shall not exceed manufacturers recommended maximums. Minimum radii are listed below. Should a smaller radius than the listed minimum be required, fittings shall be used to achieve the required deflection.

Radius of Curvature for C900 PVC Pipe	
Pipe Diameter (In)	Radius* (ft)
4" - 12"	200
>12"	300

Radius of Curvature for DIP Pipe Push-On Joints	
Pipe Diameter (In)	Radius* (ft)
6"	230
8"	230
12"	230
16"	380
24"	380

Radius of Curvature for DIP Pipe Mechanical Joints	
Pipe Diameter (In)	Radius* (ft)
6"	160
8"	220
12"	220
16"	320
24"	500

*Radius based on laying lengths of twenty (20) feet

7.3.2 Vertical

1. Back of curb waterlines shall be installed with a minimum of forty-two (42) inches of cover.
2. Waterlines installed under pavement shall be installed with a minimum of sixty (60) inches of cover.
3. Operable appurtenances such as hydrant and line valves shall generally be located at a depth of six (6) feet or less. Depths of cover for operable appurtenances greater than six (6) feet require the approval of the Municipal Services & Operations Department.

7.3.3 Sanitary Sewer Separation

1. Horizontal Separation:
    a. A minimum of ten (10) feet horizontal separation, as measured from the outside edge to outside edge, shall be required between a potable waterline and a sanitary sewer main, forcemain, service line, or manhole.
    b. Under no circumstance shall potable waterline and sanitary sewer be placed in the same trench.
    c. Potable waterlines shall meet the minimum separation requirements from all pollution sources as set forth by the appropriate reviewing agency.

d. When waterlines and other utilities are laid parallel to each other the separation distance shall be determined based on geotechnical considerations. A minimum of three (3) feet of undisturbed earth separating the trenches shall be required. Under no circumstance shall waterlines and other utilities be installed in the same trench.

2. Vertical Separation:
    a. A minimum of two (2) feet vertical separation, as measured from the outside walls of the pipe, shall be required between a sanitary sewer main or service line and potable waterline.
    b. In general, potable waterlines shall be located above sanitary sewer lines.
    c. Potable waterlines shall maintain a minimum of two (2) feet of vertical separation, as measured from the outside walls of the pipe, and shall always cross above any sewer force main.
3. Protective Measures: When potable waterlines and gravity sanitary sewers cross with less than two (2) feet of vertical clearance, and in all cases where the potable waterline is located below the gravity sanitary sewer, additional measures must be employed to protect the potable waterline.

    Acceptable measures include:
    a. Construction of the sanitary sewer line using one of the following materials:
        i. Ductile iron pipe conforming to ASTM A536 or ANSI/AWWA C151/A21.52 with a minimum thickness class 50, and gasketed, push-on, or mechanical joints in conformance with ANSI/AWWA C110/A21.10 or ANSI/AWWA C111/A21.11.
        ii. PVC pipe conforming to ASTM D3034 with minimum wall thickness of SDR41, ASTM F679, or ASTM F794, with gasketed push-on joints in conformance with ASTM D3212.
        iii. Reinforced concrete pipe conforming to ASTM C76 with gasketed joints in conformance with ASTM C361 or ASTM C443.

        Install a minimum twenty (20) foot length of sanitary sewer pipe on the crossing to maximize the joint spacing to a minimum of ten (10) feet from the crossing.

    b. Provide concrete encasement of the sanitary sewer line a minimum of six (6) inches in thickness for a minimum distance of ten (10) feet either side of the pipeline crossing.
    c. Sanitary sewer service lines may be constructed using schedule 40 PVC pipe with solvent welded joints. Pipe joints shall be located a minimum of ten (10) feet either side of the pipeline crossing.

7.3.4 General Utility Separation

1. Horizontal Separation: A minimum of five (5) feet of horizontal separation, as measured from outside walls of the pipe, shall be required between all utilities, excluding sanitary sewer, and potable waterlines.
2. Vertical Separation: A minimum of two (2) foot of vertical separation, as measured from the outside walls of the pipe, shall be required between all utilities and potable waterlines.

7.3.5 Watercourse Crossings

1. Aerial Crossings: The pipe shall be adequately supported, protected from damage and freezing, and be accessible for repair or replacement.
2. Waterlines crossing a watercourse shall be designed to cross the watercourse as nearly perpendicular to the flow direction as possible and shall be on a constant grade.
3. Water distribution systems shall be designed to minimize the number of watercourse crossings.
4. Protection of the waterline shall be provided at all watercourse crossings as required to prevent erosion.
5. If the depth of cover over the waterline is five (5) feet or less, reinforced concrete encasement, casing pipe, or other protective measure as appropriate shall be provided extending the full width of the watercourse crossing to a point ten (10) feet beyond the top of bank.
6. Valves shall be provided on both sides of the crossing to facilitate testing and repair of the pipeline. Valves should be easily accessible and shall be placed a minimum of ten (10) feet outside the top of bank.
7. Impervious ditch checks, as detailed on the standard drawings, shall be provided immediately downstream of the watercourse crossing.

7.4 Appurtenances

7.4.1 Fire Hydrants

1. Fire hydrants shall be placed no less than four (4) and no more than twelve (12) feet from the back of curb.

2. Hydrant spacing shall generally not exceed six hundred (600) feet. Fire hydrant spacing will be reviewed and approved by Lawrence Douglas County Fire and Medical Services on a case by case basis.
3. Fire hydrants shall generally be placed at intersections, end of permanent dead end lines, and intermediate points when block lengths exceed the required spacing. It is preferred to locate mid-block hydrants at property lines.
4. Only dry-barrel hydrants will be approved for installation and shall comply with the City of Lawrence Construction and Material Specifications – Waterlines.
5. Hydrant installation shall conform to the standard drawings.
6. Hydrant drains shall not be connected to a sanitary or storm sewer.
7. Note the station and offset of the fire hydrant tee and appurtenance on the plan sheet.

7.4.2 Valves

1. Line valve spacing shall not exceed eight hundred (800) feet.
2. Valves shall be placed at all tees, crosses, and other pipe intersections such that pipes in the system can be isolated and service interruptions, if required, may be limited to no more than twenty-five (25) dwelling units at a time. Where a dead end or single feed waterline is proposed to serve in excess of twenty-five (25) dwelling units, a looped and/or secondary feed shall be provided. The provision of this section may be waived by the MSO Department Director if, upon review by MSO department staff, it is found that the requirements of this section create a hardship on the property owner or that the characteristics of the property are unique in comparison of other properties in the general area. Should a waiver request be denied, the applicant may appeal the decision to the city commission for further consideration.
3. Valves shall generally be placed no more than three (3) feet from the tee, cross or other pipe intersection unless the valves can be appropriately relocated to an unpaved area.
4. Line valves shall generally be located at property lines or placed such that they can be referenced with respect to certain obvious monuments.
5. At high points in the waterline where air can accumulate, provision shall be made to remove air by means of hydrants or air relief valves. Automatic air relief valves shall not be used where flooding of the vault may occur.

7.4.3 Flushing Assemblies

Flushing assemblies, in accordance with the standard details, shall be placed at the end of all public two (2) inch waterlines, at temporary dead-end lines, and at other locations as specified by the Municipal Services & Operations Department.

7.4.4 Thrust Restraint

1. Thrust restraint shall be provided for all fittings and shall extend to solid undisturbed earth.
2. Thrust restraint shall be installed so that all joints are accessible for repair.
3. The bearing area of concrete reaction blocking shall be as shown on the standard drawings or as determined by the Engineer.
4. If adequate support against undisturbed ground cannot be obtained, metal harness anchorages consisting of steel rods across the joint and securely anchored to pipe and fitting or other adequate anchorage facilities shall be installed to provide the necessary support.

7.4.5 Casing Pipe

1. Casing pipe and appurtenant materials shall be installed at locations identified on the plans and materials shall conform to City of Lawrence Construction and Material Specifications – Waterlines.
2. Waterline to be inserted in casing pipe shall be restrained joint to a point ten (10) feet either side beyond the limits of the crossing.

7.5 Fire Lines

7.5.1 General

1. All water lines and hydrants connected to a dedicated fire line shall be considered private.
2. A fire line shall be defined as a fire protection water main which only has connections to hydrants and/or building fire sprinkler systems.

7.5.2 Backflow Prevention

1. Construction of all private waterlines requires the installation of an isolation valve located at the point the fire line becomes privately owned as well as an approved backflow prevention assembly. At a minimum, backflow assemblies shall consist of a double check detector assembly.
2. For fire lines two (2) inches in diameter and smaller, backflow prevention may be located in a building only if the backflow prevention is within one hundred (100) feet of the water main. If the building is greater than one hundred (100) feet from the water main, then backflow prevention may not be located in the building unless approved by the Municipal Services & Operations Department. Backflow prevention located outside the building must be within a privately owned and maintained manhole.
3. For fire lines greater than two (2) inches in diameter, backflow prevention may be located in a building only if the backflow prevention is within fifty (50) feet of the water main. If the building is greater than fifty (50) feet from the water main, then backflow prevention must be located outside the building within a privately owned and maintained vault.

7.6 Abandonments

7.6.1 Scope

This section governs construction methods and procedures for the abandonment of waterlines, service lines, fire lines, fire hydrants, and appurtenances.

7.6.2 General

All waterline abandonments shall conform to the following requirements.

1. Waterline: The abandoned waterline shall be disconnected and capped. At the point of disconnection any valve remaining shall be removed and the waterline remaining active shall be capped with a mechanical joint plug and a thrust block shall be installed.
2. Service Line: Water service lines shall be abandoned at the main. The curb stop/corporation stop and tapping saddle shall be removed, and the main shall be repaired with stainless steel repair clamp. If in the opinion of the Municipal

Services & Operations Department a repair clamp cannot be properly installed, a section of main may need to be replaced as directed by the Department.

3. Fire Line: Fire lines shall be abandoned at the main. The curb stop, corporation stop, or valve and tapping saddle or tapping sleeve shall be removed and the main shall be repaired with a stainless steel repair clamp. If in the opinion of the Municipal Services & Operations Department a repair clamp cannot be properly installed, a section of main may need to be replaced as directed by the Department.
4. Fire Hydrant: Fire hydrants shall be abandoned at the main. The entire hydrant assembly shall be removed at the tee and the tee shall be plugged and blocked. If a tapping saddle is present the tapping saddle shall be removed and the main repaired with a stainless steel repair clamp. If in the opinion of the Municipal Services & Operations Department a repair clamp cannot be properly installed, a section of main may need to be replaced as directed by the Department.

SECTION 8 – FIBER OPTICS

The communications subsystems to be furnished and installed by the Contractor shall include all field electronic elements; lightning and surge protection elements; user-owned fiber optic cable as defined in the plans; and all auxiliary cabinets, hardware, and wiring incidental to the transmission of data between the traffic control computers and the field locations.

The Contractor shall assume full responsibility for ensuring the successful construction and proper operation of the system components. The Contractor shall be fully responsible for all hardware design, testing, training, and documentation as detailed in this Technical Special Provision. This Technical Special Provision provides detailed operational and technical requirements for specific elements of the signal system necessary to satisfy the objective of this project.

8.1 General

8.1.1 Contractor Requirements

To assure full and complete utilization and compliance of all equipment furnished, the Contractor shall provide support services and materials at various points in the construction, including:

- Documentation as specified in Sections 6.3 of this Technical Special Provision.
- Testing as specified in Section 6.6 of this Technical Special Provision.

The Contractor shall be fully responsible for the maintenance and care of all equipment furnished and installed or modified by the Contractor until the time of final acceptance by the Engineer. The equipment and materials installation shall conform to the Plans and this Technical Special Provision, the City of Lawrence standard specifications included in the project manual, and the latest edition of the National Electric Code. The intent of this Technical Special Provision is that the work to be completed under this Contract shall be neat, finished, full, and complete in every detail and ready for use and operation for the purpose for which it is intended. The Contractor shall furnish all labor, tools, materials, machinery, test equipment, and any other equipment necessary to complete the installation and operational tests for the system. The cost of all incidentals, minor and miscellaneous items, work, and materials for which no payment is specifically provided, and any items, work, and materials not specified or shown which are necessary to complete and maintain the work shall be included in the price bid for other items in the Contract, and no other compensation will be allowed. The Contractor shall pay all shipping costs for the equipment furnished and installed under this Contract.

8.1.2 Scheduling of Work

In no case shall the Contractor install any equipment at a location until the equipment location has been flagged, staked, or marked by the Contractor and approved by the Engineer. All materials for that location must be on-hand and ready for installation unless the Engineer gives approval. Once installation of this equipment commences, the Contractor shall complete this work in a most expeditious manner. The following items shall be considered equipment:

• Communications equipment, including fiber, accessories, etc.

• Any and all electrical connections, accessories, etc., required to ensure the operation of the proposed system.

8.2 GENERAL REQUIREMENTS FOR EQUIPMENT, MATERIALS AND EVALUATION

8.2.1 General

Throughout the entire project, all units of any one item shall be made by the same manufacturer unless otherwise approved by the City of Lawrence, or the local jurisdiction's designated representative (the Engineer).

The equipment, including all parts and accessories, shall be constructed in a thoroughly competent manner and in accordance with best commercial practices. Particular attention shall be given to neatness and thoroughness of soldering, wiring, welding and brazing, plating, riveting, finishes, and machine operations. The equipment shall be free from burrs and sharp edges or any other defects that could make the equipment unsatisfactory for the operation intended.

Electrical materials shall conform to the applicable standards of the City of Lawrence, latest edition, the National Electrical Code (NEC), the International Municipal Signal Association (IMSA), the National Electrical Manufacturer's Association (NEMA), the National Safety Code (NSC), the Electronic Industry Alliance (EIA), the National Transportation Communications for ITS Protocol (NTCIP), and the American National Standards Institute (ANSI) in every case where a standard has been established for the particular article, material or equipment. Where specific standards and serial numbers are stipulated, the reference shall be construed to be the most recent standard specifications in force and in existence on the date of advertisement.

8.2.2 Submittals

All Contractor submittals shall be directed to the designated representative (Engineer). If necessary, the Engineer may direct the submittals to other parties for review. However, the Contractor must obtain written approval of the submittal from the Engineer prior to using the equipment being reviewed. All submittals must be in electronic format. For all submittals, the Engineer's review of the material will be completed within 21 calendar days from the date of receipt of the submission unless otherwise specified. The Engineer will advise the Contractor, in writing, as to the

acceptability of the material submitted. The Engineer may determine that the item is approved, in which case no further action is required by the Contractor; or the item may be partially or totally rejected, in which case the Contractor shall be required to modify the submittal as required by the Engineer and resubmit the item within 14 calendar days. At this time, the review and approval cycle described above shall begin again. The costs associated for the submittals from the Contractor shall be included within the price for the individual items and no additional compensation will be made.

8.2.2.1 Materials and Equipment List Prior to the approval of any components or material related to the project items listed in Section 3000 Approved Materials for Fiber Optics, and no more than 30 calendar days after contract award, the Contractor shall submit to the Engineer eight (8) hard copies and an electronic version of a Materials and Equipment List. The Materials and Equipment List shall identify the quantity, manufacturer, description, catalog number, or other identification, options and/or special features for each item furnished. A unique identification number shall be indicated for each item on the Materials and Equipment List.

FIBER OPTIC INFRASTRUCTURE RELATED COMPONENTS

Including, but not limited to:

- Conduit
- Pull boxes
- Communications cable
- Splice enclosures
- MISCELLANEOUS Including, but not limited to:
- Grounding material
- Construction material
- Surge protection devices
- Lightning protection devices
- Concrete
- Architectural elements

8.2.2.2 Catalog Cuts

An electronic document (pdf) version of catalog cuts and manufacturers' descriptive literature shall be submitted with each copy of the Materials and Equipment List for all manufactured items. Submittal data shall be adequate to determine if the equipment and material meet the requirements of the Plans and this Technical Special Provision. Catalog cuts shall have highlighted the submittal data to be reviewed. If the catalog cuts are not highlighted, the submittal will be automatically rejected. The Contractor shall clearly note any deviations, changes, additions, or other modifications to the submittal data, which are appropriate to reflect the exact equipment, and/or material

intended for use. Approval by the Engineer of the Materials and Equipment List and submittal data shall not relieve the Contractor of any of his responsibility under the Contract for the successful completion of the work in conformity with the requirements of the Plans and this Technical Special Provision.

8.2.3 Documentation

8.2.3.1 Wiring Diagrams Documentation is not required for fiber (wiring diagrams including end terminations and splicing) if the wiring is completed as specified in the Plans.

If installation differs from the plans documentation shall be provided, the contractor shall provide final as-built drawings of the fiber cable and splicing connectivity to the City. Coordinate for a City approved computer generated fiber splicing matrix to be provided by the contractor for the project. As-built drawings of the fiber itself should be provided with the footages of fiber denoted between all pull box, cabinet, and splice points (points A to B to C, Etc.).

8.3 CONDUIT

8.3.1 General

The Contractor shall furnish and install underground conduit as specified in the Plans. Quantities shown in the Plans for conduit installation include all quantities of each installation type (Trenched/Bored), as determined by the Contractor, necessary to install the conduit as shown in the Plans. The Contractor may choose to trench or bore conduit. Contractor shall be paid for conduit installation based on the unit cost of trenched or bored conduit.

The contractor shall provide as-built drawings denoting the depth of all new conduit installed at a maximum interval of 100'. The conduit shall be installed at a minimum depth of 36 inches below finished grade. The Contractor may reroute proposed conduit and/or adjust proposed conduit depth to a minimum of 24 inches from grade when proposed conduit installation is near and/or in conflict with an existing underground utility line unless otherwise directed or approved by the Engineer. The conduit depth shall be adjusted and documented only in the area of the conflict.

All new conduit installed, and all existing conduit used under this Contract shall be blown and/or rodded clean to the satisfaction of the Engineer prior to the installation of any cable or wire in that conduit. Disruption to sidewalks due to the Contractor installation of conduit shall be repaired or replaced by the Contractor. Costs associated with sidewalk repair or replacement due to conduit installation shall be subsidiary to conduit costs. Sidewalk restoration shall be full width by section or as approved by the Engineer. Aesthetic sidewalk and/or pavement (brick, brick paver, paver block, colored concrete, granite, slate, etc.) shall be replaced full-width and in-kind.

Underground conduit shall generally be installed in non-pavement areas if possible. The Contractor shall install underground conduit in the grass utility strip if such a strip is available. The Contractor is responsible for sizing the conduit to be used on all installations in accordance with the minimum conduit size requirements in the Plans and this Technical Special Provision. The conduit shall be of sufficient size to allow the cables/conductors to be installed without any damage. The conduit sizes and fill requirements shall conform to the requirements of the National Electric Code. All new conduit shall be installed with pull tape.

Standard "runs" of conduit for the installation of City of Lawrence fiber, shall consist of three (3) conduits of 1 ¼" SDR-11 and colored as follows: one (1) shall be colored solid orange, one (1) shall be orange with a blue stripe, one (1) shall be orange with a white stripe. When a single conduit is used as a separate pathway to service a building, that conduit shall be 1 ¼" SDR-11 solid orange. The grounding/tracer wire shall be a continuous line with no splices between handholes. The grounding/tracer wire shall be installed in the solid orange conduit.

Pull boxes installed along new conduit runs should be spaced between 500-800 feet apart. The contractor should place pull boxes at road intersections whenever possible. The Contractor shall notify the Engineer of deviations and request approval for exceptions.

8.3.2 Conduit Installation into Existing Pull Boxes

All conduits shown in the Plans to be installed into existing pull boxes shall be installed in accordance with the requirements for conduit installation into new pull boxes. The Contractor shall maintain the existing pull box, provide general maintenance and cleaning out as required, and shall restore the surrounding area to a condition equivalent to that prior to when work began. The Contractor shall immediately notify the Engineer if the Contractor determines that the existing pull box is unacceptable for reuse. If the existing pull box needs to be temporarily removed or otherwise disturbed for the new conduit installation, new gravel shall be installed in the base of the reinstalled existing pull box as required for new pull boxes. The costs of all labor, materials, and equipment necessary to complete the installation of new conduit into existing pull boxes or foundations as required in this Technical Special Provision shall be included in the quantities shown in the Plans for conduit installation. The cost of payment for base, subbase, restoration of sidewalk, driveway, and curb restoration shall be included in the quantities shown in the Plans for conduit installation.

8.4 FIBER OPTIC CABLE

Fiber optic cable will be installed in both new and existing conduit. The existing system consists of multiple 1 1/4" conduits owned by the City or other entities that enter into separate pull boxes. The City of Lawrence may own one or more of these conduits and

corresponding pull boxes. The contractor shall have access to only City of Lawrence property. Care should be taken to not disrupt or damage the remaining infrastructure within the duct bank.

8.4.1 General Requirements

The Contractor shall furnish and install fiber optic cable as shown on the Plans and in accordance with the requirements specified herein. All fibers in cable must be in working order. All fiber shall be shipped on reels of marked contiguous length. No splices shall be permitted within the fiber jacket. No point discontinuities of greater than 0.10dB shall be permitted. All fiber shall be labeled with the length at a minimum of every three feet.

After installation, the distance markings at each end of each run shall be logged and provided to the Engineer in a form acceptable to the Engineer. After installation, each run of fiber optic cable shall be marked within one foot of each splice and/or termination with the location that the cable goes to. This nomenclature shall be submitted to the Engineer for approval prior to its use. The nomenclature shall be used on the OTDR sweep test results specified separately. The following standards are applicable to this item and are hereby incorporated by reference:

ORGANIZATION	STANDARD	APPLICABILITY
RUS	PE-90a	Cable Construction
TIA/EIA	598D	Color Coding
TIA/EIA	472D0000	Fiber Optic Cable
TELCORDIA	GR-20	Optical characteristics

8.4.2 Fiber Optic Cable

Unless otherwise noted on the plans, the single mode cable shall consist of 288 fibers, arranged in color-coded buffer tubes of 12 individually color-coded fibers. Cable shall be loose-tube and consist of steel tape armoring under the outer jacket. Each buffer tube shall be filled with a non-hygroscopic gel for protection of the fibers from impact and moisture ingress. Aramid strength members shall be bundled with the buffer tubes and the filler rods, and the jacket shall also contain non-hygroscopic gel. Alternatively, the cable may be provided with a dry water blocking material installed inside the cable jacket. The entire cable shall conform to Rural Utilities Service (RUS) Specification PE-90, unless the cable manufacturer's recommendation is more stringent. The minimum bend radius of the cable shall be 20 times the cable diameter when under load and 10 times the diameter when under no load. The maximum tensile strength shall be at least 2700 Newtons (600 pound force) short-term and 601 Newtons (135 pound force) long-term.

The single mode fiber cable shall meet the following optical specifications:

1. The fibers shall be designed for dual wavelength operation at both 1310 and 1550 nm.

2. Each fiber shall have a mechanically strippable color-coated acrylic protective coating. The color of the inks applied to the fibers shall be clearly distinguishable from one another (EIA/TIA Standard) and remain so after cleaning and end preparation for splicing.

3. Each fiber shall have been subjected to and passed a tensile proof stress test equivalent to 100 kpsi for 1.0 second dwell time without damage of any kind.

4. The induced attenuation due to fiber wrapped around a mandrel of 75 mm diameter for 100 turns at 1310 nm shall not be greater than 0.05 dB.

5. Optical fiber parameters – The fiber shall meet the following specifications:
   a. Core Diameter: 8.3 µm
   b. Cladding Diameter: 125 ± 0.7µm
   c. Coating Diameter: (uncolored) 245 ± 5 µm (colored) 245 ± 7 µm
   d. Mode-field Diameter at 1310 nm: 9.2 ± 0.3 µm 1385 nm: 9.6 ± 0.6 µm 1550 nm: 10.4 ± 0.5 µm
   e. Core to Cladding Offset:
   f. Max Attenuation at 1310 nm: 0.34 dB/km 1385 nm: 0.31 dB/km 1550 nm: 0.22 dB/km

All fiber optic glass shall meet or exceed TIA/EIA-492CAAA, International Electrotechnical Commission (IEC) Publication 60793-2, and Telcordia GR20CORE. The operating, shipping, and storage range of the cable shall be -40°F to +158°F. The installation temperature range of the cable shall be -22°F to +140°F.

8.4.3 Installation

All fiber shall be installed in underground conduit. Air assisted is the preferred method however pulling the fiber in place shall be by hand or by an approved mechanical pulling machine. If a mechanical pulling machine is used, it must be equipped with a monitored or recording tension-meter. At no time shall the manufacturer's recommended maximum pulling tension be exceeded. Where pulling through pull boxes, approved pulleys and sheaves shall be used or the excess cable must be coiled in a figure eight and fed by hand. If sheaves are to be used, the contractor shall provide the Engineer with a drawing of the proposed layout showing that the cable will never be pulled through a radius less than the manufacturer's minimum bending radius

Fifty (50) feet of fiber optic cable shall be looped neatly in all fiber optic pull boxes unless noted differently in the plan set. Fifty (50) feet of fiber optic cable shall be looped neatly at all pull boxes located at signal intersections unless noted differently in the plan set. This fiber is for future additions or repairs to the fiber network. All conduit installed shall meet

the requirements of Section 6.3 of these Technical Special Provisions as well as applicable City of Lawrence specifications.

8.4.4 Fiber Optic Cable Splicing

8.4.4.1 General Requirements The Contractor shall complete all final end terminations and connections for the fiber network. When designated in the Plans, the Contractor shall terminate the fibers into a fiber distribution unit. All fibers shall be spliced by the fusion method. The Contractor shall provide and use a fusion splice machine for this purpose. The splice machine shall be equipped with a method for estimating the achieved splice loss. Either the "Local Injection Detection" or "Core Alignment Loss Estimation" system is acceptable. The machine used shall be new from the factory or serviced and certified by the factory or its authorized representative within the previous six months from the commencement of its use on the project. The Contractor shall provide to the Engineer a letter from the manufacturer or his authorized agency certifying that this requirement is met. Splice loss shall not exceed a bi-directional average of 0.10 dB per splice for a complete fiber run or a maximum of 0.15 dB bidirectional averages for any single splice at 1310 and 1550 nanometers. All fiber cable sizes called out in the Plans must be continuous for the entire length of the run unless otherwise noted in the plans. Where a fiber cable is to be accessed for signal insertion or drop, only the buffer tube containing the fiber(s) to be accessed shall be opened. For a continuous cable run, only the actual fiber to be accessed shall be cut. For a drop fiber cable, all fibers shall be cut to a length equal to that of the fiber to be used and the spare neatly laid into the splice tray. At least one and one-half revolutions of the splice tray of fiber shall be left on each end of fiber after splicing.

8.4.4.2 Splice Materials At each splice point splice organizer trays shall be provided to contain and protect the bare fibers and splices. Splice trays shall be subsidiary to splice enclosures. Splice trays shall be easily attachable and accessible. Splice tray raceways shall include a raceway for excess fiber storage that shall accommodate the minimum bend radius of the fiber without causing excessive signal losses due to bending or fiber damage.

The splice trays shall have a means to affix the buffer rigidly in place, and space and guides to allow "race tracking" of the fiber and guides to locate the splice protectors. The splice trays shall be layered above the transition/storage compartment and shall be easily slipped into place on two studs and secured with a hold down strap. Splice trays shall have fixed rigid slots for fiber placement. Each tray shall be made of injection-molded plastic and have a hinged clear plastic cover for maximum fiber protection that allows for visible inspection of the fibers. The covers shall have a lock mechanism to hold them in place. All splices shall be protected with a heat-shrink sleeve containing a stainless steel strength rod or protective sleeve and housing. Completed splice protectors shall be held in place with RTV silicone or adhesive tape. No more than 12 splices shall be placed in one tray unless the engineer approves any changes.

8.4.5 Fiber Optic Terminations

8.4.5.1 General Requirements Terminations to fiber optic cable shall be made with SC (or LC where applicable) connectors. All single-mode single break-out cable shall be yellow in color. Terminations at traffic signal cabinets shall be made via the fiber optic interface panel ITS drop cable as described in Section 5. The Contractor shall utilize the color codes and splice diagrams shown in the Plans for the termination of all cables.

8.4.5.2 Fiber Optic Connectors All SC and LC type connectors shall conform to the NTT-SC and Telcordia 326 specifications for SC and LC connectors. The completed termination shall exhibit a loss of no more than 0.25 dB per mated pair when tested with an OTDR and a standard test cable. This requirement applies equally to field terminations and factory terminated pigtails.

8.4.6 Underground Splice Enclosures

6.4.6.1 Location The cost of the enclosure used for this purpose shall be considered incidental to the installation of the communications cable network and included in the cost for fiber. Underground splice enclosures shall meet the requirements of this Technical Special Provision.

8.4.6.2 Underground Splice Enclosures Underground splice enclosures will be used for cable splicing. Splice enclosures shall be designed to be easily accessible for testing and maintenance with the necessary vehicles and equipment to perform the task. The fiber optic splice enclosures shall be capable of accommodating splice organizers to facilitate fiber management and accept fiber fusion splices. The splice enclosure shall provide fiber optic cable penetration end caps on one end, to accommodate at least two trunk fiber optic cables and two branch fiber optic cables. Water-blocking techniques shall be used to ensure that the splice enclosure and cable entry locations do not leak when immersed in 19 feet of water for 30 days. The enclosure end caps should be factory drilled to the proper diameter to accept and seal the fiber optic cable entry. Cable entry locations shall accommodate an assortment of fiber optic cable outer diameters ranging from 0.45 inches to 0.55 inches (± 10 percent) without jeopardizing its waterproof characteristics. Hinged splice enclosures with stainless steel latching devices shall be utilized. All fiber optic splice enclosures shall meet the requirements of Telcordia Technologies (formerly Bellcore) GR771-CORE and shall comply with all applicable NEC requirements.

Splice enclosures may encounter high water table conditions. Splice enclosures shall be non-filled (no encapsulate), airtight and prevent water intrusion, able to accommodate pressurization, pressurized to 4.0 psi, and have the capability to be re-entered without requiring specialized tools or equipment.

Splice enclosures shall also be supplied with all hardware necessary to provide solid mounting to wall structures. All enclosures and associated facilities provided under this Contract shall include a quality assurance/quality control inspection for materials,

workmanship, and compliance of the product to meet these specifications. The Contractor shall provide to the Engineer an executed Certificate of Compliance from the manufacturer indicating that the splice enclosures meet the requirements included herein. All splice enclosures must employ a complete fiber management system consisting of splice trays and a stress relief system. Each enclosure shall be designed to accommodate future expansion and contain modular splice organizers/trays capable of handling splices in a neat and distinguishable fashion. Spare splicing trays shall be provided to allow for future splices equal to the number of fibers in the cable. Trays shall be easily attachable and accessible.

8.5 SYSTEM AUXILIARIES

8.5.1 Fiber Optic Communications Network

This Technical Special Provision establishes the requirements for the fiber optic network installation. Fiber requirements and termination connections are referenced in Section 6.4.

8.6 CONSTRUCTION REQUIREMENTS

8.6.1 Acceptance Procedures

8.6.1.1 Test Procedure and Documentation The Contractor shall demonstrate in the presence of the Engineer, and/or the Engineer's representative if the Engineer so desires that the equipment supplied and installed as part of this project functions in full compliance with this Technical Special Provision. For this purpose, a program of testing is defined. The tests can be separated into preinstallation tests, system component tests, and a burn-in period followed by final inspection and acceptance. All test procedures and equipment shall be furnished and maintained by the Contractor. For these tests, the Contractor shall submit four copies of documentation containing proposed test procedures, test equipment, report forms, and expected results to the Engineer for review and approval at least 45 days prior to performing any test. The test plan will be reviewed by the Engineer, who shall either approve or indicate changes that are required for approval within 30 days of receipt. The Contractor shall submit the revised test to the Engineer within 15 days following the receipt of the review of the initial test plan. This process shall be repeated until the Engineer approves the test plan. Tests shall not be conducted without prior approval. Tests shall be performed on approved equipment using approved test procedures. The Contractor shall notify the Engineer at least 15 days in advance of the times and places which the tests will take place to enable the Engineer to witness them. The Contractor shall perform the tests and document the test results. When the tests are completed, whether successful or not, four copies of the test results shall be furnished to the Engineer for evaluation. The documented test results shall be self-explanatory, clearly stating how the results were obtained along with an explanation where the test results deviated from the expected results. The Engineer will notify the Contractor whether the test was successfully completed within 24 hours of receipt of the test results.

8.6.1.2 Inspection All equipment and material furnished, and all work performed in connection with the project shall be subject to inspection by the Engineer. The Engineer, or his authorized representative, shall have free access during normal working hours to any local facility or area in which work associated with the project is occurring. The Contractor shall ensure that full and sufficient information concerning the character of materials and workmanship is made available to the Engineer or his representatives.

Inspection by the Engineer or his representative shall not relieve the Contractor of his obligation to comply with the requirements of the Plans and this Technical Special Provision. Any equipment or labor, which is found by the Engineer to be defective or unsuitable prior to Final Acceptance, shall be replaced or corrected at the Contractor's expense.

8.6.1.3 Pre-Installation Testing The equipment for this project is subject to preinstallation tests by the City Lawrence Staff at a location designated by the City.

The Engineer reserves the right to withhold any payment related to the provision or installation of any piece of equipment that fails to meet the requirements of this Technical Special Provision.

The Contractor shall coordinate with the City to conduct pre-installation tests for the equipment. In the event a pre-installation test is failed, the Contractor shall schedule a retest no sooner than 15 days following the completion of the preinstallation test for that particular equipment item. The equipment item shall not be installed without successful completion of pre-installation tests and written approval of the Engineer.

8.6.1.4 System Component Tests System component tests shall be performed on all system hardware. These tests shall be successfully completed prior to the start of the control section tests. Failure to successfully complete any system component test will require the Contractor to re-run the test, in part or in whole, at no expense to the City. The Contractor shall schedule a re-test no sooner than three days following notification by the Engineer of a system component test failure.

8.6.1.4.1 Fiber Optic Communications Cable Tests

8.6.1.4.1.1 Pre-installation Test The Contractor shall test all fiber optic cable prior to installation. Cable delivered to the job site shall be tested on the reels prior to installation. This test shall consist of a single direction sweep of each individual fiber with an Optical Time Domain Reflectometer (OTDR) that has been calibrated for the index of refraction of the fiber to be tested. Verification of the fiber length and attenuation shall be made. Attenuation shall not exceed 0.56dB/mile at 1310nm and 0.40dB/mile at 1550nm and no discontinuities greater than 0.1dB over a distance of less than 300 feet shall be allowed. If the cable fails to meet these requirements, the Contractor shall replace the entire reel at no additional cost. Printouts of the OTDR trace with the identification of the fiber and the attenuation and length noted on the printout shall be provided. This test may be

eliminated at the Contractor's option if the manufacturer has done these tests at the factory and after the cable is placed on the reel and provides a typical OTDR trace together with a table of all attenuations and lengths of each fiber on a reel. If the Contractor elects to forgo this test, it shall in no way relieve him of the obligation to replace any cable that, after installation and testing, proves not to meet the specifications. Cable replacement shall be done at no additional cost to the City.

8.6.1.4.1.2 Post-installation Test After all the splices and terminations have been completed, test each fiber, including spares, with a power meter and OTDR as follows:

(1) Power Meter Tests: Install feed through connectors at all locations where an optical device is to be connected. Conduct power meter tests for each fiber to demonstrate connectivity and attenuation from origin to destination. Demonstrate that the attenuation for each fiber path including connectors, and splices as a whole, comply with the loss budgets required by these Specifications and the optical equipment being installed. Submit a test result summary sheet of each fiber to the Engineer for review and approval.

(2) OTDR Tests: Conduct bi-directional tests using an OTDR for each fiber. Demonstrate that the attenuation for each fiber and splice, individually and as a whole comply with the loss budgets required by these Specifications. Test fibers at 1310 nm and 1550 nm, using a launch cable no less than three times the pulse width used to shoot the cable. Submit OTDR traces to the Engineer for review and approval. Clearly annotate each splice and identify the measured loss. The Contractor shall investigate any discontinuities greater than those specified for the fiber and repair them or replace the cable section at no additional cost to the City. Failed splices may be remade and re-tested for compliance

Following completion of all testing, and approval by the Engineer, the Contractor shall compile and submit two (2) organized test notebooks and electronic files. These notebooks/files shall include a test summary that includes the OTDR traces of each fiber strand, and the power meter test results. An example cable verification worksheet is included in these specifications. The worksheet can be modified if approved by the Engineer.

8.6.1.4.2 Grounding System Protection Test- The Contractor shall test the grounding of each communications termination panel. Written test results shall be provided to the Engineer prior to acceptance of the controller assembly installation. The test shall be performed from the communications termination panel surface to the cabinet grounding electrode/wire in the cabinet. Maximum allowable resistance to cabinet grounding electrode/wire shall be 2 ohms.

8.6.1.5 Burn-in Period

The burn-in period shall commence upon written authorization by the Engineer and will terminate 7 consecutive days thereafter for each intersection, unless an equipment malfunction occurs. The burn-in period will be stopped for the length of time the equipment is defective. When the equipment is repaired and functions properly, the burn-in period will begin again.

Successful completion and acceptance of the burn-in period will be granted on day 7 unless any equipment has malfunctioned, in which event Final Acceptance will be withheld until all the equipment is functioning properly for 7 days after repair.

When a specific piece of equipment has malfunctioned more than twice during the 7day burn-in period, the Contractor shall replace that equipment with a new unit at his cost. The Engineer will maintain records of equipment malfunctions.

8.6.1.6 Final Inspection Upon completion of the burn-in period, the Engineer will make a final inspection. If all construction and all other aspects of the Plans and this Technical Special Provision are found complete, the Engineer may declare this project complete and inform the Contractor in writing of the Final Acceptance as of the date of final inspection.

If during the final inspection the Engineer deems any work unsatisfactory or not conforming with the Plans and this Technical Special Provision, the Engineer shall notify the Contractor in writing of any deficiencies. The Contractor shall correct these conditions within five working days, unless the Engineer grants additional time in writing. Upon completion of the Contractor's corrections, the Engineer shall conduct another final inspection. When the Engineer approves the final inspection, the Engineer shall send written notice to the Contractor of the Final Acceptance of the project.

8.7 GUARANTEES

The Contractor shall be responsible for repairing and/or replacing all equipment and material, including software, supplied under this Technical Special Provision. The Contractor shall also bear the total cost of delivery and transportation related to the repair and replacement of equipment and material throughout the Contract.

In the event of failure on the part of the Contractor to replace or repair to original condition any such articles of equipment or material within one week (seven calendar days) from the date of notice, the Engineer may have the work done by others and charge the cost to money due to the Contractor. Final Acceptance will not be given and the Contractor will not be released from the Contract until payment for such work is received.

The Engineer shall reserve the sole right to determine unsuitability of the supplied equipment and material. The Contractor shall transfer to the City of Lawrence, Kansas

any manufacturers warranties and guarantees remaining on all items after Final Acceptance. This will occur at 12:01 A.M. of the day following Final Acceptance.

APPENDIX A: GENERAL NOTES

GENERAL NOTES

General Notes

1. Plans are initially approved for a period of one (1) year, after which they automatically become void and must be updated and re-approved by the City before any construction will be permitted.
2. The City of Lawrence plan review is only for general conformance with City of Lawrence Design Criteria and City Code. The City of Lawrence is not responsible of the accuracy or adequacy of the design. The City of Lawrence through the approval of this document assumes no responsibility other than stated above for the completeness and/or accuracy of this document.
3. Inspection Fees are to be paid by the Developer.
4. The Contractor shall always have one (1) signed copy of the plans (approved by the City of Lawrence) and one (1) copy of the Project Specifications on site.
5. All construction shall conform to the City of Lawrence Complete Standard Technical Specifications and Standard Details in effect on the City's approval date shown on these plans.
6. Material submittals and shop drawings shall be submitted in portable document format (pdf), uploaded using e-Builder, the City's Capital Project Management Software (CPMS)to appropriate City staff and approved prior to Notice to Proceed, unless otherwise directed by the City. The Contractor should anticipate up to ten (10) business days for review per submittal. City approval of submitted shop drawings and details is for general conformance with the plans and specifications only. The City of Lawrence is not responsible for the accuracy or constructability of the shop drawings. Errors or omissions shall be corrected at Contractor expense.
7. All work quality and materials regulated by the City shall be subject to the inspection and approval by City personnel.
8. Unless otherwise noted, construction staking is to be provided by the Contractor. Survey stakes, benchmarks, and property pins destroyed by the Contractor shall be replaced at Contractor's expense.
9. Contractor shall not be allowed to work Sundays. Holiday or Saturday work shall be as approved by the Municipal Services & Operations Department.
10. The Contractor shall notify all landowners in writing at least one (1) week prior to any construction activities which would take place adjacent to their property. Individual detailed notices of access restrictions shall be hand delivered forty-eight (48) hours prior to construction. Twenty-four (24) hour notice shall be given to any water customer prior to interruption of service to make connections.

11. All work shall be confined within the construction limits, right-of-way, easements, or City property as shown in the plans. Any damage to adjacent surfacing, pavement markings, curb, sidewalks, bikeways, driveways, streetlights, signal poles, or other objects within or out of the right-of-way shall be repaired at the Contractor's expense.
12. Contractor shall call 1-800-DIG-SAFE prior to any project excavation.
13. All sidewalk and sidewalk ramps constructed will be required to comply with the Public Right-of-Way Accessibility Guidelines (PROWAG). Building sites located outside of the right-of-way shall comply with the appropriate Americans with Disabilities Act (ADA) requirements.
14. When blasting is permitted by Lawrence-Douglas County Fire and Medical Services, the Contractor shall use the utmost care to protect life and property. The Contractor shall comply with all laws, ordinances, and the applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property, and they shall be responsible for all damage thereto caused by their or their subcontractor's operations.
15. The Contractor shall provide insurance as required by the General Provisions and Covenants and Special Project Specifications before performing any blasting. The governing agency shall be notified at least twenty-four (24) hours before blasting operations begin.
16. The Contractor shall contact the City of Lawrence Traffic Division at 785-832-3035 to remove and replace traffic signs which are in conflict with the proposed improvements but are not specified to be removed as a part of this project.
17. All disposal sites must be approved by the Kansas Department of Health and Environment. Materials either stockpiled or disposed of in a flood plain require a Kansas State Board of Agriculture Permit. Any material dumped in waters of the United States or Wetlands is subject to U.S. Corps of Engineers permitting regulations.
18. Geological information as shown herein was completed with the best information available to the Engineer at the time of plan preparation. The Contractor shall be responsible for verifying, identifying and making their own determinations of subsurface conditions. All excavation shall be unclassified. No direct payment will be made for rock, debris, or pavement excavation. All work shall be considered subsidiary to other bid items unless otherwise shown in the plans.

Erosion & Sediment Control Notes

1. The Contractor is responsible for providing erosion and sediment control to prevent sediment from reaching paved areas, storm sewer systems,

drainage courses and adjacent properties. In the event the prevention measures are not effective, the Contractor shall remove any debris, silt, or mud and restore all disturbed areas to original or better condition.

2. The Contractor shall comply with Chapter 9, section 903 of the Code of the City of Lawrence regarding storm water pollution prevention. Unless otherwise noted in the plans or special provisions, all work related to this will be paid for in the bid item "Storm Water Pollution Prevention." This shall include, but not be limited to items such as street cleaning, protecting piled soils from eroding, temporary seeding, regular inspection reporting and documentation, etc.
3. All areas disturbed during construction shall be fertilized, seeded, and mulched by the Contractor in accordance with current City of Lawrence Technical Specifications.
4. All surface features disturbed by construction activities shall be restored by the Contractor to original condition.
5. Maintenance of drainage shall be the contractor's responsibility. Dewatering shall be subsidiary to other items of work.

Paving & Sidewalks Notes

1. All concrete for publicly maintained infrastructure shall be KCMMB unless otherwise noted in the plans.
2. All asphalt and concrete to be removed shall be neatly saw cut. Saw cuts shall be full depth and shall be subsidiary to related bid items. If the Contractor exceeds the pavement removal limits without approval from the Engineer, removal and replacement shall be at the Contractor's expense.

Utility Notes

1. In areas to be graded, all exposed manholes shall be backfilled to within 1-foot of the top of rim at a 3:1 (horizontal:vertical) or flatter slope. Place backfill per City Specifications. Positive drainage shall be maintained away from manholes.
2. Where existing utilities and service lines are to be encountered, the Owner thereof shall be notified by the Contractor at least forty-eight (48) hours in advance of performing any work in the vicinity.
3. The utility information shown herein is based on the best information available to the engineer; however, all existing utilities within the construction limits may not be shown. The Contractor shall verify all utility ownership, type, size, depths and locations prior to construction and coordinate any necessary relocations. Utilities damaged through the

negligence of the Contractor to obtain the location of same shall be repaired and replaced by and at the expense of the Contractor.

4. Utilities exposed during construction shall be adequately supported by the Contractor to prevent the conduits/lines from sagging and putting stress on any joints.
5. Abandoned utilities exposed by Contractor operations shall be removed as directed by the Engineer. This work shall be considered subsidiary to other bid items unless otherwise noted on the plans.
6. All manholes, utility valves, and meter pits shall be adjusted or rebuilt to grade as required and set in concrete if in roadway for field adjustment.
7. During a period of one year from the date of acceptance by the City, the City shall perform a video inspection on the sanitary sewer line installed under this contract. Per resolution number 5614, or latest update, an inspection fee is required for this service. Contractor shall be responsible for all repairs needed as determined from the video inspection.
8. Only authorized employees of the City of Lawrence, Municipal Services & Operations Department shall operate valves.
9. The Contractor shall install proposed waterlines without disruption of water service to customers until connections to proposed waterlines are ready to be made. Once service to customers has been interrupted, the Contractor shall work continuously until service is restored.
10. The Contractor shall install and properly maintain a mechanical plug at all connection points with existing lines until such time that the new line is tested and approved.
11. All water required for the construction of this project shall be purchased from the City of Lawrence Municipal Services & Operations Department using a fire hydrant water meter. Meters can be obtained from the Municipal Services & Operations Department for a nominal deposit, refundable upon the return of the meter.
12. Flowable fill shall be used to backfill all excavations within two feet of existing or proposed public pavement areas. Flowable fill shall be placed to the top of the subgrade.

ROW & Temporary Traffic Control Notes

1. A Temporary ROW permit is required for any temporary use of the ROW or work within the ROW. Any placement of barricades, cones, or equipment in the ROW that affects pedestrian, bicycle, or vehicular traffic shall also require the possession of a Temporary Traffic Control ("TTC") Permit.
2. Temporary Traffic Control Plans, when included, are intended to provide a general overview of traffic handling and may not be exhaustive. Traffic control requirements shown on these plans do not attempt to address in

depth the variety of situations that may occur once construction has started. In no way do the requirements shown on these plans relieve the Contractor of their responsibility to select proper traffic control devices and implementation procedures to accommodate the safety of motorists, bicyclists, pedestrians, and workers at all times. Additional signs, temporary striping, barricades, sidewalk closures, or other measures necessary to complete the construction and accommodate Contractor staging, as required by the Engineer, shall not be paid for directly, but shall be considered subsidiary to other Temporary Traffic Control items.

3. Lane closure hour restrictions listed in the ROW Administrative Regulations, section 9.4 shall be complied with unless an exception is approved and noted on the permit.
4. All traffic control devices shall be provided, installed, and maintained in accordance with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD).
5. At least one (1) person present for installation of traffic control devices shall have training in the installation of temporary traffic control devices and provide proof of training on request.
6. All flaggers shall possess a flagger certification card issued by American Traffic Safety Services Association (ATSSA), by Kansas Department of Transportation (KDOT), or other approved entity.
7. Flaggers shall be equipped with sign paddles.
8. All workers in construction zones shall wear MUTCD compliant high-visibility garments.
9. The ROW Permit Holder is responsible for maintenance of traffic control devices at all times. Maintenance may be required after hours and on non-working days. Deficiencies shall be corrected in a timely manner. The permit shall include an individual who can be contacted 24 hours a day, 7 days a week in case of emergencies.
10. The ROW Permit Holder shall contact the City of Lawrence Traffic Division at 785-832-3035 a minimum of 24 hours in advance about any conditions that will impact the operation of a traffic signal. That includes lane closures, turning restrictions, and any other potential impacts.
11. When a difference in pavement elevation is created perpendicular to traffic flow, the ROW Permit Holder shall provide, at the end of the work day, a temporary wedge over an 18" length. The ROW Permit Holder is required to mill the wedge prior to final pavement placement.
12. A traffic lane shall not be considered satisfactorily open to traffic unless it is paved to a condition that matches existing pavement material and markings are in place. Where all existing pavement has been removed, a traffic lane shall not be considered as satisfactorily open to traffic, unless

graded reasonably smooth and maintained dust free as determined by the City. Hot or cold mix asphalt may be used on a conditional basis only in order to open traffic lanes on a temporary basis; a written letter must be submitted to the City at the time of ROW permit application stating when permanent repairs will be made.

13. Small openings in the roadway surface may be bridged with steel plates. An asphalt wedge (or approved device) shall be installed around all edges of the steel plate and the plate shall be anchored so that it does not shift under traffic. Steel plates that are located in travel lanes of roadways with a posted speed of 35 mph or more for a duration of more than 3 days shall be level with the abutting pavement (pavement milled around edges of opening) unless another appropriate solution is approved by the Inspector. Roadway depressions should not exceed 1" in 10'. All visible pushing/shoving of pavement shall be corrected. All temporary pavement shall be inspected daily by the ROW Permit Holder and all maintenance issues corrected within 24 hours.
14. The ROW Permit Holder shall be required to post a W8-1 "Bump" advance warning sign 250 feet ahead of a steel plate.
15. Private vehicles shall not be parked in a roadway within the work zone.
16. Vehicles shall not be parked or driven on sidewalks. If work necessitates that vehicles travel over sidewalks then the condition of the sidewalk should be documented by video or pictures prior to vehicles crossing it. The sidewalk condition shall be inspected after work is complete and any new or undocumented cracks or other damage shall be corrected by the Permit Holder.
17. Vehicles shall not drive over non-mountable curb without first properly ramping the gutter to avoid damage to the curb.
18. The ROW Permit Holder is responsible to remain at the work site until all barricading is removed from the roadway. All barricading must be removed from the roadway within two hours of work completion or prior to any work hour restrictions detailed in the ROW Administrative Regulations or on the Temporary Traffic Control Permit. If barricades remain longer than two hours after work completion, without prior approval, the City may remove the barricades and may charge the contractor for any time and equipment expended on their behalf.
19. Any work zone that requires a TTC Permit shall have a sign posted at each end of the work zone that meets the following requirements:
    a) Be placed in a position that can be read by traffic from each direction
    b) Be colored "construction orange" with block letters at least six inches in height

c) Contain the name of the company using the ROW and a phone number for a representative of the company.

20. Placement of temporary signs shall not obstruct or be obstructed by existing signs to remain active during construction. Temporary signs shall be placed so as to not be obstructed by other existing features (such as foliage, utility poles, etc.).
21. All existing signs that are contradictory to the temporary traffic control shall be covered or removed by the contractor. Signs shall be restored immediately upon removal of the temporary traffic control.

APPENDIX B: KDOT LPA LETTING INFORMATION

Dwight D. Eisenhower State Office Building
700 S.W. Harrison Street
Topeka, KS 66603-3745
Calvin E. Reed, P.E., Secretary
Tod L. Salfrank, Chief

Kansas
Department of Transportation
Bureau of Local Projects

Phone: 785-296-3861
Fax: 785-296-6946
kdot#publicinfo@ks.gov
http://www.ksdot.gov
Laura Kelly, Governor

April 5, 2024

Mr. Dave Cronin, P.E.
City Engineer
Municipal Services and Operations
City of Lawrence
PO Box 708
Lawrence, KS 66044

Dear Mr. Cronin:

Thank you for submitting your LPA-Administered projects re-certification application. KDOT Bureau of Local Projects has completed the review of your application.

The City of Lawrence is hereby certified to proceed with administration of State and Federally-funded projects within the City on routes that are off the National Highway System. This three-year certification will expire on April 5, 2027.

Attached is the LPA-Administered Re-Certification Checklist.

If you have any questions, please do not hesitate to contact us. Questions may be directed to Dawn Hueske, dawn.hueske@ks.gov. Again, we would like to thank you for your cooperation and effort in completing this certification process.

Sincerely,

Dawn M Hueske

Digitally signed by Dawn M Hueske
DN: C=US, E=dawn.hueske@ks.gov,
O=KS Dept of Transportation,
OU=Bureau of Local Projects,
CN=Dawn M Hueske
Date: 2024.04.05 15:18:52-05'00'

for Tod L. Salfrank, Chief
Bureau of Local Projects

c: Jake Baldwin, Program Manager, City of Lawrence
Richard Jurey, P.E., Engineering Services Team Leader, Kansas Division of FHWA
Scott King, P.E., Director, Division of Engineering and Design, KDOT
file

KDOT Bureau of Local Projects
LPA-Administered Projects, Certification Application

General Information
Local Public Authority / City / Department: City of Lawrence/Lawrence, KS/Municipal Services & Operations

Person in Responsible Charge (PIRC) (may list more than one person, all must be PMCP certified):
David Cronin
Jake Baldwin, Aaron Parker

Design Criteria Manual Used (may be KDOT Design Manual) (attach a copy or link)**:**
2024 Plan Preparation & Design Criteria, City of Lawrence:
https://lawrenceks.org/wp-content/uploads/2023/03/2023-DRAFT-MSO-Design-Criteria-Combined.pdf
Revision Date: March 2024

Specifications Used (may use KDOT Specifications) (attach a copy or link):
City of Lawrence Construction Material Specifications
https://lawrenceks.org/mso/technical-resources/
Revision Date: March 2024

Organizational Chart Revision Date (attach a copy or link):
Attached – November, 2022

EEO Policy Revision Date (attach a copy or link):
Attached – December, 2015

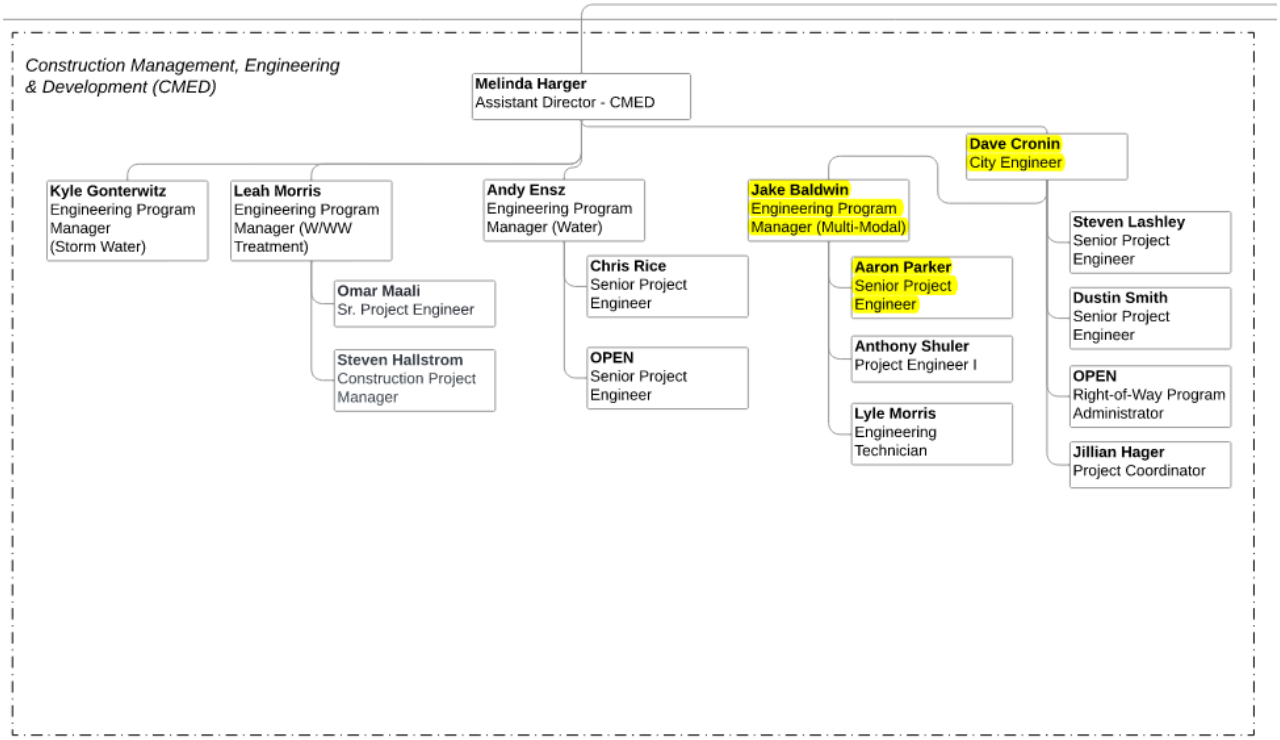
Project Development Procedures Used (may use KDOT LPA Manual) (attach a copy or link):
KDOT Local Public Authority - Project Development Manual
Revision Date: 2020 Edition

The LPA must notify BLP within 30-days of any revisions to the above criteria.

For <u>each</u> project administered, the LPA PIRC will submit a request to administer, develop a project schedule and cost estimate, and designate a PMCP certified project manager (LPA PM).

3/19/2024

LPA Signature / Date


Construction Management, Engineering & Development (CMED)
Melinda Harger
Assistant Director - CMED
Kyle Gonterwitz
Engineering Program Manager (Storm Water)
Leah Morris
Engineering Program Manager (W/WW Treatment)
Omar Maali
Sr. Project Engineer
Steven Hallstrom
Construction Project Manager
Andy Ensz
Engineering Program Manager (Water)
Chris Rice
Senior Project Engineer
OPEN
Senior Project Engineer
Jake Baldwin
Engineering Program Manager (Multi-Modal)
Aaron Parker
Senior Project Engineer
Anthony Shuler
Project Engineer I
Lyle Morris
Engineering Technician
Dave Cronin
City Engineer
Steven Lashley
Senior Project Engineer
Dustin Smith
Senior Project Engineer
OPEN
Right-of-Way Program Administrator
Jillian Hager
Project Coordinator

10.0 LPA-Administered Procedures

10.1 Introduction

10.1.1 Purpose

KDOT, in cooperation with the FHWA, has developed a program through which local units of government may administer their own state and federal funded projects with oversight from KDOT.

Under this program, the LPA will certify that it will follow the LPA-Administered Procedures identified in this Section. The purpose of this section of the Manual is to outline the responsibilities of BLP and the LPA for federal-aid and/or state-aid projects that are administered by the LPA with oversight by BLP.

MAP-21 has identified all principal arterials as being a part of the NHS. For additional procedures that involve projects with principal arterials, see *Section 10.3.2.1.4* below for more information.

10.1.2 Compliance Requirements

BLP will determine, by review of plans and other project documents, whether the requirements of the program have been met.

Certain minimum criteria have been established for the LPA to be approved to administer state and federal funded projects. These criteria are intended to provide verification that projects will be developed in accordance with all applicable laws, regulations, criteria, and accepted engineering practices. The following are the minimum criteria for certification and recertification:

1. LPA must have a full-time, public employee in responsible charge. More than one person may share the duties of the Person in Responsible Charge (PIRC), but all must be certified through KDOT's LPA Project Manager Certification program.
2. LPA must employ a licensed professional engineer (LPA-PM) to manage each project; the PIRC may also be the LPA-PM if they meet the criteria. The licensed professional engineer may be publicly employed or a consultant. There may be different project managers for design and construction. All project managers must be certified through KDOT's LPA Project Manager Certification program.
3. BLP must approve all locally developed design criteria manuals and specifications. Any revisions to these documents must be approved by BLP before use on the project.
4. LPA must submit a current organizational chart and EEO policy to BLP. Any revisions to these documents must be submitted to BLP within 30 days.
5. LPA must review this and other applicable sections of this Manual including all appendices.
6. LPA and BLP staff shall meet and discuss procedures and responsibilities.

7. LPA shall develop procedures for project development including planning, design, letting, and contract administration. These procedures shall be submitted to BLP for approval every **three years** to maintain their certification. All subsequent changes to the LPA's procedures shall be submitted to BLP immediately for approval. As an alternative, the LPA may commit to following the procedures in this Manual.

10.1.3 KDOT Responsibilities

KDOT has oversight of the projects administered under this program. In cooperation with the FHWA, KDOT has determined this oversight will include the following:

1. Determine that the LPA is suitably equipped and organized to discharge the duties of the Code of Federal Regulations, Title 23 CFR Part 771.
2. Review of LPA's design and construction policies, manuals, standards, and specifications.
3. Confirm that adequate acceptance, independent assurance sampling and testing, and manufacturers' materials certifications are incorporated in the LPA's materials process.
4. Develop and approve the Project Authorization (KDOT Form 883).
5. Authorize the LPA to proceed with the project.
6. Designate a BLP Project Manager.
7. Provide environmental oversight and coordinate with resource agencies.
8. Participate in project field checks.
9. Review and concur in PS&E.
10. Request authorization of federal funds.
11. Obligate federal funds for the project.
12. Issue an Authority to Administer the project (the LPA may proceed to Advertise the project for a minimum of 30-days).
13. Concur in award of the construction contract.
14. Review LPA Approved Sub-Contractors form.
15. Confirm all Contractors have an EEO policy on file with the Office of Contract Compliance.
16. Attend the Pre-Construction meeting.
17. Create a contract in AWP for tracking of project costs and for reimbursement documentation.
18. Process LPA invoices in AWP for payment.
19. Track DBE participation monthly.
20. Determine funding participation in change orders. This includes concurrence in/approval of all change orders prior to the Contractor beginning the work.

21. Assist the LPA during construction with issues involving materials testing, inspection, and construction.
22. Provide project closeout documents to KDOT Bureau of Fiscal Services including all changes from the original contract.
23. Participate in the final inspection of the project.
24. Confirm compliance with non-Title 23 CFR Part 771 laws and regulations, i.e.; Davis-Bacon; NEPA; Relocation Assistance Act; Build America, Buy America Act; Debarment; etc.

10.1.4 LPA Responsibilities

10.1.4.1 Person in Responsible Charge and Project Manager(s)

1. Submit a request to develop the project under the approved procedures; include the project manager contact information and proposed design criteria. PIRC
2. Administer inherently governmental project activities, including those dealing with cost, time, adherence to contract requirements, construction quality, and scope of project. PIRC
3. Direct project staff, agency or consultant, to carry out project administration and contract oversight, including proper documentation. PIRC
4. Be aware of the qualifications, assignments, and on-the-job performance of the agency and consultant staff at all stages of the project. PIRC
5. Develop a project schedule (City Administered Project Schedule) and cost estimate and submit to the BLP Project Manager. – LPA PM
6. Execute the project agreement through BLP and proceed with project development. PIRC
7. Maintain familiarity of day-to-day project operations, including project safety issues. PIRC
8. Submit Field Check review package in accordance with the E-plans submittal instructions. LPA PM
9. Conduct Field Check meeting and provide written meeting minutes to PM. LPA PM
10. Submit Office Check (100% complete) review package in accordance with the E-plans submittal instructions. LPA PM
11. Include project on applicable transportation plan. This must be complete prior to obligation of funds. For more information, see *Section 2.0 Programming* in this Manual. PIRC
12. Submit PS&E review package in accordance with the E-plans submittal instructions (including required contract specifications for Federal-aid projects.) LPA PM
13. Advertise project (minimum 30-day). LPA PM
14. Review bids for signs of collusion. LPA PM
15. Award construction contract. PIRC

16. Submit signed contracts and Letting Summary Documents along with Bid Tabs and Paid Items List (PIL) organized by work type in Excel format to be used by KDOT Bureau of Fiscal Services. LPA PM
17. Fill out LPA Approved Sub-Contractors Form and submit to BLP. LPA PM
18. Invite PM to the pre-construction meeting. LPA PM
19. Provide PM with half-size set of construction plans in accordance with the E-plans submittal instructions . LPA PM
20. Send PM a copy of the Notice to Proceed (NTP) document. LPA PM
21. Visit and review the project on a frequency that is commensurate with the magnitude and complexity of the project. PIRC and LPA PM
22. Submit **monthly** reimbursement requests to BLP PM. LPA PM
23. Review financial processes, transactions, and documentation to ensure that safeguards are in place to minimize fraud, waste, and abuse. PIRC
24. Submit change orders with necessary documentation including determination of participating and non-participating items to PM. Signed by PIRC; submitted by LPA PM.
25. Review materials certifications. LPA PM
26. Provide PM with the Construction Summary Documents, including the Final Paid Items List (FPIL) and the Notice of Acceptance. Signed by PIRC; submitted by LPA PM.

10.2 Administration

Federal-aid fund categories and fiscal and audit responsibilities are discussed in *Section 2.0 Programming* in this Manual.

10.3 Procedures

10.3.1 Procedures Outline

Normal phases of project development will include Initiation; Scoping and Scheduling; Preliminary Design; Final Design; and Construction. Each phase involves activities and events needed to complete the project while verifying to KDOT compliance with applicable State Laws and Regulations as well as the Code of Federal Regulations, Title 23 CFR, Part 771 (Environmental Impact and Related Procedures) and applicable Non-Title 23 CFR, Part 771 federal requirements. Activities listed are common to the various types and scopes of projects that are developed under federal aid non-full oversight procedures. Forms listed may be used, or the LPA may develop, with KDOT's approval, its own forms for submittal to KDOT to accomplish the verification.

10.3.2 Project Development Procedures for Locally Administered Projects

10.3.2.1 Initiation, Scoping and Scheduling Phase

10.3.2.1.1 LPA Project Identification – Primary Responsibility - LPA

For more information, see *Section 2.0 Programming* in this Manual.

10.3.2.1.2 Public Involvement – Primary Responsibility – LPA

The LPA is responsible for a public involvement process that is commensurate to the scope, complexity and potential of environmental impact of the proposed project. Public involvement should begin at the earliest stages of project development and continue throughout the project development process. It should be done in accordance with KDOT's Sharing the Future: Public Involvement in the Kansas Transportation System. The level of public involvement will be dependent upon the complexity of the project, potential for significant social or environmental impacts, and amount of controversy generated. Less complex projects involving little or no environmental impact may involve only a public informational meeting. More complex projects which have a high potential for environmental impact will need early and continuous public participation during project development and extensive documentation in accordance with Code of Federal Regulations, Title 23 CFR, Part 771. Documentation in these cases may be in the form of either an Environmental Impact Statement (EIS) (Class I) or an Environmental Assessment (EA) (Class III). The public involvement process flow charts included in KDOT's Sharing the Future: Public Involvement in the Kansas Transportation System provide the process used to categorize projects along with the sequence of events that need to be completed for each classification in order to comply with the federal requirements.

10.3.2.1.3 Request for Construction Project – Primary Responsibility - LPA

The LPA shall submit the Request for Construction Project (KDOT Form 1302) along with supporting information such as a project schedule, map, detailed estimate, TIP, award letter if not from BLP, etc. (See LPA Administered Project Schedule in the *Forms and Documents* area of the BLP LPA Administered Projects webpage for an example.) Once this information is received, BLP will verify the LPA is Pre-Project Certified (Pre-Project Certification Program, PPCP) and the project shall be programmed. After review, the BLP shall generate the Project Authorization (KDOT Form 883) and create the City/State Agreement. Non-infrastructure and procurement projects should use Form 1312.

For more information, see *Section 2.0 Programming* in this Manual.

10.3.2.1.4 NHS Approval Procedure – Primary Responsibility - LPA

For projects on principal arterials, the LPA must request special approval to administer federally funded projects on the NHS. This request needs to document the reasons for the request, demonstrate that the LPA has successfully administered a non-NHS project, and be submitted to BLP for approval.

10.3.2.1.5 Environmental Process – Primary Responsibility – BLP

When the project is authorized and the Project Authorization (KDOT Form 883) is executed, the KDOT Bureau of Right of Way, Environmental Services Section (ESS) will perform initial reviews and make initial contacts with the environmental regulatory agencies to ascertain the potential for environmental impacts. For more information, see *Section 4.0 Environmental* in this Manual.

10.3.2.2 Preliminary Design

10.3.2.2.1 Consultant Selection Process – Primary Responsibility – LPA

For information, see *Section 3.0 PE Consultant Selection and Agreements* and *Section 11.0 CE Consultant Selection and Agreements* in this Manual.

10.3.2.2.2 Consultant Selection Process Certification – Primary Responsibility – LPA

When federal funds are used in the preliminary engineering, the LPA will provide KDOT documentation that appropriate steps have been completed and that the process complied with all applicable regulations. Any work done prior to obligation of federal funds will be non-participating.

For more information, see *Section 3.0 PE Consultant Selection and Agreements* and *Section 11.0 CE Consultant Selection and Agreements* in this Manual.

10.3.2.2.3 Field Surveys - Primary Responsibility – LPA

The LPA is responsible for the acquisition of all survey and geotechnical data that is necessary for the development of the plans. Data gathering techniques and procedures will be commensurate with the complexity of the project and will be in accordance with State statutes and accepted survey practices.

10.3.2.2.4 Design Exception Request – Primary Responsibility – LPA

For information, see *Section 5.0 Plan Development* and *10.3.2.3.1 (Design Exception Approval)* in this Manual.

10.3.2.2.5 Field Check Plans Preparation and Submittal – Primary Responsibility – LPA

The development of Field Check plans by the LPA shall be in accordance with recognized prevailing design criteria which are provided in *Section 5.0 Plan Development, Appendix A*. The LPA may request use of local criteria if they are consistent with these criteria/guidelines. The LPA administering the project is responsible for the completeness and accuracy of the plans. KDOT's Design Manual, Volume 1 (Part A and B), Road Section, Section 2.3, FIELD CHECK PLANS is the guide for plan preparation.

The LPA shall provide electronic Field Check plans and project cost estimate, per the instructions on submitting E-Plans, to BLP for KDOT distribution, review and processing.

10.3.2.2.6 Field Check Plans Review - Primary Responsibility – BLP

BLP will distribute the Field Check plans for review within KDOT and external agencies, as applicable.

10.3.2.2.7 Field Check Meeting and Report - Primary Responsibility – LPA - Coordination with BLP

The LPA will schedule the Field Check meeting time and location in coordination with BLP, Consultant and all other necessary parties. The LPA will conduct and take minutes of the meeting. The Consultant or LPA will provide sets of plans for use at the meeting. BLP will review comments and will discuss any necessary actions with LPA and Consultant. After the meeting, the Consultant or the LPA will distribute meeting minutes and provide BLP with a response to the issues identified/discussed in the meeting. When BLP receives the meeting minutes and issues response, BLP will generate a Field Check Report and provide to the LPA, Consultant, and all other necessary parties.

During the site review/field check meeting, the participants shall determine if the proposed project will have a potential impact on rail facilities. If it appears that work will be near or on railroad right-of-way, the LPA will coordinate with the railroad to determine the need for flagging, liability insurance, agreements and a possible diagnostic review.

10.3.2.2.8 Environmental Process Continuation - Primary Responsibility –LPA

For information, see *Section 4.0 Environmental* in this Manual.

10.3.2.2.9 Public Involvement Process Continuation - Primary Responsibility – LPA

Although the public is involved in the early stages of project development for the more complex projects, additional public input may be needed in the early stages of preliminary design so that public opinion can be reflected in final design. Informational meetings may be needed at this stage along with environmental investigations to confirm the Environmental Classification shown on the Project Authorization (KDOT Form 883) and/or to provide input for use in the appropriate environmental documents.

10.3.2.2.10 Public Interest Finding (PIF) – Primary Responsibility - LPA

Federal-aid regulations specifically allow deviation from some standard practices through a public interest finding (PIF) or a determination of cost effectiveness. If the LPA requests to deviate from a standard practice, the LPA shall submit a PIF to BLP explaining the need for the deviation and why it is in the public's best interest to allow it. BLP shall review the request and work with FHWA to approve or deny the PIF.

10.3.2.3 Final Design

10.3.2.3.1 Design Exception Approval – Primary Responsibility – BLP

BLP will respond to the LPA approving or denying any design exception request. Requests made prior to Field Check will be addressed as a part of the Field Check discussions. When the request is made after or because of Field Check discussion, the approval may be made prior to Office Check plan submittal if sufficient plan information or other details are provided to support the request. Approved items will be reflected in the Design Summary Document.

For more information, see *Section 5.0 Plan Development* in this Manual.

10.3.2.3.2 ROW Activities Initiated - Primary Responsibility – LPA

For information, see *Section 7.0 Right of Way* in this Manual.

10.3.2.3.3 Utility Adjustments Initiated – Primary Responsibility – LPA

Coordination with affected utility companies may begin at any time in the project development process. Early coordination is recommended to minimize negative impacts on the project schedule.

For information, see *Section 8.0 Status of Utilities* in this Manual.

10.3.2.3.4 Environmental Review Process/NEPA – Primary Responsibility – KDOT/LPA

All environmental reviews and clearances (such as noise, air quality, farmland, archaeological, historical, wildlife, Section 4(f), etc.) will conform to applicable federal and state law. When the reviews are complete, and all agencies have submitted their comments, KDOT's Environmental Services Section will transmit a "Status of Project's Environmental Concerns – Final" memo to BLP. Once received by BLP, the PM will distribute to the LPA.

For information, see *Section 4.0 Environmental* in this Manual.

10.3.2.3.5 ROW Acquisition Completion – Primary Responsibility – LPA – Coordination with BLP

Right of Way Clearance for Federal Aid Projects (KDOT Form 1306) must be completed and returned to BLP on all projects even if no rights of way are being acquired. All persons involved with the right of way process must be certified through KDOT's Right of Way Certification Program (ROWCP), see *Section 7.1.1.4*.

For more information, see *Section 7.0 Right of Way* in this Manual.

10.3.2.3.6 Utility Adjustments Completion – Primary Responsibility – LPA – Coordination with BLP

For information, see *Section 8.0 Status of Utilities* in this Manual. Include Form 1304 in contract documents.

10.3.2.3.7 Permits Obtained – Primary Responsibility – LPA

For information, see *Section 4.0 Environmental* in this Manual. Include permits in contract documents.

10.3.2.3.8 Additive Work – Primary Responsibility – LPA – Coordination with BLP

The use of additive work bidding will require prior approval from the PM. The project's defined scope of work must be included in the base bid.

If the LPA chooses to include additive work bidding procedures, the LPA shall be required to prioritize the additions in order of consideration. Selection of the Contractor shall be based on the sum of the base bid plus the selected additive work items in order of consideration. If the LPA has any questions regarding the procedures for this, please contact the PM to discuss. Separate DBE goals may be required for additive work.

10.3.2.3.9 PS&E Package Submittal – Primary Responsibility – LPA

The LPA will submit to BLP all necessary documentation for the PS&E approval. As a minimum, this documentation will include completed plans, project specifications and contract documents, engineer's estimate of probable cost, Status of Utilities (KDOT Form 1304), Right of Way Clearance for Federal Aid Projects (KDOT Form 1306) and List of Permits and Status of Same (KDOT Form 1307). This shall all be submitted to the PM electronically via the FTP site.

PS&E documents shall be submitted a **minimum of 30 days** prior to the desired advertisement date.

10.3.2.3.10 Contract Documents - Primary Responsibility- LPA

The LPA shall be responsible for the completion, execution and implementation of all contract documents, which may include, but are not limited to, proposals, notice to contractors, special provisions, bidding requirements and conditions (KDOT's "Standard Specifications for State Road and Bridge Construction", Section 102), bid bond, and the proposal schedule.

The Required Contract Specifications shall be included on all Federal-aid projects.

Additionally, per 23 CFR 635.109(a)(1)(i-iv), the following changed conditions contract clauses shall be made part of, and incorporated in, each highway construction project approved under 23 U.S.C. 106:

> *(1) Differing site conditions*
> *(i) During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering*

such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.

(ii) Upon written notification, the engineer will investigate the conditions, and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding anticipated profits, will be made and the contract modified in writing accordingly. The engineer will notify the contractor of the determination whether or not an adjustment of the contract is warranted.

(iii) No contract adjustment which results in a benefit to the contractor will be allowed unless the contractor has provided the required written notice.

(iv) No contract adjustment will be allowed under this clause for any effects caused on unchanged work.

One of the following two (2) paragraphs **must be placed above the signature line in the bidding document**:

PARAGRAPH #1 (For projects WITH Federal funds)

REQUIRED CONTRACT PROVISIONS:
The current versions of the following Required Contract Provisions (I-IV) require the Contractor to furnish information. The Contractor shall complete and submit with its proposal these provisions. The City/County of _____ ***will reject*** *proposals that fail to contain completed Required Contract Provisions I, II and III and* ***may reject*** *proposals that fail to contain completed Required Contract Provision IV.*

I.	*08-10-66 (LPA)*	*Certification – Non-collusion & History of Debarment*
II.	*04-26-90 (LPA)*	*Declaration – Limitations on Use of Federal Funds for Lobbying*
III.	*07-19-80 (LPA)*	*DBE Contract Goal*
IV.	*01-01-11 (LPA)*	*Tax Clearance Certificate*

PARAGRAPH #1 (For projects with NO Federal funds)

REQUIRED CONTRACT PROVISIONS:
The current versions of the following Required Contract Provisions (I-IV) require the Contractor to furnish information. The Contractor shall complete and submit with its proposal these provisions. The City of _____ ***will reject*** *proposals that fail to contain completed Required Contract Provision I and* ***may reject*** *proposals that fail to contain completed Required Contract Provision IV.*

I.	*08-10-66 (LPA)*	*Certification – Non-collusion & History of Debarment*
IV.	*01-01-11 (LPA)*	*Tax Clearance Certificate*

PARAGRAPH #2 (For ALL projects)

CERTIFICATION:
I CERTIFY THAT I AM AUTHORIZED TO REPRESENT THE CONTRACTOR IN PREPARING AND PRESENTING THIS PROPOSAL. I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING (INCLUDING, BUT NOT LIMITED TO, THE INFORMATION CONTAINED IN THE REQUIRED CONTRACT PROVISIONS REFERENCED ABOVE) IS TRUE AND CORRECT. EXECUTED ON _____ (DATE).

Note: Davis-Bacon wage rates used for a project shall be those in effect **no more than 10 days** prior to the letting. Per FHWA, "A contracting agency is responsible for incorporating the applicable wage rate determination into each federally-assisted contract entered into pursuant to competitive bidding procedures. When notice of a change to a wage determination is published in the Federal Register 10 days or more before the opening of bids, the USDOL requires that the new wage determination be incorporated into the contract by amendment. 29 CFR1.6(c)(3)(i)". Davis-Bacon wage rates are required to be followed on all federal-aid projects.

Some LPAs may wish to utilize contract incentives/disincentives (liquidated damages) for either timely or untimely completion of part or all of the work for a specified period (hourly, working day, calendar day, or calendar completion date. Should the LPA choose to use Contract Incentives/Disincentives, this shall be included in the preliminary contract documents submitted during PS&E. If the LPA has adopted the Kansas Department of Transportation Standard Specifications for Road and Bridge Construction (Current Version) and accompanying Special Provisions, the Incentive/Disincentives are outlined in Sections 108.7 and 108.8. If the LPA has their own Specifications, the incentive/disincentive language should be included in the Current Specification or in a Special Provision with the requirements for the incentive/disincentive defined for the prospective bidders. Incentives/disincentives are a participating part of the contract as outlined in 23 CFR 635.127.

LPAs must, as part of their DBE program, include a contract clause to require prime contractors to pay subcontractors for satisfactory performance of their contracts no later than 30 days from receipt of each payment made to the prime contractor. The LPA must ensure prompt and full payment of retainage from the prime contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. One of the following methods must be used to comply with this requirement:

1) The LPA may decline to hold retainage from prime contractors and prohibit prime contractors from holding retainage from subcontractors. (Preferred)
2) The LPA may decline to hold retainage from prime contractors and require a contract clause obligating prime contractors to make prompt and full payment of any retainage kept by prime contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed.

3) The LPA may hold retainage from prime contractors and provide for prompt and regular incremental acceptances of portions of the prime contract, pay retainage to prime contractors based on these acceptances, and require a contract clause obligating the prime contractor to pay all retainage owed to the subcontractor for satisfactory completion of the accepted work within 30 days after the LPA's payment to the prime contractor. (Discouraged)

For purposes of this section, a subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the LPA. When an LPA has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed. The LPA's DBE program must provide appropriate means to enforce the requirements of this section. These means may include appropriate penalties for failure to comply, the terms and conditions of which the LPA sets. The program may also provide that any delay or postponement of payment among the parties may take place only for good cause, with your prior written approval. The LPA may also establish, as part of their DBE program, any of the following additional mechanisms to ensure prompt payment:

1) A contract clause that requires prime contractors to include in their subcontracts language providing that prime contractors and subcontractors will use appropriate alternative dispute resolution mechanisms to resolve payment disputes. The LPA may specify the nature of such mechanisms.
2) A contract clause providing that the prime contractor will not be reimbursed for work performed by subcontractors unless and until the prime contractor ensures that the subcontractors are promptly paid for the work they have performed.
3) Other mechanisms, consistent with this part and applicable state and local law, ensure that DBEs and other contractors are fully and promptly paid.

10.3.2.3.11 PS&E Review – Primary Responsibility – BLP

Upon receipt of the PS&E package from the LPA, BLP will review the documents to confirm that the project complies with State and/or Federal requirements.

The estimate will be distributed by BLP to the Program Consultant in KDOT's Office of Contract Compliance to determine the DBE goal. Once the PM receives the DBE Goal, the LPA will be notified so that the DBE Goal may be updated in the project proposal.

The PM will review the LPA's documents to verify that all required specifications are included.

Upon completion of the review, PS&E approval by KDOT will be obtained.

10.3.2.3.12 Obligation of Funds – Primary Responsibility – LPA/BLP/FHWA

After PS&E plans and documents have been approved by BLP, KDOT BPPM will request FHWA to obligate the project's federal funds. The project agreement must be executed before obligation of funds. For projects within an MPO, the TIP must be up to date before obligation of funds.

After the funds have been obligated, the PM will submit the Authority to Administer the project for approval by the BLP Bureau Chief.

After the Authority to Administer has been approved, it will be submitted to the LPA via electronic memo (Authority to Bid) by email. The LPA shall advertise the project for **a minimum of 30 days**.

10.3.2.3.13 Contract Addenda – Primary Responsibility – LPA – Coordination with BLP

If it is necessary that changes must be made after a project is advertised, project addenda shall be provided to all potential bidders and shall be issued with sufficient time for contractors to prepare their bids. Copies of all addenda shall be submitted to BLP for review and to confirm that the previous PS&E approval continues to be valid after the changes are made. The LPA shall not let the project to bid until all applicable addenda have been approved by the BLP.

10.3.2.3.14 Construction Engineering (CE) Agreement – Primary Responsibility – LPA – Coordination with BLP

For information see *Section 11.0 CE Consultant Selection and Agreements* in this Manual.

10.3.2.3.15 Public Involvement Continuation – Primary Responsibility – LPA

The public involvement process should be ongoing and provide input from interested parties throughout the project development.

10.3.2.4 Letting

STATEMENT OF POLICY

The Kansas Department of Transportation's Construction Manual (CM), Standard Specifications for State Road and Bridge Construction (Standard Spec), required contract provisions, and recurring special provisions have been approved by the Federal Highway Administration (FHWA) for use on highway and similar construction projects when Federal money is involved as a means to comply with Federal laws and regulations. Therefore, when projects sponsored by local units of government involve federal money, all letting, and construction activities shall be regulated by these documents. All activities contained therein are not listed below as procedures to follow since not all activities are applicable to LPA's projects; however, as foreseen and unforeseen situations arise during the course of a project that are not covered below, policies and procedures contained in the CM and Standard Spec shall be used to resolve the situation.

These procedures and regulations were written for KDOT personnel; however, since these projects involve federal monies and are being completed with oversight of KDOT, appropriate representatives of the local units of government should use the procedures and regulation as if they were written for their use.

Exception: The LPA can use their own specifications and procedures if they have been reviewed and approved by KDOT.

10.3.2.4.1 Letting Process -- Primary Responsibility – LPA

The LPA is responsible for following the letting process as documented in this section or the LPA's approved procedures manual.

10.3.2.4.2 Project Schedule and Plans Distribution - Primary Responsibility – LPA

After given authority to administer, the LPA will confirm the project letting date and provide full, complete and accurate plans, specifications and special provisions for examination purposes by interested and qualified contractors. These will be made available **at least 30 days before** the scheduled letting date.

10.3.2.4.3 Advertisement - Primary Responsibility-LPA

After the date is set for receipt of proposals, the LPA will give notice of such letting to prospective bidders. The notice shall conform to the requirements set forth in KDOT's "Standard Specifications for State Road and Bridge Construction", Section 102.1. The Notice describes the contemplated work, informs the prospective Contractor to obtain bidding proposal forms, identifies the location of plans and specifications, identifies the time and place for the public opening and reading of proposals and reserves the LPA's right to reject bids.

10.3.2.4.4 Contractor Prequalification: Prime, Sub-Contracting, and EEO – Primary Responsibility – LPA

All prime contractors must be on KDOT's list of pre-qualified contractors as a prerequisite to submitting a responsive bid. (The LPA's proposal must include this requirement.)

All contractors working on any State/Federal-Aid project must have an EEO policy on file with the Office of Civil Rights Compliance. Each contractor and is responsible for submitting their company's EEO policy on their company letterhead, a letter of appointment of the company's EEO officer, and the DOT 1049 CFR Form. If a contractor has 50 or more employees, an Affirmative Action Plan is also required. Please contact KDOTs Office of Civil Rights Compliance with any questions. (785.296.7940)

See ***Appendix A*** for a table of *EEO and DBE Documentation* that is required for Federally funded projects. The LPA is responsible for receiving, checking and submitting to BLP.

10.3.2.4.5 Public Opening of Proposals – Primary Responsibility – LPA

The LPA shall be responsible for the letting place and schedule and for the notification of interested participation of the same. The LPA shall conduct the letting in accordance with state laws and regulations. Proposals shall be opened and read in public at the time and place indicated in the Notice to Contractors. This procedure shall follow instructions listed in Sections 102.15-18 of KDOT's "Standard Specifications for State Road and Bridge Construction".

10.3.2.4.6 Letting Review and Authority to Award

10.3.2.4.6.1 Bid Analysis - Primary Responsibility – LPA/KDOT

The LPA will, after the proposals are opened and read, evaluate the bids to determine whether funds are being spent effectively, that there was good competition in the bidding, and the lowest practicable price for the project was received. The review will include a comparison of the bid prices with respect to the Engineer's Estimate and other factors that may include the following:

- Number of bids
- Distribution or range of the bids
- Identity and geographic location of the bidders
- Urgency of the project
- Unbalancing of the bids
- Current market conditions and workloads
- Comparison of bid prices with similar projects in recent lettings
- Justification for significant bid price differences
- Potential for savings if the project is re-advertised
- Other factors as warranted

As a part of this review, the LPA must review the bids for collusion. The Department of Justice, Antitrust Division has a Red Flags of Collusion checklist to help prevent and detect collusion.

Copies of the detailed bid tabulations will be submitted to BLP for review by the BOCM.

10.3.2.4.6.2 Bid Approval - Primary Responsibility – LPA – Coordination with BLP

The proposals shall be considered by the LPA in accordance with Section 103.1 of KDOT's "Standard Specifications for State Road and Bridge Construction". Once reviewed, the lowest responsible and responsive bidder should be approved. If any of the required certifications have not been signed by the Contractor, their bid will be considered non-responsive and will be rejected. In addition, the DBE goal for the project must be met for the bid to be considered responsive unless Good Faith Effort documentation has been submitted and approved by KDOT. The LPA will also verify that the apparent low bidder is on KDOT's list of approved contractors (https://www.ksdot.org/hwycont.asp). The LPA shall submit to BLP its recommendation for award, detailed bids from all bidders, and copies of all required certifications for the apparent low bidder (Checklist for Authority to Award).

10.3.2.4.6.3 Concurrence in Award - Primary Responsibility - BLP

BLP will review the information submitted by the LPA and confirm that all requirements have been satisfactorily met. When it has been determined that all requirements are met, the LPA will submit "Authority to Award Contract" document for KDOT execution. The executed "Authority to Award Contract" document will then be sent to the LPA.

10.3.2.4.6.4 Award and Execution of Contract – Primary Responsibility - LPA

Upon notification of the "Authority to Award" from KDOT, the LPA shall award and execute a contract in accordance with Section 103 of KDOT's "Standard Specifications for State Road and Bridge Construction", or the LPA's KDOT-approved procedures may be used.

The LPA will submit both a hard copy and an electronic copy of the fully executed contract with all required certifications to the PM prior to the PM issuing the Notice to Proceed. The electronic copy shall be in pdf form and all sections shall be bookmarked.

10.3.2.4.6.5 Letting Summary Document - Primary Responsibility – LPA

Upon completion of the Letting Phase, the LPA shall provide BLP with a "*Letting Summary Document*" that certifies the letting process has been completed and the contract has been awarded in accordance with the requirements of this document as well as Section 102, 103, and 104 of the KDOT "Standard Specifications for State Road and Bridge Construction". The "*Letting Summary Document*" shall be submitted to the PM prior to the PM issuing the Notice to Proceed.

An example of the "*Letting Summary Document*" is included in *Appendix A* of this section. A breakdown of the project construction costs (Paid Item List) by work type (i.e., roadway, surfacing, bridges, traffic signals, and common items) and with non-participating items identified in an Excel spreadsheet shall be submitted to BLP at this time.

10.3.2.4.6.6 Request for Project Exemption Certificate – Primary Responsibility LPA

After the "Authority to Award" has been issued by BLP, the LPA must complete a "REQUEST FOR PROJECT EXEMPTION CERTIFICATE (Department of Revenue Form PR-76)" available from KDOR at:

https://ksrevenue.org/pdf/pr76.pdf

If the LPA has attained "agent" status through KDOR, they must submit a copy of the document granting them "agent" status and a copy of the Form PR-76 issued by the LPA to the Contractor. A publication containing more information about this form and the process can be found at:

https://www.ksrevenue.org/pdf/pub1520.pdf

or you may contact the Kansas Department of Revenue (KDOR) directly at the address or phone shown below:

Kansas Department of Revenue (KDOR)
120 S.E. 10th Avenue
Topeka, KS 66612-1588
Phone: (785)296-3081
FAX: (785)296-7928

After the LPA completes the form, they need to return it to the address stated above. KDOR will assign the LPA an Exemption Certificate Number specific to the project. A copy of the document from KDOR assigning the Exemption Certificate Number must be provided to BLP prior to issuing the "Notice to Proceed."

After the project is completed, the LPA shall complete the "State of Kansas Project Completion Certification" (KDOR Form PR-77) available from KDOR at:

https://www.ksrevenue.org/pdf/pr77.pdf

This certifies that all materials purchased by the Contractor were exempt from payment of sales tax. This form must be delivered to the LPA and kept on file for 5 years after project finalization.

10.3.2.4.6.7 Sub-Contractor Approval

After award, the LPA will submit the BLP LPA Sub-Contractor Approval Form and *DBE Commitment Letter*(s) to the PM for review prior to issuing the Notice to Proceed to the Contractor. All sub-contractors working on any State/Federal-Aid project must have an EEO policy on file with the Office of Civil Rights Compliance. Each sub-contractor is responsible for submitting their company's EEO policy on their company letterhead, a letter of appointment of the company's EEO officer, and the DOT 1049 CFR Form. If a sub-contractor has 50 or more employees, an Affirmative Action Plan is also required. Please contact KDOTs Office of Civil Rights Compliance with any questions. (785.296.7940). The PM will notify the LPA if a subcontractor does not have a policy on file. The sub-contractor will not be allowed to work on the project until the Office of Civil Rights Compliance verifies that they have a policy on file.

10.3.2.5 Construction Phase

10.3.2.5.1 Pre-Construction Meeting – Primary Responsibility - LPA/KDOT

The LPA shall coordinate with the PM regarding the Pre-Construction meeting date and location.

10.3.2.5.2 Notice to Proceed - Primary Responsibility - LPA

Following the instructions in Section 108.1 of KDOT's "Standard Specifications for State Road and Bridge Construction", the LPA shall provide a written notice to the Contractor to proceed with the contract work including, when applicable, the date for commencement of the contract time for performance. This notice shall be submitted to BLP electronically.

10.3.2.5.3 Contract Administration - Primary Responsibility - LPA - Coordination with KDOT

The LPA is responsible for implementing and controlling the work described and required in the project contract including requirements of the Construction Engineering agreement. Control of the work should follow instructions provided in Sections 2.07 through 2.13 of KDOT's "Construction Manual", current edition, where 'Field Engineer' is the LPA PM, 'Inspector' is the LPA's CE Inspector, and 'District Engineer' is the PIRC. Traffic is to be handled during construction in accordance with the plans and the current edition of FHWA's "Manual on Uniform Traffic Control Devices" (MUTCD). Monitoring shall be performed to confirm the Contractor's compliance with Davis-Bacon wage requirements, EEO, DBE, and other contractual requirements.

The LPA shall pay the Contractor and submit a voucher for reimbursement to BLP on a **monthly** basis using the Payment Request Form (KDOT Form 1313). Appropriate data shall be provided to justify the amount of reimbursement and non-participating amounts clearly noted, with a billing summary sheet. The voucher will be checked by BLP and processed for payment. A copy of the Certificate of Subcontractor Work Payment (KDOT Form 1010LP) and Monthly DBE Payment Affidavit (KDOT Form 1008) shall be included with the reimbursement requests. Any changes to subcontractors must be approved using the same procedures as initially followed; If the DBE goal is affected, discuss with BLP.

The LPA shall maintain contact with BLP throughout the project. The LPA shall submit monthly construction progress reports to the PM. BLP will conduct audits of documentation, certifications and billing during the project construction. BLP shall be invited to all project progress meetings and be invited to the final inspection.

10.3.2.5.4 Change Orders - Primary Responsibility - LPA - Coordination with KDOT.

Often changes occur during construction of a project that requires adjusting the compensation paid to a Contractor. All changes must be within the scope and limits of the project. All change order requests must be submitted to the PM using the Contract Change Order Form (KDOT Form 1314) for review and approval **before the work is initiated**. KDOT will provide email concurrence on all changes within **3 business days**. If the LPA does not receive prior approval, the items on that change order may be deemed non-participating, as per the "Code of Federal Regulations", Title 23 CFR 635.120. KDOT's role is to provide general administrative oversight and to determine the amount of federal participation.

The LPA will submit change orders using the unit prices from the original bid tabs when possible. If unit prices for the work aren't included in the original paid items list, the LPA will conduct an independent cost analysis (per 23 CFR 635.120) for the proposed work. The LPA will submit to BLP the cost analysis and the proposal from the Contractor as backup documentation for the negotiated price. If line items are deleted or zeroed out by change order, they will be listed at the bottom of the pay estimate, in the change order section, as negative amounts. Line items shall never be completely removed from the original bid tabs/paid items list. When changing an existing item, the existing unit price must be used.

Non-participating items shall be clearly marked on the original bid tabs, plans, pay estimates and change orders. Email correspondence between the LPA and KDOT regarding the prior approval and determination of federal participation of the change order items shall be submitted by the LPA as backup documentation with change orders. Once the determination of participation has been made, the items will be marked accordingly on the pay estimates.

The LPA will conduct a cost analysis of all changes to the contract included in the change order request. Per KDOT's "Standard Specifications for State Road and Bridge Construction", Section 104.9a, all direct and indirect costs associated with the Contract Change, including labor, materials, equipment, overhead, profit, impact costs and other costs for which the Contractor claims compensation is owed. Do not include prohibited costs as listed in Subsection 104.9c.

The LPA must list all changes on the Final Paid Items List (FPIL), and units and unit prices must be the same as on the Bid Item List. For example, if the bid item is 1 LS $10,000, it can only be adjusted in $10,000 increments.

10.3.2.5.5 Public Involvement Complete – Primary Responsibility – LPA

Public involvement is a continuous and ongoing process during project development and should continue through the construction phase. The LPA is responsible for implementing measures, appropriate for the specific project, to keep the public informed of project activities and to respond to their input.

10.3.2.5.6 Materials Certification - Primary Responsibility - LPA

The LPA is responsible for materials certifications as documented in KDOT's "Construction Manual", Section 2.08, and KDOT's "Standard Specifications for State Road and Bridge Construction", Section 2601. These certifications will verify the Contractor has furnished materials that meet specified requirements.

Materials sampling, testing procedures and materials certification requirements must be included in the LPA procedures manual and followed on each project. Materials testing personnel must be properly certified.

See KDOT's "Standard Specifications for State Road and Bridge Construction", Section 106 for information on QC/QA or Verification testing.

Materials testing personnel performing materials tests on Federal-aid projects must be witnessed by BCM personnel. Mass witnessing events take place in each KDOT District on a yearly basis. Most consultants already participate. It is the LPA's responsibility to contact the local KDOT construction office to inquire about mass witnessing events.

10.3.2.5.7 Final Closeout - Primary Responsibility – LPA

Once the project is substantially complete, the LPA will coordinate with the Contractor, the Inspector, and the PM to perform a walk-through of the project. Any corrective measures to be addressed by the Contractor will be noted by the LPA and a schedule to complete the corrective work (if any) will be determined. Once the LPA is satisfied that the project is complete, they will begin the final closeout process for the project.

The LPA is responsible for creating and submitting the following documents to the PM:

- **Notice of Acceptance**. This document notifies the Contractor that the LPA has accepted the project and that the Contractor is relieved of their responsibility for maintenance of barricades, lights and watchmen, and will no longer be required to perform additional work or maintenance.
- **DBE Summary Report**. This document shows that the DBE goals were met.
- **Construction Summary Document**. This document certifies that all project activities (PE, CE, and Construction) have been completed in accordance with federal and state laws and regulations as well as KDOT's "Construction Manual" and/or the LPA's approved procedures manual. The document will include a final statement that the Contractor has provided appropriate materials certification for the project.
- **Final Acceptance of Federal-Aid Project Constructed Under Exempt Oversight**. This document states the LPA's acceptance of the project and compliance with all federal regulations and material certifications.
- **State of Kansas Project Completion Certificate (PR-77)**. This document certifies that all tax-exempt materials purchased under the exemption certificate were incorporated into the project.
- **Paid Items List by Work Type**. This document provides a final breakdown of costs by work type (i.e., roadway, surfacing, bridges, traffic signals, and common items) with the participating and non-participating items clearly separated. It must include all costs associated with the project regardless of funding source.
- **Final Invoice**.

Examples of these documents are provided in ***Appendix A*** below.

10.3.2.5.8 Project Audit - Primary Responsibility – KDOT

Costs shall be audited according to the "The Single Audit Standards" set forth in Federal O.M.B. Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations" and in the "the Office of Management and Budget Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards", Title 2 CFR part 200.

10.3.2.5.9 Final Payment - Primary Responsibility – KDOT

After the audit is completed, KDOT will submit the final claim to FHWA. After FHWA concurs with the final claim, KDOT will provide the LPA with a "Final Statement of Costs" for final settlement.

10.3.2.5.10 Retention of Records – Primary Responsibility – LPA

The LPA is responsible for retaining all project records for five years after the project's completion.

Appendix A – Index of Items

Documentation of Public Meeting

Authority to Bid

Checklist for Authority to Award

Authority to Award Contract Document from LPA

Letting Summary Document

KDOT BLP LPA Approved Sub-Contractors Form

Example of DBE Commitment Letter

EEO and DBE Required Documentation

Final Transmittal

Notice of Acceptance

DBE Summary Report

Construction Summary Document

Final Acceptance of Federal-Aid Project Constructed Under Exempt Oversight

Paid Items List by Work Type

Final Invoice

Project Completion Certificate (PR-77)

Documentation of Public Meeting

Documentation of Public Meeting

Project Location:

KDOT Project No.:

LPA Project No.:

Project Name:

Project Limits:

Meeting Location:

Meeting Date and Time:

Translation Services: ☐ Yes ☐ No If yes, what language(s):

Presenters:

Elected Officials in Attendance:

Total number of attendees (approx.):

Total number of commenters:

Describe how the event was advertised:

Contents/Attachments:

A. Comment/response matrix
B. Notices
C. Sign-in sheet(s)
D. Comments received
E. Figures, handouts, etc.

Authority to Bid

Dwight D. Eisenhower State Office Building
700 S.W. Harrison Street
Topeka, KS 66603-3745
Julie L. Lorenz, Secretary
Michael J. Stringer, P.E., Chief

Kansas
Department of Transportation
Bureau of Local Projects

Phone: 785-296-3861
Fax: 785-296-6946
kdot#publicinfo@ks.gov
http://www.ksdot.org
Laura Kelly, Governor

June 25, 2019

Re: 23 U-2334-01
SRTS Phase 2
City of Lawrence
Douglas County

Mr. Dave Cronin. P.E.
City Engineer
City of Lawrence
6 East 6th Street
Lawrence, Kansas 66044

Dear Mr. Cronin,

The Plans, Specifications, and Estimate (PS&E) for the referenced project were approved on 6/21/2019 and the Federal Highway Administration has approved the obligation of funds for this project. Therefore, the City is hereby authorized to take bids for contract after a minimum 21-day advertisement.

After the bids have been opened and the City has identified the lowest responsible bidder, please submit a copy of the low bidder's bidding documents, a copy of the bid tabs, and a copy of the DBE's acceptance of his subcontract offer to this office. Upon satisfactory review by KDOT, we will authorize the City to award the contract and issue the Notice to Proceed.

Sincerely,

Bill Legge, P.E.
Local Road Engineer

BL

c: Jake Baldwin, P.E., City of Lawrence
file

Checklist for Authority to Award

ITEMS REQUIRED FOR AUTHORITY TO AWARD

PROJECT _____ LETTING DATE _____

- ☐ All required provisions that were included during PS&E review are still included?
- ☐ LPA reviewed bids for collusion (memo)?
- ☐ Submit bid tabs to Construction & Materials for review.
- ☐ Receive comments from Construction & Materials regarding review of bid tabs?
- ☐ 04-26-90: Declaration - Limitations on Use of Federal Funds signed by Contractor?
- ☐ 08-10-66: Certification – Non-collusion and History of Debarment signed by Contractor?
- ☐ 07-19-80: DBE Contract Goals completed and signed by Contractor?
- ☐ DBE Commitment Letter signed by DBE?
- ☐ 01-01-11: Tax Clearance Certificate completed and signed by Contractor?
- ☐ Does listed DBE participation equal or exceed the established DBE goals?
- ☐ Are listed DBE contractors on the approved DBE list?

Revised 10/2014 Checklist for Authority to Award

Authority to Award Contract Document from LPA

December 1, 2014

John Smith
Bureau of Local Projects
Kansas Department of Transportation
Dwight D. Eisenhower State Office Building
700 SW Harrison Street, 3rd Floor
Topeka, KS 66603-3745

XX N-XXXX-01
GEOMETRIC IMPROVEMENTS - CITY OF ANYTOWN

Dear Mr. Smith:

Please find the attached AUTHORITY TO AWARD CONTRACT COMMITMENT OF FEDERA L/STATE FUNDS that has been executed by the City of Anytown. You will also find a copy of the bid tabulation resulting from the letting on November 30, 2014, and the required contract documents indicating Contractor compliance with the following items:

- Certification – Non-collusion and History of Debarment;
- Declaration - Limitations on use of Federal Funds for Lobbying;
- Certification - Contractual Services with a Current Legislator or a Current Legislator's Firm;
- DBE Contract Goals (DBEs are on the approved KDOT list); and
- DBE subcontractor commitments.

Acme Construction Company, the design consultant, and Anytown staff have reviewed the detailed bid tabulations and compared them with other recent bid lettings on similar projects in the City of Anytown. We find no evidence of contractor collusion or bid rigging.

We are requesting KDOT authorization, so we can award this contract by December 15, 2014. Please return the fully executed copy to my attention.

If you have any questions or comments, please contact me as soon as possible.

Sincerely,
Sally Jones, PE
Project Manager, Anytown, KS

Attachment

Authority to Award Contract Document from LPA (Continued)

AUTHORITY TO AWARD CONTRACT
COMMITMENT OF FEDERAL/STATE FUNDS
September 30, 2016

Project No.: XX N-XXXX-01 (Project Name)
STP-NXXX(X01)

WHEREAS bids were received at Anytown, Kansas on September 29, 2016 for the performance of work covered by plans on the above numbered project, and

WHEREAS the bidder and low bid or bids on work covered on this project were:

CONTRACTOR	ADDRESS	TYPE OF WORK	AMOUNT
Acme Construction Co.	P.O. Box 1234 Anytown, KS 66xxx	Grading, Surfacing, Seeding	$1,000,000.00

WHEREAS bids are considered satisfactory and have been recommended by the City Engineer of the City of Anytown, for consideration and acceptance of the work on this project as covered by such bid or bids.

The State Transportation Engineer of the State of Kansas, and the City of Anytown agree to fund the cost of construction in accordance with the City/State Agreement No. XXX-YY.

Recommended for Approval:

_____ _____
Sally Jones, P.E. Date
City of Anywhere Title

_____ _____
Catherine M. Patrick, P.E. Date
State Transportation Engineer

Letting Summary Document

Lenexa
KANSAS

LETTING SUMMARY DOCUMENT
November 6, 2013

Project: 46 N-0545-01 / HSIP-N054(501)
College Boulevard & Lackman Road Traffic Improvements

Johnson County

MEMORANDUM TO: Bureau Chief - Bureau of Local Projects

The above referenced project was advertised in publications listed below on the dates indicated in accordance with Section 102.01 KDOT's Standard Specification for State Road and Bridge construction, current edition.

Publication	Date Advertised
Legal Record	7/23/13, 7/30/13, 8/6/13, 8/13/13, 8/20/13
Kansas Register	7/25/13, 8/1/13, 8/8/13, 8/15/13, 8/22/13

Contractors were prequalified in accordance with KDOT's Standard Specification for State Road and Bridge Construction, current edition, and KDOT's Construction Manual or they were taken from KDOT's list of pre-qualified contractors.

Contract documents that were used fulfilled federal and state requirements in regard to letting procedures and with the City of Lenexa's Project Procedures Manual.

Public opening of the proposals took place **August 29, 2013** at **Lenexa City Hall, 12350 W. 87th Street Parkway, Lenexa, Kansas** in accordance with State Law and Regulations and with the City of Lenexa's Project Procedures Manual.

The bid of the lowest responsible and qualified bidder was accepted and contracts were awarded on **October 15, 2013** in accordance with the City of Lenexa's Project Procedures Manual.

Tim Green, PE
City Engineer

City of Lenexa / 12350 West 87th Street Parkway / Lenexa, Kansas 66215-2882
City of Lenexa / P.O. Box 14888 / Lenexa, Kansas 66285-4888
Telephone (913) 477-7500 / Fax (913) 477-7504

KDOT-BLP LPA Approved Sub-Contractors Form

KANSAS DEPARTMENT OF TRANSPORTATION
LPA APPROVED SUB-CONTRACTORS

CMS Contract Number: _____

County: _____ KDOT Project No. _____

LPA City: _____

Prime Contractor: _____

The LPA hereby Certifies that (Check one):

☐ Federally-Aided contracts. These contracts contain the applicable Required Contract Provisions, Specific Equal Employment Opportunity Responsibilities, and FHWA-1273. The requirements of this Contract Provision will be physically incorporated into such subcontract.

☐ State Funded Contracts. These contracts contain the applicable Required Contract Provisions, Specific Equal Employment Opportunity Contractual Requirements. The applicable requirements of this Contract provision will be physically incoprorated into such subcontract.

Sub-Contractor	DBE (Y or N)	Line Items Responsible for	Total Amount
		TOTAL	**$ -**

LPA APPROVAL

Approved on _____ , 20_____
(Month) *(Day)* *(Year)*

By _____
Local Public Authority

Example of DBE Commitment Letter

City of Lawrence
MUNICIPAL SERVICES & OPERATIONS

CITY COMMISSION
MAYOR
LISA LARSEN
COMMISSIONERS
JENNIFER ANANDA, JD, MSW
MATTHEW J. HERBERT
LESLIE SODEN
STUART BOLEY

CRAIG S. OWENS
CITY MANAGER

City Offices
PO Box 708 66044-0708
www.lawrenceks.org

6 East 6th St
785-832-3000
FAX 785-832-3405

July 31, 2019

Traffic Management LLC
2378 Cheyenne Rd
Holton, KS 66436

Safe Routes to School Phase 2
23 U-2334-01
DBE SUBCONTRACT

Your firm received a subcontractor commitment in this letting. The information is listed below. If this agrees with your records and if you are ready, willing, and able to perform this work please sign and date below and fax, email, or mail a copy within 48 hours.

PROJECT	CONTRACTOR	SUBCONTRACT AMOUNT	LINE ITEMS
23 U-2334-01	Traffic Management	$6,450.00	2

If you have any questions, please contact this office at (785) 832-3196.

Sincerely,

Jake Baldwin, PE
Senior Project Engineer

Signature: Amy Banks Date: 7/31/2019

We are committed to providing excellent city services that enhance the quality of life for the Lawrence Community

EEO and DBE Required Documentation

Document	Frequency	Who Retains
EEO Policy – prime & subs	Calendar Year	Office of Civil Rights Compliance
DBE Certification	At Contract Award • Only 60% of DBE supplier value can be used	DBEs and Office of Civil Rights Compliance
Wage Rate Interviews	One employee/company/quarter	LPA
Certified Payroll	Weekly (within 7 calendar days of pay)	Contractor and LPA
Bulletin Board	Details posters required for project	Contractor
Bulletin Board Check Sheet	Maintain during project	LPA
Form 239* Field Construction Administrator's Report	When Project is 20-30% complete	LPA and BLP
Form 270 (or similar from LPA) DBE Payment Affidavit	End of Project	LPA, BLP and Office of Civil Rights Compliance
Form 294* Additional Classification Request Form	As needed for job classes not in contract	Contractor, LPA, BLP and BOCM
Form 1003 Federal-Aid Highway Construction Employment Data Summary	Monthly (contracts over $500,000)	Contractor and BLP
Form 1008 Monthly DBE Payment Affidavit	Monthly - One per each DBE subcontractor (by the 5th for preceding month)	BLP
Form 1010LP Certificate of Subcontractor Work and Payment	Monthly (within 15 calendar days after making subcontractor payment)	Contractor, LPA and BLP
Form 1014* Commercially Useful Function	One for Each DBE per project (when DBE's work is 1/3 to 1/2 complete)	LPA and BLP
Form 1391 (FHWA) Federal-Aid Highway Construction Contractors Annual EEO Report	Annually to Civil Rights Compliance (last full pay period of July)	Office of Civil Rights Compliance

***Request from the BLP PM**

Final Transmittal

January 8, 2014

Ed Thornton, P.E.
Bureau of Local Project
Kansas Department of Transportation
700 SW Harrison
Topeka, KS 66603-3754

RE: 46 N-0568-01
151ST & MAHAFFIE GEOMETRIC IMPROVEMENTS PROJECT
CITY OF OLATHE (PN 3-C-002-11)

Dear Ed:

I am enclosing the following documents in order to complete the final closeout of the subject project and receive final payment reimbursement up to the agreed cap amount:

- Notice of Acceptance
- DBE Summary Report
- Construction Summary Document
- Final Acceptance of Federal-Aid Projects Constructed Under Exempt Oversight
- State of Kansas Project Completion Certificate
- Paid Items List by Work Type
- Final Invoice

The final construction invoice for payment in the amount of $6,345.16 has been sent to you in the Topeka office. This final amount represents the total reimbursements requested for this project less retainage.

Please call me at (913) 971-9032 if you have any questions regarding the attached paperwork or request.

Sincerely,

Therese Mersmann, P.E.
Capital Projects and Development Manager

Notice of Acceptance

CITY OF OLATHE

NOTICE OF ACCEPTANCE

X OF CONTRACT ___ OF PORTION OF CONTRACT

TO Gunter Construction Company CONTRACTOR

CITY OLATHE PROJECT NO. 3-C-002-11 KDOT PN 46 N-0568-01

TYPE OR BRIDGE NO. Turn Lane Addition LENGTH OF PROJECT: NET 0.122 KILOMETERS GROSS 0.122 KILOMETERS

PREVIOUS SURFACE TYPE Asphalt NEW SURFACE TYPE Asphalt

DATE CONTRACTOR COMPLETED WORK November 14, 2013

You are hereby notified that the contract described as follows: 400 L.F. of turn lane addition with demolition and removal of existing curbs and pavement, storm sewer modifications, traffic signal modifications, and all other related work and appurtenances necessary to complete the project.

was accepted on November 14, 2013 and you are hereby relived of your responsibility for maintenance of barricades, lights and watchmen, and will be required to perform no additional work or maintenance subject to contractual requirements and the following conditions: _____

RECOMMENDED BY: Project Engineer

APPROVED BY City Engineer

This is to affirm that I agree to the acceptance of the portion of the contract and to the conditions stated above.

CONTRACTOR _____

SIGNED BY _____

NOTE: Contractor's signature required only for acceptance of portion of contract. This form to be mailed to the Contractor and to the Bureau of Construction and Maintenance on the date of acceptance of the project.

2/10/98 City Form V-2398

DBE Summary Report

City of Olathe

DBE SUMMARY REPORT

MEMORANDUM TO: Bureau Chief, Bureau of Local Projects
Date: December 5, 2013

Project: 151st & Mahaffie Geometric Improvements
Johnson County

KDOT Project No. 46N-0568-01

Contractor: Gunter Construction Company
Contract Amount: $153,086.98

DBE SUBCONTRACTOR	SUBCONTRACT AMOUNT	ITEMS PERFORMED
Tenoch Construction, Inc	$13,000	7

Project Engineer

Construction Summary Document

CONSTRUCTION SUMMARY DOCUMENT
DATE: December 1, 2014

Project: XYZ Geometric Improvements Project
Location: Nowhere County

MEMORANDUM TO: Bureau Chief, Bureau of Local Projects

Notice to proceed on the referenced project(s) was issued to Acme Construction Company Contractor(s) on April 1, 2014 in accordance with Section 101.43, KDOT's Standard Specification for State Road and Bridge Construction, current edition.

Contract administration was completed in accordance with the requirements referenced in Section 15.3.2.5, LPA Project Development Manual.

Notice of Acceptance of the contracted work was issued to the contractor(s) in accordance with Section 105.17, KDOT's Standard Specification for State Road and Bridge Construction, current edition.

Materials Certification was completed in accordance with Section 2.07, KDOT's Construction Manual, current edition, and Section 2600, KDOT's Standard Specification for State Road and Bridge Construction, current edition.

Preliminary Engineering (PE) performed by the PE consultant was accepted as complete.

Construction Engineering (CE) performed by the CE consultant was accepted as complete.

_____
City Engineer

Final Acceptance of Federal-Aid Project Constructed Under Exempt Oversight

CITY OF OLATHE

FINAL ACCEPTANCE OF FEDERAL – AID PROJECTS
CONSTRUCTED UNDER EXEMPT OVERSIGHT

KDOT PROJECT NO. 46-N-0568-01 CITY: OLATHE

DESCRIPTION OF IMPROVEMENT AS PROGRAMMED: 400 L.F. of turn lane addition with demolition and removal of existing curbs and pavement, storm sewer modifications, traffic signal modifications, and all other related work and appurtenances necessary to complete the project.

CONTRACTOR'S NAME:	CONTRACT AMOUNT:
Gunter Construction Company	$153,086.98

NOTICE OF ACCEPTANCE REQUIREMENTS: The above project has been completed under the provisions of Title 23 C.F.R. and all applicable Federal and State rules and regulations. All Notice of Acceptance's have been submitted and Final Contractor Payments have been made. There is no litigation pending.

FINAL INSPECTION: BY: Therese [illegible]
Project Engineer

DATE: 1/8/14

APPROVAL: BY: Celia J. D[illegible]
Celia J. Duran, P.E. - City Engineer

DATE: 1/8/14

2/10/98 City Form V-2698

Paid Items List by Work Type

151st & Mahaffie Turn Lane

KDOT Project Number 46N-0568-01

City of Olathe PN 3-C-002-11

Gunter Construction Company - Bid Breakdown

				Participating		Non-Participating	
Item No	Item Name	Qty	Unit	Unit Price	Total Price	Unit Price	Total Price
1	Clearing and Grubbing	1	L.S.	1,145.00	1,145.00		
2	Excavation and Grading	245	C.Y.	100.00	24,500.00		
3	Curb and Gutter Removal and Disposal	93	S.Y.	50.00	4,650.00		
4	Sidewalk Removal and Disposal	371	S.Y.	11.00	4,081.00		
5*	6" Aggregate Base (OP-Modified AB-3)	429	S.Y.	14.00	6,006.00		
6*	Install 2" Superpave Asphaltic Concrete	359	S.Y.	25.00	8,975.00		
7*	Install 8" Superpave Asphaltic Concrete Base	259	S.Y.	71.00	18,389.00		
8*	Install 10" Concrete Pavement	59	S.Y.	83.00	4,897.00		
9	Install Type B Concrete Curb & Gutter	408	L.F.	17.00	6,936.00		
10	Install 4" Concrete Sidewalk (5' width)	233	S.Y.	30.00	6,990.00		
11	Install ADA Handicap Sidewalk Ramp	1	ea.	1,390.00	1,390.00		
12	Convert Curb Inlet to Junction Box	1	ea.	2,250.00	2,250.00		
13	Install 4'x4' Curb Inlet	1	ea.	3,000.00	3,000.00		
14	Install 15" RCP	9	L.F.	100.00	900.00		
15	Install 6" HDPE Underdrain	193	L.F.	15.00	2,895.00		
16*	4" Solid Yellow Cold Plastic Line	80	L.F.	2.50	200.00		
17	6" Solid White Cold Plastic Lane Line	424	L.F.	3.50	1,484.00		
18	6" Solid White Cold Plastic X-Walk Line	223	L.F.	3.50	780.50		
19	6" Dotted White Cold Plastic Extension Line	415	L.F.	1.25	518.75		
20	12" Solid Yellow Cold Plastic Diagonal Line	23	L.F.	7.00	161.00		
21*	24" Solid White Cold Plastic Stop Line	45	L.F.	14.00	630.00		
22	Turn Arrow White Cold Plastic	5	ea.	185.00	925.00		
23	Turn/Thru Arrow White Cold Plastic	3	ea.	275.00	825.00		
24	Word Symbol White Cold Plastic	1	ea.	250.00	250.00		
25	Permanent Street Signing	2	ea.	300.00	600.00		
26	Traffic Signal Reconstruction (Mahaffie Street)	1	L.S.	35,950.00	35,950.00		
27*	Sod - (Tall Turf Type Fescue)	518	S.Y.	6.00	3,108.00		
28	Erosion Control and SWPPP Compliance	1	L.S.	600.00	600.00		
29	Mobilization	1	L.S.	6,305.00	6,305.00		
30	DBE Mobilization	1	L.S.	1,000.00	1,000.00		
31	Temporary Traffic Control	1	L.S.	3,450.00	3,450.00		
32	Construction Staking	1	L.S.	950.00	950.00		
33*	Additional Milling	1	LS	1,162.04	1,162.04		
34**	Damage to Traffic Signal Cabinet	1	LS	(2,816.31)	(2,816.31)		
	Bid Total				**$ 153,086.98**		**$ -**

Work Type Summary			
	Participating	Non-Participating	Total
Common Items			
Roadway			
Surfacing			
Storm/Sewer/Water			
Traffic Signals			
Total			

Final Invoice (Page 1 of 2)

ESTIMATE NO: 4 - Final
PROJECT NAME: 151st & Mahaffie Turn Lane
ENGINEER: Schlagel and Associates

PROJECT NO. 3-C-002-11 ENC# 700143
DATE: 11/13/2013 OL 200982
CONTRACTOR: Gunter Construction

Item#	Item	Quanity	Unit	Unit Cost	Contract Price	Units to Date	Value of Work Completed	% Complete
1	Clearing and Grubbing	1	LS	1,145.00	$1,145.00	1	$1,145.00	100%
2	Excavation and Grading	245	CY	100.00	$24,500.00	245	$24,500.00	100%
3	Curb and Gutter Removal and Disposal	93	SY	50.00	$4,650.00	93	$4,650.00	100%
4	Sidewalk Removal and Disposal	371	SY	11.00	$4,081.00	371	$4,081.00	100%
5*	6" Aggregate Base (OP-Modified AB-3)	429	SY	14.00	$6,006.00	429	$6,006.00	100%
6*	Install 2" Superpave Asphaltic Concrete	359	SY	25.00	$8,975.00	359	$8,975.00	100%
7*	Install 8" Superpave Asphaltic Base	259	SY	71.00	$18,389.00	259	$18,389.00	100%
8*	Install 10" Concrete Pavement	59	SY	83.00	$4,897.00	59	$4,897.00	100%
9	Install Type B Concrete Curb & Gutter	408	LF	17.00	$6,936.00	408	$6,936.00	100%
10	Install 4" Concrete Sidewalk (5' width)	233	SY	30.00	$6,990.00	233	$6,990.00	100%
11	Install ADA Handicap Sidewalk Ramp	1	Ea	1,390.00	$1,390.00	1	$1,390.00	100%
12	Convert Curb Inlet to Junction Box	1	Ea	2,250.00	$2,250.00	1	$2,250.00	100%
13	Install 4'x4' Curb Inlet	1	Ea	3,000.00	$3,000.00	1	$3,000.00	100%
14	Install 15" RCP	9	LF	100.00	$900.00	9	$900.00	100%
15	Install 6" HDPE Underdrain	193	LF	15.00	$2,895.00	193	$2,895.00	100%
16*	4" Solid Yellow Cold Plastic Line	80	LF	2.50	$200.00	80	$200.00	100%
17	6" Solid White Cold Plastic Lane Line	424	LF	3.50	$1,484.00	424	$1,484.00	100%
18	6" Solid White Cold Plastic X-Walk Line	223	LF	3.50	$780.50	223	$780.50	100%
19	6" Dotted White Cold Plastic Extension Line	415	LF	1.25	$518.75	415	$518.75	100%
20	12" Solid Yellow Cold Plastic Diagonal Line	23	LF	7.00	$161.00	23	$161.00	100%
21*	24" Solid White Cold Plastic Stop Line	45	LF	14.00	$630.00	45	$630.00	100%
22	Turn Arrow White Cold Plastic	5	Ea	185.00	$925.00	5	$925.00	100%
23	Turn/Thru Arrow White Cold Plastic	3	Ea	275.00	$825.00	3	$825.00	100%
24	Word Symbol White Cold Plastic	1	Ea	250.00	$250.00	1	$250.00	100%
25	Permanent Street Signing	2	Ea	300.00	$600.00	2	$600.00	100%
26	Traffic Signal Reconstruction (Mahaffie St)	1	LS	35,950.00	$35,950.00	1	$35,950.00	100%
27*	Sod - (Tall Turf Type Fescue)	518	SY	6.00	$3,108.00	518	$3,108.00	100%
28	Erosino Control and SWPPP Compliance	1	LS	600.00	$600.00	1	$600.00	100%
29	Mobilization	1	LS	6,305.00	$6,305.00	1	$6,305.00	100%
30	DBE Mobilization	1	LS	1,000.00	$1,000.00	1	$1,000.00	100%
31	Temporary Traffic Control	1	LS	3,450.00	$3,450.00	1	$3,450.00	100%
32	Construction Staking	1	LS	950.00	$950.00	1	$950.00	100%
33*	Additional Milling	1	LS	1,162.04	$1,162.04	1	$1,162.04	100%
34**	Damage to Traffic Signal Cabinet	1	LS	(2,816.31)	($2,816.31)	1	($2,816.31)	100%
					$153,086.98		$153,086.98	

Unused Materials on Hand $0.00

Final Invoice (Page 2 of 2)

ESTIMATE NO: 4 - Final
PROJECT NAME: 151st & Mahaffie Turn Lane
ENGINEER: Schlagel and Associates

PROJECT NO. 3-C-002-11 ENC# 700143
DATE: 11/13/2013
CONTRACTOR: Gunter Construction

Item#	Item	Quanity Unit	Unit Cost	Contract Price	Units to Date	Value of Work Completed	% Complete

ORIGINAL CONTRACT AMOUNT	$149,023.25		
CHANGE ORDER 1	$6,880.04		
CHANGE ORDER 2	($2,816.31)		
REVISED CONTRACT AMOUNT	$153,086.98		
Total Value of Work and Unused Material on Hand		$153,086.98	
Total Previous Payments	$145,155.54		
Total Previous Retainage	$7,639.77		
Total Previous Value of Work & Unused Material on hand	$152,795.31		
Total Payments to Date	$153,086.98		
Total Retainage to Date	$0.00		
Amount Remaining on Contract	$0.00		

Current Value of Work & Unused Material on Hand	$7,931.44	
Less % To be Retained (0%)	$0.00	
AMOUNT DUE	$7,931.44	100%

Inspector

Project Manager

Contractor

Project Completion Certificate (PR-77)

Office of Policy & Research
Kansas Department of Revenue
915 SW Harrison Street
Topeka, KS 66612-1588

Phone: (785) 296-3498
Fax: (785) 296-7928

STATE OF KANSAS
PROJECT COMPLETION CERTIFICATE

TO: City of Olathe
Name of Entity to whom Project Exemption Certificate was Issued

100 E Santa Fe	Olathe	Kansas	66061
Street	City	State	Zip Code

This is to certify, to the best of my knowledge and belief, that all materials purchased under **Exemption Certificate Number** 0000032995, issued by the Kansas Department of Revenue, were incorporated into the building or project for which the exemption was issued and were entitled to an exemption pursuant to K.S.A. 79-3606(d), (e), or (ee), as amended.

Gunter Construction Company
Contractor/Subcontractor

510 Southwest Boulevard, Ste A
P.O. Box and/or Street Number and Name

Kansas City, KS 66103
City, State Zip

[illegible], President
Signature and Title of Authorized Representative

12/6/13
Date

INSTRUCTIONS

Upon completion of a tax exempt project, the contractor must furnish this certification to the taxpayer for which the work was performed. A copy of this certificate must also be forwarded to the Kansas Department of Revenue, Office of Policy & Research, 915 SW Harrison Street, Topeka, Kansas 66612-1588. All invoices must be retained by the contractor for a period of five (5) years and are subject to audit by the Kansas Department of Revenue.

PR-77 (Rev. 7/98)

APPENDIX C: SIDEWALK INSPECTION CHECKLIST & EXCEPTION DOCUMENTATION

Reset Form

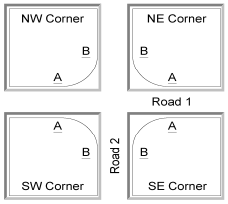
Project:

City of Lawrence, KS: ADA Compliance Checklist

Inspection Date:	**Mark Inspected Ramps**
Inspector:	**Road 1:**
Contractor:	**Road 2:**

Please provide photo documentation of all inspected ramps.
Record your measurements in the blanks provided.
A 'No' signifies a possible violation.

Instructions: Enter "0" when measurement is N/A.



	Compliance Questions	Curb Ramp A	Curb Ramp B
1	Type: Curb Ramp (grade break/det. warnings perpendicular to direction of travel) OR Blended Transition (grade break/det. warnings radial or NOT perpendicular to direction of travel)?	[Choose from Pull Down]	[Choose from Pull Down]
2	Traffic control on street approach crossing:	[Choose from Pull Down]	[Choose from Pull Down]
3	Is the street grade at the ramp crossing flatter than allowable (5% for Signal or Uncontrolled; 2% for Stop or Yield Control; General grade of road for Mid-Block)?		
4	Does the curb ramp meet cross slope requirements?	N/A	N/A
	2% or flatter at Top of Ramp — *Measured At Top of Ramp:*	%	%
	*Road grade or flatter at Bottom of Ramp** — *Measured At Bottom of Ramp*	%	%
	**See Question 3 for Roadway Slope Requirements)*		
5	Does the ramp meet running slope requirements? (Curb Ramp = 8.33% or flatter; Blended Trans. 5% or flatter) *Measured:*	%	%
6	If ramp running slope is steeper than 8.33% does the ramp length measure 15' or greater?	N/A	N/A
	Measured Length:	FT.	FT.
7	Is the curb at bottom of the ramp 5% or flatter along direction of travel (slope and counterslope)?	N/A	N/A
	Slope (BOC to Flowline) Measured:	%	%
	Counterslope (Flowline to EOP) Measured:	%	%
8	Does the curb ramp measure at least 4' wide (excluding the flares and/or side curb)?	N/A	N/A
	Measured Width:	FT.	FT.
9	Is there a continuous 4' wide pedestrian route through the intersection corner?	N/A	N/A
	Measured:	FT.	FT.
10	Is there a turning space at the curb ramp? (Perpendicular Ramp: Turning space at top; Parallel Ramp: Turning space at bottom)	[Choose from Pull Down]	[Choose from Pull Down]
11	Are all turning spaces equal to or greater than the sidewalk width?	[Choose from Pull Down]	[Choose from Pull Down]
	Measured Width:	FT.	FT.
12	Do all turning spaces have a 5' minimum unobstructed length (in the direction of the crossing)?	N/A	N/A
	Measured Length:	FT.	FT.
13	If turning space is where a change in direction could occur, does it measure 5'x5' min.?	N/A	N/A
	Measured:	FT.	FT.
14	Does slope of turning space, measured in any direction, measure 2% or flatter?	N/A	N/A
	Cross slope measurement:	%	%
	Running slope measurement:	%	%
15	If side curbs or side flares are used, are they outside the pedestrian access route?	[Choose from Pull Down]	[Choose from Pull Down]
16	If side flares are in pedestrian circulation path, do the side flares measure 10% or flatter?	N/A	N/A
	Measured:	%	%
17	Do the detectable warning surfaces match appearance of the other detectable warning surfaces at adjacent curb ramps?	[Choose from Pull Down]	[Choose from Pull Down]
18	Does the detectable warning surface measure 2' long and extend the full width of the ramp, excluding the flares?	[Choose from Pull Down]	[Choose from Pull Down]
19	If detectable warnings were installed perpendicular to the running slope of the ramp, does the nearest edge of detectable warning surface measure 5' or less from the back of curb?	N/A	N/A
	Measured:	FT.	FT.
20	Is the running slope between the detectable warnings and back of curb 5% or flatter?	N/A	N/A
	Measured:	%	%
21	If the truncated domes were installed along the back of curb, does the nearest edge of the truncated dome measure 2" or less from the back of curb?	N/A	N/A
	Measured:	IN.	IN.
22	Do the vertical changes in level along the pedestrian access routes measure 1/4" or less?	[Choose from Pull Down]	[Choose from Pull Down]
23	Is the ADA ramp curb and gutter flush with adjacent ramp and pavement?	[Choose from Pull Down]	[Choose from Pull Down]
24	Do the horizontal gaps along the pedestrian access routes measure 1/2" or less?	[Choose from Pull Down]	[Choose from Pull Down]

If you answered 'No' for any of the questions above, note reasons for non-compliance (Exceptions Shall be Approved By Engineer)

Comments:

Contractor Signature: _____ **Date:** _____

Lawrence Representative: _____ **Date:** _____

Ramp Photos

(Click Box to Insert Photos)

CLICK TO INSERT IMAGE

Ramp A (From Top of Ramp)

CLICK TO INSERT IMAGE

Ramp A (From Street)

CLICK TO INSERT IMAGE

Ramp B (From Top of Ramp)

CLICK TO INSERT IMAGE

Ramp B (From Street)

CLICK TO INSERT IMAGE

Other as Needed:

CLICK TO INSERT IMAGE

Other as Needed:

APPENDIX D: STANDARD PROPERTY ACQUISITION TEMPLATES

D.1 – Temporary Construction Easement

D.2 – Right of Way Dedication

D.3 – Pedestrian Easement

D.4 – Utility Easement

D.5 – Drainage Easement

D.6 – Sanitary Sewer Easement

TEMPORARY CONSTRUCTION EASEMENT

THE UNDERSIGNED GRANTOR is the owner of record of that real property ("the subject property") commonly known as _____, Lawrence, Douglas County, Kansas, and bearing the following legal description, to-wit:

[Legal of entire tract here]

THE UNDERSIGNED GRANTOR, for and in consideration of the sum of One Dollar and No Cents ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is acknowledged, hereby grants, sells, conveys, and delivers unto the City of Lawrence, Kansas, a municipal corporation ("Grantee"), a Temporary Construction Easement in, over, under, and through the subject property (a exhibit map showing the Easement is affixed hereto as Exhibit A and is incorporated herein by reference) for the construction, installation, and maintenance of a driveway, sidewalk and pedestrian path, and all other facilities appurtenant thereto, said Easement bearing the following legal description, to-wit:

[INSERT LEGAL]

Grantee shall have the right of ingress and egress upon the above-described Easement for the purpose of repairing, or replacing said sidewalk, driveway and other appurtenances thereto and otherwise to make all uses of said Easement and to do all things necessary or proper for the use of said Easement for said public facilities and structures.

Within reasonable time following the termination of the temporary easement, Grantee shall leave the area thereof free of litter and debris; shall cause such area to be of a level and grade compatible with that of the area around said temporary easement; and shall restore the area disturbed, including restoration of driveways, landscaping and irrigation systems, at the earliest practical time and pursuant to the project plan specifications.

This temporary easement shall terminate and be of no further force and effect ninety (90) days after the completion of the said improvements or December 31, 2024, whichever shall first occur.

Grantor shall do or cause nothing to be done to interfere with the Grantee's right of use of said Easement for the purposes herein stated.

THE UNDERSIGNED GRANTOR FURTHER WARRANTS that it has good and lawful right to convey said Easement and that it will forever defend the title thereto.

THIS GRANT AND CONVEYANCE is and shall be binding and obligatory upon the heirs, administrators, executors, personal representatives, successors, and assigns of the Grantor and the Grantee.

DATED THIS _____ day of _____, 2024.

_____
name

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2024, before me, the undersigned, a Notary Public in and for the County and State aforesaid came _____, who is personally known to me to be the same person who executed this instrument in writing, and said person fully acknowledged this instrument to be the act and deed of the afore-mentioned entity.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

_____
Notary Public

My Commission Expires:

DEDICATION OF RIGHT-OF-WAY

THE UNDERSIGNED GRANTOR is the owner of record of that real property ("the subject property") commonly known as _____, Lawrence, Douglas County, Kansas, and bearing the following legal description, to-wit:

[Legal of entire tract here]

THE UNDERSIGNED, for and in consideration of the sum of One Dollar ($1.00) and other valuable consideration, receipt of which is hereby acknowledged, hereby grants, sells, conveys, and delivers unto the City of Lawrence, Kansas, a municipal corporation, ("Grantee") a permanent and perpetual right-of-way in, over, under, and through the subject property (an exhibit map showing the Dedication of Right-of-Way is affixed hereto as Exhibit A and is incorporated herein by reference) for use in the construction, installation, expansion, development and maintenance of a street and sidewalk, with appurtenances and attendant facilities thereto, and for all other lawful uses and purposes, in, over, under, through and upon and the following described tract of real estate situated in Douglas County, Kansas, to-wit:

INSERT LEGAL HERE

The Grantee shall have the right of ingress and egress upon the above described right-of-way for the purpose of maintaining, repairing, or replacing said street and sidewalk or other improvements together with appurtenances and attendant facilities and otherwise make all uses of said right-of-way and do all things necessary or proper for the use of said right-of-way for said public facilities and structures. Nothing in this dedication of right-of-way shall allow an investor-owned utility to use or occupy the above-described property unless such utility has a valid franchise agreement with the Grantee. Any use or occupation by the utility shall only be pursuant to the laws of the City of Lawrence, Kansas.

Grantor shall do or cause nothing to be done to interfere with the Grantee's right of use of said right-of-way for the purposes herein stated.

THE UNDERSIGNED FURTHER WARRANT that it has good and lawful right to convey said right-of-way, and will forever defend the title thereto.

THIS GRANT AND CONVEYANCE is and shall be binding and obligatory upon the heirs, administrators, executors, personal representatives, successors, and assigns of the Grantor and the Grantee.

DATED THIS _____ day of _____, 2024.

_____
[insert property owners]

ACKNOWLEDGMENT

STATE OF KANSAS)
:SS
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2024, before me, the undersigned, a Notary Public in and for the County and State aforesaid came _____, who is personally known to me to be the same person who executed the within and foregoing instrument of writing, and duly acknowledged the execution of the same.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

_____
Notary Public

My Commission Expires: _____

PEDESTRIAN EASEMENT

THE UNDERSIGNED GRANTOR is the owner of record of that real property ("the subject property") commonly known as _____, Lawrence, Douglas County, Kansas, and bearing the following legal description, to-wit:

[INSERT LEGAL OF ENTIRE TRACT HERE]

THE UNDERSIGNED GRANTOR, for and in consideration of the sum of One Dollar and No Cents ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is acknowledged, hereby grants, sells, conveys, and delivers unto the City of Lawrence, Kansas, a municipal corporation ("Grantee"), a permanent and perpetual Easement in, over, under, and through the subject property (a site plan showing the Easement is affixed hereto as Exhibit A and is incorporated herein by reference) for the construction, installation, and maintenance of a sidewalk and pedestrian path, and all other facilities appurtenant thereto, said Easement bearing the following legal description, to-wit:

[INSERT LEGAL]

Grantee shall have the right of ingress and egress upon the above-described Easement for the purpose of maintaining, repairing, or replacing said sidewalk and otherwise to make all uses of said Easement and to do all things necessary or proper for the use of said Easement for said public facilities and structures.

Grantor shall do or cause nothing to be done to interfere with the Grantee's right of use of said Easement for the purposes herein stated.

THE UNDERSIGNED GRANTOR FURTHER WARRANTS that it has good and lawful right to convey said Easement and that it will forever defend the title thereto.

THIS GRANT AND CONVEYANCE is and shall be binding and obligatory upon the heirs, administrators, executors, personal representatives, successors, and assigns of the Grantor and the Grantee.

DATED THIS _____ day of _____, 2024.

_____
name

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2024, before me, the undersigned, a Notary Public in and for the County and State aforesaid came _____, who is personally known to me to be the same person who executed this instrument in writing, and said person fully acknowledged this instrument to be the act and deed of the afore-mentioned entity.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

_____
Notary Public

My Commission Expires:

UTILITY EASEMENT

THE UNDERSIGNED GRANTOR is the owner of record of that real property ("the subject property") commonly known as _____, Lawrence, Douglas County, Kansas, and bearing the following legal description, to-wit:

[INSERT LEGAL OF ENTIRE TRACT HERE]

THE UNDERSIGNED GRANTOR, for and in consideration of the sum of One Dollar and No Cents ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is acknowledged, hereby grants, sells, conveys, and delivers unto the City of Lawrence, Kansas, a municipal corporation ("Grantee"), a permanent and perpetual Easement for the construction, installation, and maintenance of utilities in, over, under, and through the subject property (a strip may showing the Easement is affixed hereto as Exhibit A and is incorporated herein by reference), and all other facilities appurtenant thereto, said Easement bearing the following legal description, to-wit:

[INSERT LEGAL]

Grantee shall have the right of ingress and egress upon the above-described Easement for the purpose of maintaining, repairing, or replacing said utilities and otherwise to make all uses of said Easement and to do all things necessary or proper for the use of said Easement for said public facilities and structures.

Grantor shall do or cause nothing to be done to interfere with the Grantee's right of use of said Easement for the purposes herein stated.

THE UNDERSIGNED GRANTOR FURTHER WARRANTS that it has good and lawful right to convey said Easement and that it will forever defend the title thereto.

THIS GRANT AND CONVEYANCE is and shall be binding and obligatory upon the heirs, administrators, executors, personal representatives, successors, and assigns of the Grantor and the Grantee.

DATED THIS _____ day of _____, 2024.

_____
name

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2024, before me, the undersigned, a Notary Public in and for the County and State aforesaid came _____, who is personally known to me to be the same person who executed this instrument in writing, and said person fully acknowledged this instrument to be the act and deed of the afore-mentioned entity.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

_____
Notary Public

My Commission Expires:

DRAINAGE EASEMENT

THE UNDERSIGNED GRANTOR is the owner of record of that real property ("the subject property") commonly known as _____, Lawrence, Douglas County, Kansas, and bearing the following legal description, to-wit:

[INSERT LEGAL OF ENTIRE TRACT HERE]

THE UNDERSIGNED GRANTOR, for and in consideration of the sum of One Dollar and No Cents ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is acknowledged, hereby grants, sells, conveys, and delivers unto the City of Lawrence, Kansas, a municipal corporation ("Grantee"), a permanent and perpetual Easement for the construction, installation, and maintenance of storm sewer utilities in, over, under, and through the subject property (a strip map showing the Easement is affixed hereto as Exhibit A and is incorporated herein by reference), and all other facilities appurtenant thereto, said Easement bearing the following legal description, to-wit:

[INSERT LEGAL]

Grantee shall have the right of ingress and egress upon the above-described Easement for the purpose of maintaining, repairing, or replacing said storm sewer utilities and otherwise to make all uses of said Easement and to do all things necessary or proper for the use of said Easement for said public facilities and structures.

Grantor shall do or cause nothing to be done to interfere with the Grantee's right of use of said Easement for the purposes herein stated.

THE UNDERSIGNED GRANTOR FURTHER WARRANTS that it has good and lawful right to convey said Easement and that it will forever defend the title thereto.

THIS GRANT AND CONVEYANCE is and shall be binding and obligatory upon the heirs, administrators, executors, personal representatives, successors, and assigns of the Grantor and the Grantee.

DATED THIS _____ day of _____, 2024.

_____
name

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2024, before me, the undersigned, a Notary Public in and for the County and State aforesaid came _____, who is personally known to me to be the same person who executed this instrument in writing, and said person fully acknowledged this instrument to be the act and deed of the afore-mentioned entity.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

_____
Notary Public

My Commission Expires:

SANITARY SEWER EASEMENT

THE UNDERSIGNED GRANTOR is the owner of record of that real property ("the subject property") commonly known as _____, Lawrence, Douglas County, Kansas, and bearing the following legal description, to-wit:

[INSERT LEGAL OF ENTIRE TRACT HERE]

THE UNDERSIGNED GRANTOR, for and in consideration of the sum of One Dollar and No Cents ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is acknowledged, hereby grants, sells, conveys, and delivers unto the City of Lawrence, Kansas, a municipal corporation ("Grantee"), a permanent and perpetual Easement for the construction, installation, and maintenance of sanitary sewer utilities in, over, under, and through the subject property (a strip map showing the Easement is affixed hereto as Exhibit A and is incorporated herein by reference), and all other facilities appurtenant thereto, said Easement bearing the following legal description, to-wit:

[INSERT LEGAL]

Grantee shall have the right of ingress and egress upon the above-described Easement for the purpose of maintaining, repairing, or replacing said sanitary sewer utilities and otherwise to make all uses of said Easement and to do all things necessary or proper for the use of said Easement for said public facilities and structures.

Grantor shall do or cause nothing to be done to interfere with the Grantee's right of use of said Easement for the purposes herein stated.

THE UNDERSIGNED GRANTOR FURTHER WARRANTS that it has good and lawful right to convey said Easement and that it will forever defend the title thereto.

THIS GRANT AND CONVEYANCE is and shall be binding and obligatory upon the heirs, administrators, executors, personal representatives, successors, and assigns of the Grantor and the Grantee.

DATED THIS _____ day of _____, 2024.

_____
name

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2024, before me, the undersigned, a Notary Public in and for the County and State aforesaid came _____, who is personally known to me to be the same person who executed this instrument in writing, and said person fully acknowledged this instrument to be the act and deed of the afore-mentioned entity.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

_____
Notary Public

My Commission Expires:

APPENDIX E: SANITARY SEWER DESIGN GUIDANCE

E.1 – KDHE Sanitary Sewer Extension Permit with City Details

E.2 – KDHE Checklist for Sewer Extension Plan Review

E.3 – City of Lawrence Design Flow Example (Area Method)

STATE OF KANSAS
DIVISION OF ENVIRONMENT
APPLICATION FOR SEWER EXTENSION PERMIT

The applicant hereby requests a permit for extension of sanitary sewers in compliance with the requirements of K.S.A. 65-165 and K.S.A. 65-166. Plans and specifications submitted must comply with the Kansas Department of Health and Environment, Division of Environment, "Minimum Standards of Design for Water Pollution Control Facilities."

APPLICANT DATA

1. PROJECT NAME
Name of Project (as it appears on plans)

2. City of Lawrence, Kansas
Name of Applicant (Governmental Unit)

3. M - K S 3 1 - I O 0 1
Kansas Water Pollution Control Permit Number for the Wastewater Treatment Facility which will treat the flow from this sewer extension.

4. Municipal Services and Operations Department, City of Lawrence, Kansas
Name the engineer or engineering firm responsible for inspection of this extension.

In making application for a sewer extension permit, I hereby certify that continuous engineering observation of the construction of the proposed improvement, including building connections, shall be provided in accordance with Kansas Department of Health and Environment Regulation 28-16-55.

Signature: _____
Authorized Official

Print Name: City PM Name

Title: City PM Title

Mailing Address: City of Lawrence - MSO
P.O. Box 708
Lawrence, KS 66044

E-Mail Address: City PM Email Address

DESIGN ENGINEER DATA

1. PROJECT NAME
Name of Project (as it appears on plans)

2. Engineers estimate of construction cost PROJECT COST

3. What are the conditions and capacity of the existing sewer system downstream of this sewer extension?

a. What is the present average daily flow at the wastewater treatment facility? 10.1 MGD MGD

CIRCLE YES OR NO

b. Do the downstream sewer lines presently convey the peak flow without inducing backup into buildings or bypass to the environment? YES NO

c. Can the downstream receiving sewers convey the additional peak design flow generated after completion of this sewer extension without backup into buildings or bypassing to the environment? YES NO

d. If the answer to either of the above questions is NO, what steps are being taken to eliminate or prevent bypass or service line backup conditions?

_____

_____

_____ Attach additional pages if necessary.

4. What are the design flows for this sewer extension?
(Include a copy of the calculations for flow and list the following values)
Average daily ##### MGD Peak ##### MGD

5. If wastewater pumping facilities are included in the project, provide with this application the following: system curve, pump curve and total head calculations and planned control elevations i.e. pumps off, low level on, high level on, and alarm level.

The information contained above is accurate to the best of my knowledge.

Signature: _____
Kansas Licensed Engineer

Print Name: _____

Address: _____

_____

_____

E-Mail Address: _____

P.E. Stamp/Date/Signature

Checklist for Sewer Extension Plan Review

Project name: PROJECT NAME

City: Lawrence, Kansas **Project #:** Project # **Date:** DATE

Flow Check

Project ADF: #### mgd/Current **{*A*}** Average Daily Flow at WWTP/F 10.1 **{B}**

Design Flow @ WWTP/F: 12.5 mgd **{*C*}**

____ WWTF has capacity for added flow (**{*A*} + {*B*} < {*C*}**)

____ WWTF has valid NPDES permit (effective date: 8/1/2019)

____ Flow to correct WWTP

Facility Short Name: Kansas River Wastewater Treatment Facility NPDES KS0038644

Quick checks

____ Stamp & Seal on every plan sheet & cover sheet submitted OR a digital signature on cover sheet

____ Site map

____ North arrow and scale on every page necessary

____ Benchmarks stated

Stamps/Signatures/Officiality

____ Application is filled out correctly (i.e. correct NPDES number, signed in correct boxes)

____ PE Stamp on application

____ City Official signature on application

____ Appropriate specifications stated on transmittal letter, plans, or provided

Cross section/Pipe details

____ Easements/Right of ways

____ Connected to existing downstream sewer system

____ In/Out flow directions on manholes

____ In/Out flow elevations on manholes

____ Sanitary Sewer materials identified

____ Slope between each manhole is correct

____ Plan = profile MH

____ Cover depth > 30in (2.5ft)

____ Water/Sewer separation

____ Drop manholes

Misc.

____ Approved details on detail sheet

____ Access to manholes (opening >22in)

____ Cleanout distance not >150 ft from manhole

____ Collars on pipes

____ Trench plugs

____ Identify 100-year flood plain

____ Other: _____

External Reviewer Signature: _____

KDHE Reviewer Signature: _____

Design Document Downloads

- City of Lawrence Flow Calculators and Templates
  - lawrenceks.org/mso/development/

Design Flow Example:

Develop the design sanitary sewer flow rate for a development with the following characteristics:

Land Use:

10 ac medium density residential

6 ac office/multi family

4 ac office/commercial

Solution:

Step 1: Input the land use acreages into column A of the Land Use sheet as shown.

Step 2: Input the density into column E of the Land Use sheet as shown.

Step 3: Input the bounding values from the Design Table for developed acreage in column B of the Design Flow sheet as shown.

Step 4: Read the design flow as calculated in column N of the Design Flow Sheet as shown.

DEVELOPMENT LAND USE INPUT

Input Area Zoned Acres	Calculated Percent Zone as Decimal	Zone Type	Land Use Description	Input Density units/acre	Given Equivalent capita/unit	Calculated Equivalent capita/acre	Calculated Equivalent capita	Given Capita Usage gal/capita/day	Calculated Average WWP gal/acre/day	Given Infiltration gal/acre/day	Given Inflow Coeff K
0	0.00	1	Very Low Density Res	1.0	2.3	2.3	0	100	230	500	0.0035
0	0.00	2	Low Density Res	4.0	2.3	9.2	0	100	920	500	0.0035
10	0.50	3	Medium Density Res	12.0	2.3	27.6	276	100	2760	500	0.0035
6	0.30	4	Office//Multi Family	12.0	2.3	27.6	166	100	2760	200	0.0030
4	0.20	5	Office/Commercial	2.0	3.0	6.0	24	100	600	200	0.0030
0	0.00	6	Heavy Industry	1.0	25.0	25.0	0	100	2500	200	0.0030
0	0.00	7	Public	1.0	7.0	7.0	0	100	700	0	0.0005
0	0.00	8	Agriculture/Park	1.0	1.0	1.0	0	100	100	0	0.0005
20	1.00	Calculated Weighted Averages		10.0	2.4	23.3	466	100	2328	350	0.0033

DEVELOPMENT DESIGN FLOW CALCULATION

	Developed Factor	Tc Population	10 Yr i (gpm)	WWP Inflow	Peak WWP Infiltration	Calculated Design Flow	Calculated Design Flow	Calculated ADF	Calculated Peaking Factor	Equivalent Design Flow (acres)	Inflow + Peak WWP + Infiltration = Calculated Design Flow (minutes)	Calculated (in/hr)	Calculated Peaking Factor	Calculated Design Flow/ADF (cfs)	Calculated (cfs)	Calculated (cfs)	Calculated (mgd)	Calculated (mgd)
Lesser value from Design Table	10.00	66.6	2.58	2.00		0.084	0.072	0.005	0.161	0.104	0.023	4.48	233	72				
Results for Development	**20.00**	69.1	2.58	1.95		0.168	0.141	0.011	0.319	0.206	0.047	4.43	466	143				
Higher value from Design Table	25.00	70.4	2.58	1.93		0.210	0.174	0.014	0.397	0.257	0.058	4.41	582	178				

Lawrence Design Data From 2003 Wastewater Master Plan			
Developed Acres	**Tc minutes**	**10 Yr "i" in/hr**	**WWP Peaking Factor**
1	62.1	2.58	2.17
10	66.6	2.58	2.00
25	70.4	2.58	1.93
50	74.7	2.58	1.88
75	78.1	2.16	1.85
100	80.9	2.16	1.83
250	93.0	1.89	1.76
500	106.6	1.69	1.71
750	117.1	1.69	1.68
1000	126.0	1.54	1.66
1250	133.7	1.54	1.64
1500	140.8	1.40	1.63
1750	147.3	1.40	1.62
2000	153.3	1.30	1.61
2500	164.3	1.30	1.59
3000	174.2	1.21	1.58
4000	191.9	1.13	1.56
5000	207.5	1.13	1.54
7000	234.5	1.00	1.52
7500	240.6	0.90	1.51
10000	268.6	0.90	1.49
50000	526.4	0.53	1.37

APPENDIX F: COMPLETE STREETS POLICY & CHECK LIST

CITY OF LAWRENCE, KANSAS, COMPLETE STREETS POLICY (adopted December 4, 2018)

SECTION 1: SHORT TITLE.

This policy shall be known as the "Complete Streets Policy."

SECTION 2: INTRODUCTION.

The City of Lawrence, Kansas, desires to establish this Complete Streets Policy to foster the continued development of a sustainable environment and, through the policy, shall consider all aspects of multi-modal transportation in the design and implementation of street and related infrastructure projects. The health, safety, and well-being of its residents and visitors, including those with disabilities, is foremost in the City's intent in creating this policy and in establishing a complete and connected street network, with emphasis on active modes of transportation, including biking, walking, and wheeling. The benefits of Complete Streets include: improving safety for pedestrians, bicyclists, children, older citizens, non-drivers, and mobility-challenged, as well as those that cannot afford a car or choose to not have a car; providing connections to bicycling and walking trip generators such as places of employment, educational institutions, residences, recreational centers, retail centers, transit stops, and public facilities which promotes healthy lifestyles; creating more livable communities by reducing the need for a vehicle which will, in turn, reduce traffic congestion and reduce air pollution; and saving money and efficiencies by incorporating sidewalks, bike facilities, safe crossings, and transit amenities into the initial design of a project, thus sparing the expense of retrofits later. It is the intent of the City that, under this Complete Streets Policy, diverse populations should be included in the decision-making process.

SECTION 3: APPLICABILITY.

The City should follow this Complete Streets Policy for each transportation and land use project that uses public funds, unless the City determines, through the exception process, that it cannot be followed. The Complete Streets Policy should be applied during the planning, design, construction, maintenance, and operation phases of new, retrofit, or reconstruction projects. The Complete Street Policy shall not apply to street maintenance, sidewalk maintenance, or other maintenance-funded projects. However, when feasible, the City should consider pedestrian and bicycle improvements in maintenance projects. For the purposes of this Complete Streets Policy, street maintenance is defined as the minor, routine, upkeep and maintenance of streets, such as mill and overlay, microsurfacing, crack seal, concrete rehab, curb repair, spot repair, and restriping, and signal operations.

The Complete Streets Policy includes a checklist that should be used by project team members when making decisions about those components of Complete Streets elements that will be included in a particular project. The multimodal staff team shall ensure that there is interdepartmental involvement and coordination in the decision-making process. The checklist should, among other things, include clear-cut guidelines identifying who is responsible for maintenance and repairs.

SECTION 4: GOALS.

The Goals of the Complete Streets Policy are, as follows:

(a) To create a comprehensive, integrated, connected multi-modal transportation network by facilitating connection to bicycling and walking trip generators such as places of employment, educational institutions, residences, recreational centers, retail centers, transit stops, and other public facilities.

(b) To create safe and accessible accommodations for pedestrians, bicyclists, and transit users. The City should give consideration to future demand and should include provisions for future improvements, if warranted.

(c) To address the needs of people walking, biking, or wheeling in all designs. The design of intersections and other interchanges should provide safe and convenient elements for these users.

(d) To provide for all users when closing roads or sidewalks during construction. The provisions shall be Manual on Uniform Traffic Control Devices (MUTCD) and Americans with Disabilities Act Accessibility Guidelines (ADAAG) compliant.

(e) To consider connections to Safe Routes to School, transit routes, shared use path crossings and connections, and areas or population groups with limited transportation options, when making improvements.

(f) To consider the community context as a factor in the design and implementation of all future applicable projects. Projects should demonstrate how designs will serve current and future land use in addition to transportation functions.

(g) To design and construct pedestrian and bicycle facilities to the best currently available standards and practices, in accordance with Municipal Services and Operations Design Criteria.

(h) To consider Complete Streets elements in the planning, design, and construction of privately-funded development projects.

(i) To provide educational materials and opportunities to residents to raise awareness of other modes of transportation and to promote a culture of safe multi-modal transportation.

SECTION 5: CHECKLIST.

The Complete Streets Checklist should be used in both the planning and conceptual design phase (30% design). The planning level checklist should detail items that are included in the budget for the project. The checklist should be provided to the Transportation Commission in the conceptual design stage, if possible but not later than at field check design (60% design).

SECTION 6: EXCEPTIONS.

Every project shall incorporate Complete Streets elements sufficient to enable reasonably safe travel along and across streets and sidewalks for all persons using the same, provided, however, that such infrastructure may be excluded from a project where the documentation and data indicate that:

(a) Non-motorized users are prohibited from the roadway.

(b) Limited trip generators, both existing and in the future, indicate an absence of need for such Complete Streets elements.

(c) Detrimental environmental or social impacts outweigh the need for Complete Streets elements.

(d) Cost of Complete Streets elements are excessively disproportionate to the cost of the project.

(e) The safety or timing of the project is compromised by the inclusion of Complete Streets.

SECTION 7: PERFORMANCE MEASURES.

City Staff will track the following performance measures annually, or as data is available. The performance measures are all also part of the Metropolitan Transportation Plan, Transportation 2040 (T2040). The performance measures will be collected as a joint effort between the Lawrence-Douglas County Metropolitan Planning Organization (MPO) and City of Lawrence, Kansas, Department of Municipal Services & Operations (MSO). The results will be reported to the Transportation Commission and City Commission on an annual basis, or as data is available. Items to be considered include but are not limited to the following:

- Percentage of people who have access within a ¼ mile to the bikeway network*
- Percentage of public streets with sidewalks on at least one side*
- Percentage of public streets with bikeway network*
- Percentage of population with access within ¼ mile to a bus stop for fixed route transit*
- Number of non-motorized fatalities and serious injuries on public roads

*these items will be tracked for the entire City of Lawrence and also for the Environmental Justice (EJ) Zones of Lawrence established by the MPO

COMPLETE STREETS CHECKLIST

PROJECT NAME	
LOCATION	

PROJECT INFORMATION

		Explanation
Classification		
Speed limit		
AADT		
Right-of-way width		
Safe Route to School		
Bus/Transit route		
On planned bikeway network		
Existing bicycle accomodations		
Existing sidewalk		
Vulnerable Road User High Injury Network		
High Injury Network		

Checklist Consideration		*Yes*	*No*	*Explanation*
Does the project provide a main route to a significant destination?	Park/Recreation area			
	School			
	University			
	Shopping/Commercial area			
	Employment center			
	Community facility			
	Other:			
Does the project provide access across a natural or human-made barrier?				
Are there nearby parallel routes that provide a similar level of convenience and connectivity?				
Pedestrian and bicycle demand	Is there a high amount of bicycle and pedstrian traffic along route			
	Is there a high amount of bicycle and pedstrian crossings			
	Is there a history of bicycle or pedestrian crashes (last 3 yrs)			

CONSTRAINTS

Are there constraints to consider in reviewing this project for possible inclusion of Complete Streets elements?

Constraint Type	*Yes*	*No*	*Explanation and Date of Comment*
Right-of-Way			
Utilities			
Environmental			
Funding			
Maintenance			
Other Existing Condition			
Other:			

COMPLETE STREETS ELEMENT REVIEW

For each of the sections below, indicate whether a Complete Streets Element is/is not included. Provide an explanation of the element to be used or rationale why the element is not being included.

Complete Streets Element	*Checklist Consideration*	*Included*	*Not Included*	*Explanation and Date of Comment*
Traffic Safety				
Does the roadway design consider elements to improve safety for pedestrians, bicyclists, and motorists?	Narrower driving lanes			
	Lane reduction			
	Other Safety Improvements:			
If on VRU HIN/HIN - Was a road Safety Audit performed?	Road Safety Audit			
Pedestrian and Bicycle Facilities:				
Reduce pedestrian crossing distance at intersections where high motor vehicle counts and high pedestrian counts are expected.	Pedestrian island			
	Curb bump-outs			
	Other:			
Does it provide appropriate pedestrian accommodations?	Sidewalks			
	Crosswalks			
	Mid-block crosswalks			
	Buffers between roadway and sidewalks			
	Lighting			
	Street furniture			
	Other:			

Does it provide appropriate accommodations in accordance with bikeway plan?	Bike lane			
	Buffered bike lane			
	Protected bike lane			
	Shared use path			
	Bike boulevard			
	Bike sharrow			
	Bike racks			
	Other bike parking			
	Other:			
Transit Facilities				
Does it provide appropriate transit accommodations?	Transit shelters			
	Accessible location (sidewalk, pad)			
	Bus turnout			
	Public seating			
	Signage/maps			
	Trash/recycling receptacles			
	Other:			
On-Street Parking				
Existing Parking	One side			
Planned Parking	No change			
Streetscaping				
Does the project include streetscaping along newly constructed or reconstructed roadways?	Street trees			
	Landscape plantings			
	Planters			
	Buffer strips			
	Other:			
ADA Accessibility				
Does it include appropriate ADA design features?	Curb ramps			
	Detectable warning surface			
	Crossing distance consideration			
	Signal timing			
	Other:			

IMPLEMENTATION AND EVALUATION

Checklist Consideration		*Yes*	*No*	*Explanation and Date of Comment*
Have you provided advance notification and/or opportunity for review to key groups impacted by the project?	Parks and Recreation			
	Historic Resources			
	Transit			
	Fire/Med			
	Other City Departments			
	Neighborhood Association			
	School Districts			
	University			
Maintenance Are there any added maintenance projections for this project?	Pavement rehabilitation			
	Pavement marking			
	Street sweeping			
	Snow removal			
	Street trees			
	Site furnishings			
	Pavers			
	Other:			

APPENDIX G: TRAFFIC IMPACT STUDY GUIDELINES

I. INTRODUCTION

Background

Land use and transportation are strongly interdependent. Transportation facilities and services are essential for development to occur, and high levels of mobility and accessibility are needed to attract economic development to provide and maintain a high quality of life.

The transportation decisions made in the land development process have a significant cumulative effect on the safety and efficiency of a community's street system. There is a strong correlation between the amount of access provided to major streets and the safety and efficiency on those streets. Therefore, it is in the long-term interests of all parties to balance the mobility and safety needs of the traveling public with the accessibility to development.

Purpose

The primary purpose for evaluating the impact of development through transportation impact studies is to protect the integrity of the transportation systems. Neither public nor private interests are well served if transportations systems needlessly degrade due to poor planning and design.

In order to accomplish this objective, the review of transportation systems associated with development needs to be more extensively scrutinized and needs to take a long-term perspective. What might be acceptable today may not be as an area develops and matures. This is certainly consistent with the City's long-range planning for land use, major streets and other infrastructure. Both long term traffic impact needs should be considered but also long term city maintenance needs. New development should not take away from the City's ability to maintain its existing infrastructure.

These transportation impact study guidelines, and the resulting work products, will allow for more informed decision-making and could lead to a framework for the negotiation of mitigation measures for the impacts created by development.

II. EXTENT OF STUDY REQUIRED

The necessity to review all land development applications from a transportation perspective as well as the wide variety of land use types and intensities suggest that multiple thresholds or triggers be established to warrant a transportation impact study. The following guidelines will be followed.

All Applications

1. Identify the specific development plan under study and any existing development on and/or approved plans for the site (land use types and intensities and the arrangement of buildings, parking and access). Also identify land uses (including types and the arrangement of buildings, parking and access) on property abutting the proposed development site, including property across public streets.

2. Identify the land uses shown in the Lawrence/Douglas County Comprehensive

Plan for the proposed development site under study, as well as the ultimate arterial and collector street network in the vicinity of the site (at least the first arterial or collector street in each direction around the site).

3. Identify the functional classification of the public street(s) bordering the site and those streets on which access for the development is proposed. The functional classification is shown on the Major Thoroughfares Plan, which is incorporated into the Comprehensive Plan.

4. Identify allowable access to the development site as defined by City design criteria and/or access management guidelines and adopted Access Management Plans for arterial and collector streets in Lawrence.

5. Document current public street characteristics adjacent to the site, including the nearest arterial and collector streets (number and types of lanes, speed limits or 85th percentile speeds, and sight distances along the public street(s) from proposed access(es)).

6. Compare proposed access with established design criteria (driveway spacing, alignment with other streets and driveways, width of driveway, and minimum sight distances). Identify influences or impacts of proposed access to existing access for other properties. If appropriate, assess the feasibility of access connections to abutting properties, including shared access with the public street system.

7. Estimate the number of trips generated by existing and proposed development on the site for a typical weekday and weekday peak hours using the latest edition of Trip Generation published by the Institute of Transportation Engineers. Local trip generation characteristics may be used if deemed to be properly collected and consistent with the subject development application with appropriate documentation provided for review. The City Engineer shall make such determination. Calculate the net difference in trips between existing and proposed uses. If the development site already has an approved plan, also estimate the number of trips that would be generated by the approved land uses. If the development application proposes a land use different than indicated in the Comprehensive Plan, also estimate the number of trips that would be generated by the land use indicated in the Comprehensive Plan. The City Engineer or designee shall approve the potential land use intensity in such cases.

Development or Site Plan Generates 100 to 499 Trips in a Peak Hour
A Standard Transportation Impact Study will be required. The study area may tend to be confined to the street or streets on which access is proposed but should be extended to at least the first major intersection in each direction.

Development or Site Plan Generates 500 or More Trips in a Peak Hour
A Standard Transportation Impact Study will be required. The study area may extend beyond the streets onto which access is proposed.

Proposed Land Use Deviates from Comprehensive Plan
Determine the extent of a transportation impact study based on anticipated trip generation. Conduct comparative analyses using the proposed land use and the land use identified in the comprehensive plan.

III. QUALIFICATIONS TO CONDUCT AND REVIEW A STUDY

The parties involved in a land development application sometimes have different objectives and perspectives. Further, the recommended elements of a transportation impact study require skills found only in a trained professional engineer with specific experience in the field of traffic engineering.

For these reasons, the person conducting and the person reviewing the study must be registered professional engineers with demonstrated experience in the preparation or review of transportation impact studies for land development.

The City Engineer or designee shall determine whether an individual professional engineer is qualified to conduct a transportation impact study. Credentials shall be provided upon request. If the City Engineer determines that it is appropriate to engage an engineer or engineering firm to conduct a Traffic Impact Study, the City shall give the applicant written notice of that determination 10 business days before work on the Traffic Impact Study begins. This study shall be conducted for the City at the applicant's expense. If the applicant objects to the TIS requirement, the application process shall be suspended until an acceptable TIS is completed.

IV. REVIEW AND USE OF STUDY

A transportation impact study should be viewed as a technical assessment of existing and projected transportation conditions. The extent to which individual professional judgment has to be applied will be minimized by provision of community policies and practices with respect to street and traffic control design and land development.

Ultimately, a transportation impact study will be used by professional staff to make recommendations to the planning commissions and governing bodies charged with reviewing and approving development applications. Transportation is one element amongst many that must be considered.

City personnel charged with reviewing transportation impact studies have several functions to consider:

- Determine whether the impacts of development have been adequately assessed.
- Ensure that proposed access is properly coordinated with existing and planned facilities, fits into the ultimate configuration of the street system, and is appropriately designed at its connection to the public street system.
- Determine whether proposed improvements for the public street system are sufficient to mitigate the impacts created, and that the improvements meet local requirements.
- Ensure that the development plan considers the needs of pedestrians, bicyclists, and transit users.
- Determine whether the development layout can accommodate all anticipated vehicle types.
- Invite other responsible and applicable transportation agencies or entities, e.g., Kansas Department of Transportation, to participate in the study and review processes.
- Provide consistent, fair, and legally defensible reviews.

STANDARD TRANSPORTATION IMPACT STUDY PROCEDURES

Step 1 Study Methodology Determination

Prior to conducting any transportation impact study it is necessary to determine the minimum technical responsibilities and analyses that will be performed. It is the applicant's responsibility to ensure that the study utilizes the techniques and practices accepted by the City and other participating agencies.

The following items shall be considered, discussed and agreed to by the City Engineer or designee (and others if appropriate) and the applicant for transportation impact studies prior to performing any analysis. If the applicant does not submit a study methodology prior to submitting a traffic impact study, then the review schedule may require resubmittal of the traffic impact study prior to plat or site plan approval.

- Definition of the proposed development, including type and intensity of the proposed land uses and proposed access.
- Study area limits based on the magnitude of the development.
- Impact or influence on access for adjacent and nearby properties.
- Time periods to be analyzed, e.g., weekday A.M. and P.M. peak hours.
- Scenarios or conditions to be analyzed, e.g. existing conditions, existing plus development conditions, and Long Range Transportation Plan Horizon Year conditions.
- Future analysis year(s), including special study procedures for multi-phase development plans.
- General assumptions for trip generation, trip distribution, mode split, and traffic assignment.
- Traffic analysis tools and acceptable parameters.
- Availability and applicability of known data.
- Traffic data collection requirements and responsibilities, including time periods in which traffic counts will be collected.
- Transportation system data, e.g. traffic signals, transit stops, bicycle and pedestrian facilities, etc.
- Planned transportation system improvements, including the anticipated timing, for all modes of transportation, e.g. street widening, bicycle trails, transit stops, etc.
- Methodology for projecting future traffic volumes.
- Current level of service and access management requirements.
- Acceptable mitigation strategies.

<u>Study Area</u>

The study area and the intersections and street segments to be included will vary for a number of reasons - the type and intensity of the development, the maturity of other development in the vicinity, the condition of the street network, etc. The study area should be large enough to assess the impact or influence of proposed access along street segments and to evaluate the ability of streets and intersections to absorb the additional traffic.

The study area should at least include those street segments onto which access is proposed and should typically extend to the next major intersection (arterial/arterial, arterial/collector, or collector/collector) in each direction. Final determination of the study area will be determined by the City Engineer or designee.

Analysis Periods
Transportation impact studies should be based on peak-hour analyses. The analysis period(s) should be based on the peaking characteristics of both the public transportation systems and development traffic. The typical analysis periods for most development are the A.M. and P.M. peak hours, of a typical weekday (Tuesday, Wednesday, and/or Thursday). Retail development that is typically not open early in the morning may not warrant study for the A.M. peak hour. On the other hand, intense retail activity in an area may warrant study during the Saturday peak hour.

Analysis Years
In general, the analysis years should be related to the opening date of the proposed development and the horizon year in the City's long-range transportation plan.

Method of Determining Future Traffic Volumes
Future daily traffic volumes on arterial and collector streets shall be identified from the long- range transportation plan or from the traffic model used to develop the plan for each arterial and collector street segment in the study area.

Step 2 Data Collection and Safety Analysis

Once the parameters for the transportation impact study have been established, the first step in the study process is to collect relevant data and assess existing conditions. The following data should be assembled for each TIS.

2.1 Project Site Characteristics

Identify the specific development plan under study and any existing development on and/or approved plans for the site. This includes land use types and intensities and the arrangement of buildings, parking and access. Also identify land uses (including types and the arrangement of buildings, parking and access) on property abutting the proposed development site, including property across public streets.

Information for the proposed development shall be displayed on a scaled drawing. If detailed information regarding abutting property is not shown on the development plan, it may be exhibited on a current aerial photograph, or other drawing, along with the proposed development.

This information is needed to assess the proposed access in relation to existing driveways and side streets at the site and along the street corridors on which access is proposed. This process should also consider potential access for undeveloped land in the vicinity.

2.2 Transportation System

This includes the physical and functional characteristics of the transportation systems in the study area. Data to be collected includes:

a. Functional classification for each street
b. Posted speed limit
c. The number and types of lanes for all intersections and street segments
d. Intersection control information (two-way stop control, roundabout, traffic signal, etc.)
e. Existing signal phasing, including left-turn phasing
f. Available sight distance at access points. New access points may require field measurements
g. Pedestrian and bicycle facilities (existing and planned)
h. Existing or proposed transit routes
i. Identify any planned streets that have not yet been built
j. Planned improvements for each street and/or intersection (either programmed for construction or included in the long-range transportation plan).

2.3 Transportation Demand Data

This includes current traffic volumes (intersection turning movement counts), percent trucks, peak hour factors, transit patronage, bicycle usage, and pedestrian usage. For some studies, additional data such as right-turn-on-red usage, traffic distribution by lane, or other similar data may be required.

Intersection turning movement counts shall be taken on a Tuesday, Wednesday, and/or Thursday for weekday conditions. It is preferred that morning and afternoon counts be taken on the same day. For a study requiring traffic counts at several intersections that cannot be accomplished all in one day, the counting program should be organized so that adjacent intersections are counted as close in time as possible. As a minimum, traffic volumes should be measured at any existing site driveway and on the adjacent streets, including the nearest arterial/arterial or arterial/collector intersection in each direction along streets bordering the development site. If a proposed driveway or street will line up with an existing driveway or street opposite it, traffic volumes shall be collected at the existing intersection. The time periods in which existing traffic is counted should generally coincide with the highest combination of existing traffic plus traffic expected to be generated by the proposed development. A minimum of one hour is required but the count periods should extend at least 15 minutes before and at least 15 minutes beyond the anticipated peak hour to ensure that the highest one hour of traffic is identified. Traffic volume counts at intersections shall document left-turn, through and right-turn movements on all approaches and shall be tabulated in no greater than 15-minute increments. All traffic counts should include pedestrian and bicycle counts by direction of movement. The City Engineer or designee shall determine, based on the nature of the development, additional time periods in which current traffic volumes shall be documented.

2.4 Safety Analysis

Safety analysis for a TIS shall include review of available crash data for the roadway segments and intersections located withing the study area over a five-year period. Crash data can be requested from KDOT at the link below.

https://kdotapp.ksdot.gov/KORA/KORR/RequestForm?request=CData&level=public

The safety analysis should specify whether any part of the site is on the high injury network or on the vulnerable road user high injury network. These can be found in the Vision Zero Transportation Safety Action Plan.
https://lawrenceks.gov/mpo/vision-zero/

The safety analysis should provide a summary of the crash types, severity, and crash rate for the study intersections. The analysis should also provide discussion of any patterns and possible mitigation strategies.

Intersection crash rate:

$$R = \frac{1{,}000{,}000 \times C}{365 \times N \times V}$$

R = Crash rate for intersection expressed in crashes per million entering vehicles (MEV)

C = Total number of intersection related crashes in the study period

N = Number of years of data

V = Traffic volumes entering the intersection daily

Step 3 Background Traffic Growth

Background traffic is the expected increase in traffic volumes over time except for the specific development under study. Background traffic needs to be estimated out to the applicable horizon year in order to assess future traffic conditions.

Future daily traffic volumes on arterial and collector streets shall be identified from the traffic model used to develop the long-range transportation plan or developed using a growth rate based on review of historic traffic volumes. The existing background volumes should be projected using the calculated growth rate. Project generated trips will be added to the future year background volumes.

Step 4 Trip Generation

Trip generation is the process used to estimate the amount of travel associated with a specific land use or development. Trip generation is estimated through the use of “trip rates” that are based on some measure of the intensity of development, such as gross leasable area (GLA) or gross square footage (GSF).

Anticipated traffic for the Project shall be estimated using trip generation methods and

procedures defined in the ITE Trip Generation Manual, 11th Edition or latest edition. The Trip Generation Manual should be used to determine the process for selecting the appropriate average rate or equation for each land use code. If the Trip Generation Manual recommends local data to be collected, prior approval from the City Engineer is required.

A table to summarize the trip generation for the Project shall be included in the TIS report. The table should include the land use code, unit used (i.e. square feet, number of dwelling units, rooms, etc.), projected ADT, peak hour volumes including directionality, and summary of project phases for larger developments.

Trip generation shall be calculated for the development analysis periods. Trip generation tables for the peak hour of the adjacent street should typically be used. For conditions during non-typical peak periods, ITE Trip Generation Manual "Peak Hour of Generator" rates may be used of those conditions.

Trip generation for redevelopments, mixed-use developments, larger developments and certain types of land uses may choose to use some of these more advanced tools when determining the number of trips a site generates.

Net Trips: Redevelopment sites may determine the previously generated number of trips based on the ITE land use codes and subtract those from the proposed site development with approval from the City Engineer. Depending on the intensity of the former development and the proposed development, this may result in the proposed development generating a net number of trips less than, approximately equal to, or more than, the existing site.

Mode Split: Mode split is the estimated number of travelers anticipated to use transportation modes other than automobiles. Mode split would require typical trip generation rates to be modified when the influence of non-automobile transportation modes is demonstrated and documented. Approval must be received from the City Engineer prior to implementing a trip generation reduction for Mode Split. Mode split should occur prior to applying pass-by trips.

Pass-by Trips: If pass-by trips are used for the TIS, the generation of the pass-by trips should be documented and noted within the TIS report. Methods described in the ITE Trip Generation Handbook should be used to estimate pass-by trips. Pass-by trip rate should not exceed 10 percent of the adjacent street or 25 percent of the proposed development site-generation potential, whichever is less.

Mixed-Use Internal Capture: For mixed-use developments, internal site-generation capture procedures may be used. Methods defined in the Trip Generation Handbook for internal capture should be used. Approval must be received from the City Engineer prior to implementing internal capture across collector or thoroughfare roads. The internal capture method should be clearly documented, and worksheets shall be provided with the TIS appendix.

Step 5 Trip Distribution and Assignment

Trip distribution is the general direction of approach and departure to/from a development site. Trip distribution rates should be developed by reviewing the existing traffic patterns near the development and the respective location of the site within the

City. The trip distribution percentages should be documented in a figure to visually represent the origins and destinations for the site-generated traffic. Good judgment is necessary to develop reasonable estimates of trip distribution.

Estimated vehicle-trips will be assigned to the existing and proposed street network using the trip distribution rates. Traffic assignment should be completed using judgement for the best routes to/from the development site for the identified analysis periods (i.e. AM and PM peak hours). Site generated traffic volumes should be documented in a figure. The proposed development volume scenario figures should include the total traffic with the site-generated traffic included in parenthesis. The resulting trip distribution and roadway assignment should be reviewed and approved by City staff prior to proceeding with analysis. Provide traffic volume figures to summarize the traffic assignment for each traffic volume summary. Figures shall include total movement volumes, site-generated volume and how pass-by trips were assigned, if used.

Step 6 Traffic Signal Warrant Analysis

Project access points or existing unsignalized intersection(s) that have volumes anticipated to meet one or more traffic signal warrants will require a traffic signal warrant analysis to be completed. Traffic signal warrant analysis should be completed using Manual on Uniform Traffic Control Devices (MUTCD) methodologies to determine which signal warrants may be met, if any. Signal warrant analysis should be included in the TIS and a recommendation with justifications should be provided. Note that Warrant 3, Peak Hour Warrant, shall be applied only in unusual cases as described in the MUTCD. Meeting only Warrant 3 may be insufficient evidence to justify the installation of a signal. It is ultimately the decision of the City to determine if/when a signal will be constructed at any given location.

Step 7 Turn Lane Analysis

For locations where a new access point is added to a corridor that does not have the necessary turn lanes, either a left or right turn lane, turn lane warrant analysis will need to be completed. Left and right turn lanes provide separation of vehicles that are slowing or stopped to turn from the vehicles that are going through the intersection. Separating the turning vehicles minimizes turn-related crashes and eliminates unnecessary delay to the through vehicles. Based on data reported in the National Cooperative Highway Research Report (NCHRP) 457, crash rate for unsignalized intersections can be reduced by 35 to 70 percent with the addition of a left-turn lane.

To evaluate the need for the auxiliary lanes, the turn lane warrant procedure documents in NCHRP 457 should be used. Variables used in the turn lane warrant analysis involve two-lane vs four-lane facility, major roadway speed, percent left-turn volume, advancing movement and the opposing volume. NCHRP 457 includes an Excel spreadsheet to assist with the turn lane warrant analysis. NCHRP Figure 2-5 should be used for the evaluation of left-turn lane at a two-way stop controlled intersection. NCHRP Figure 2-6 should be used to evaluate right-turn lanes.

7.1 Unsignalized Intersections – General Considerations

A recommendation for either a left or right turn lane at an unsignalized location requires evaluation of both vehicular and non-vehicular impacts. Additional non-vehicular factors may need to be evaluated further. For any given turning location,

the engineer should evaluate the vehicular traffic desires and when it can be demonstrated that vehicular operations may warrant a turn lane, an analysis of non-vehicular impacts shall be completed based on location specific factors. The City Engineer has ultimate decision for the addition of a left or right-turn lane in the Public Right-of-Way, especially on a 4-lane roadway or in tight urban dense environments.

Non-vehicular factors that should be considered include but are not limited to:

- Potential negative impacts to the usability of adjacent previously developed property.
- Utility relocations that may be required to accommodate the widened section and whether the cost and overall impact of such relocations outweigh the benefit of the turn lane.
- Impacts to adjacent sidewalks/trails. The engineer should evaluate whether the roadway widening will negatively impact the safety of pedestrians and bicyclists due to potentially requiring the trail/sidewalk to be located closer to the street and increased crossing distances.
- A contextual analysis of the need for a turn lane should be completed. For example, a turn lane may be warranted in a suburban type of environment involving lower density land uses where prior development in the area also provided turning lanes, while it may be inappropriate to recommend a turn lane in a denser urban type area if prior development did not provide turn lanes.
- Existing or proposed on-street bike lanes where a right turn lane would create a weaving movement for more vulnerable roadway users.

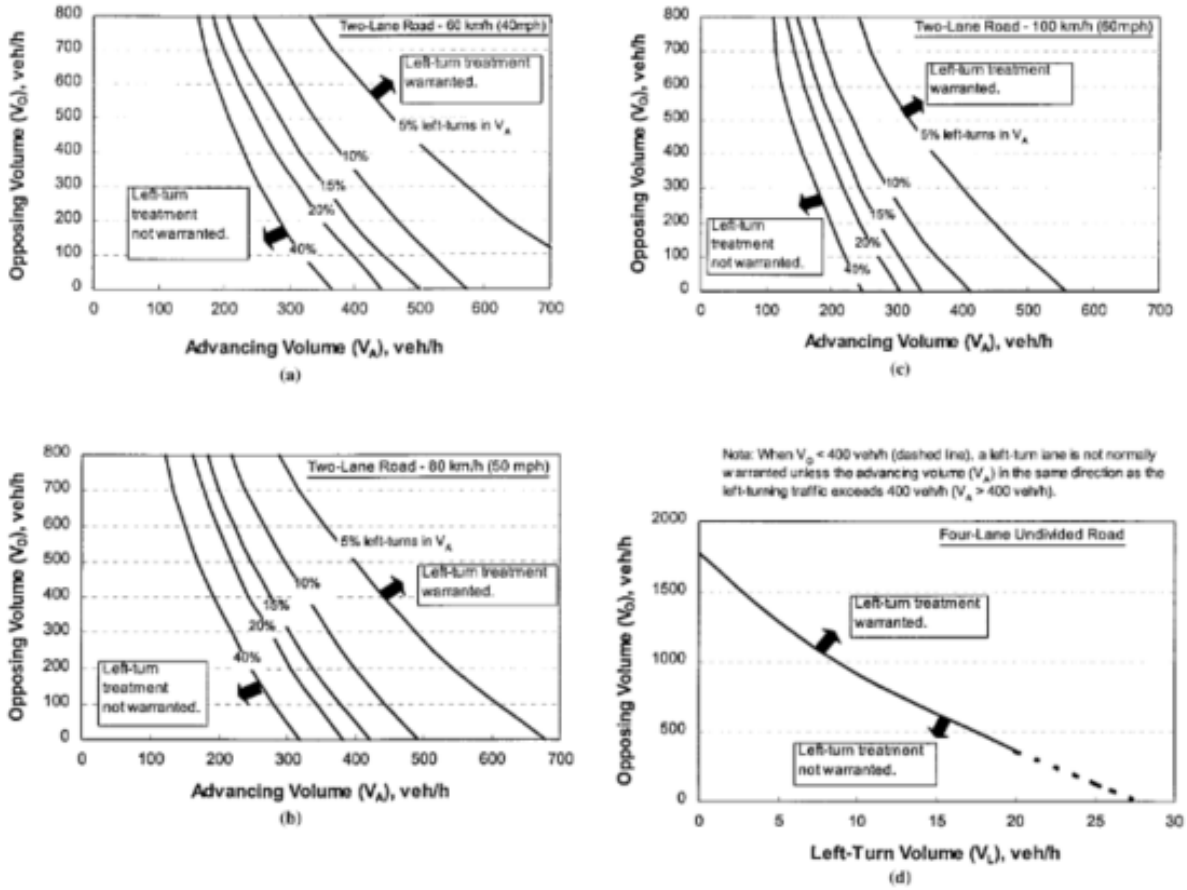
7.2 Unsignalized Intersections – Left Turns

Table 1 below provides guidance on requirements for left turn lanes at unsignalized intersections on arterial streets. For collector streets, the need for turn lanes should be evaluated in a similar manner. Generally on collector streets, a left turn lane is required at the approach to arterial streets and at heavy uses that have a primary access to a collector street. For intersections listed as requiring further evaluation, the engineer should provide an analysis of the non vehicular traffic factors listed in Section 7.1 above with a review of turning traffic shown in NCHRP 457 Figure 2-5.

Table 1: Left-Turn Guidance for Access from a Thoroughfare Road-Unsignalized Intersections

Intersecting Street/Drive Land Use	Intersecting Street or Drive	Thoroughfare Section				
		2 lane undivided	2 lane divided	4 lane undivided	4 lane divided	6 lane divided
Residential**	Driveway	Not Required*	Not Required*	Not Required*	Not Applicable	Not Applicable
Residential**	Local Street	Not Required*	Not Required*	Not Required*	Required	Required
Residential**	Collector Street	Evaluate***	Required	Required	Required	Required
Non Residential	Driveway	Evaluate***	Evaluate***	Evaluate***	Required	Required
Non Residential	Local Street	Evaluate***	Evaluate***	Evaluate***	Required	Required
Non Residential	Collector Street	Evaluate***	Required	Required	Required	Required
Non Residential	Thoroughfare	Evaluate***	Required	Required	Required	Required

** Not required except in cases where stopping sight distance is insufficient for advancing vehicles behind a stopped left turning vehicle.*
*** Residential defined as "Residential Low Density" (R-1 & R-2)*
**** Evaluate peak hour turning movement and directional peak hour through volume according to NCHRP 457 Figure 2-5 below. Also evaluate impact to pedestrian/bicycle facilities and other factors listed in 7.1 above.*



NCHRP 457 Figure 2-5: Guideline for determining the need for a major road left turn bay at a two-way stop-controlled intersection

<u>Left-turn Geometric Considerations</u>

- Left turn lanes shall be 200 feet plus the taper at the intersection with another arterial street and 150 feet plus the taper at other locations.
- Dedicated left-turn lanes are required on side streets or driveways intersecting arterial streets at full median breaks. Minimum distance shall be 150 feet plus the taper.
- The length of the left-turn lane shall be increased as necessary to accommodate estimated queue length. The minimum length shall be exceeded based on the estimated 95th percentile queue length determined for future traffic volume projections. The queue length shall be estimated using analysis procedures outlined in the latest edition of the Highway Capacity Manual published by the Transportation Research Board. Where the analysis is based on traffic signal control, existing cycle lengths shall be used when available, otherwise a 120 second cycle length should be used in the analysis.
- Unless otherwise approved by the City Engineer, left-turn lane lengths shall cover the full-width segment between the taper and the end of the lane at an intersection with a public street or driveway. The end of the lane at the intersection shall be determined as the point of curvature for the turning radius used for design of the particular intersection. Turning radius shall meet City of Lawrence design standards.

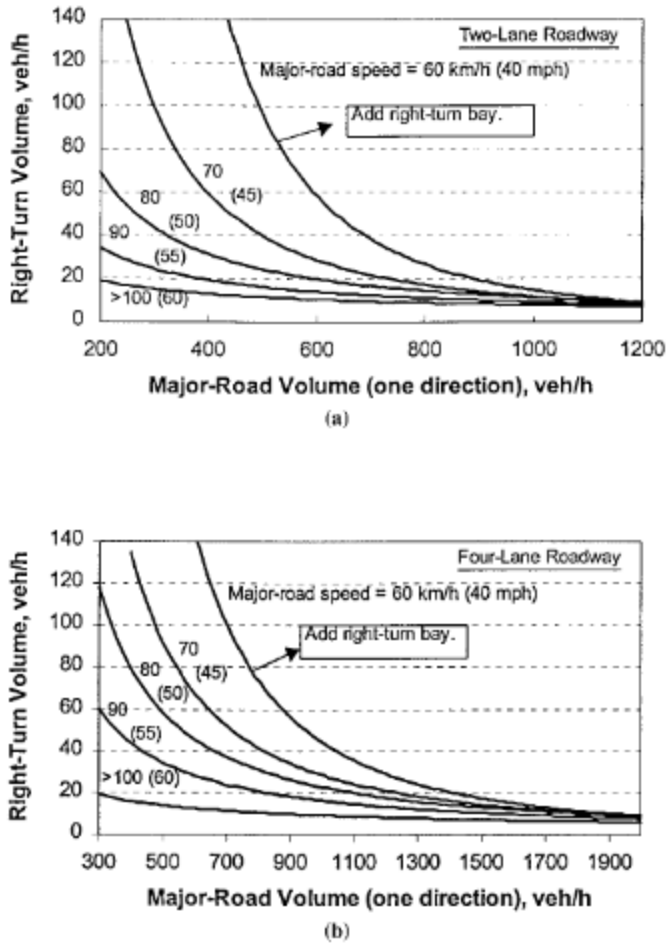
7.3 Unsignalized Intersections – Right Turn Lanes

Table 2 below provides guidance on requirements for right turn lanes at unsignalized intersections on thoroughfares. For intersections listed as requiring further evaluation, the engineer should provide an analysis of the non-vehicular traffic factors listed in Section 7.1 above along with a review of turning traffic shown in NCHRP 457 Figure 2-6.

Table 2: Right Turn Lane Guidance on Thoroughfare Roads-Unsignalized Intersection

Intersecting Street/Drive Land Use	Intersecting Street or Drive	Thoroughfare Section				
		2 lane undivided	2 lane divided	4 lane undivided	4 lane divided	6 lane divided
Residential**	Driveway	Not Required	Not Required	Not Required	Not Required	Not Required
Residential**	Local Street	Not Required	Not Required	Not Required	Not Required	Not Required
Residential**	Collector Street	Evaluate*	Evaluate*	Evaluate*	Evaluate*	Not Required
Non Residential	Driveway	Evaluate*	Evaluate*	Evaluate*	Evaluate*	Not Required
Non Residential	Local Street	Evaluate*	Evaluate*	Evaluate*	Evaluate*	Not Required
Non Residential	Collector Street	Evaluate*	Evaluate*	Evaluate*	Evaluate*	Evaluate*
Not Applicable	Thoroughfare	Evaluate*	Evaluate*	Evaluate*	Evaluate*	Evaluate*

**Evaluate peak hour turning movement and directional peak hour through volume according to Figure 4 and 5 below. Also evaluate impact to pedestrian/bicycle facilities and other factors listed in Section 12.C above.*
*** Residential defined as "Residential Low Density" (R-1 & R-2)*



NCHRP 457 Figure 2-6: Guideline for determining the need for a major road right- turn bay at a two-way stop-controlled intersection

7.4 Signalized Intersections

Determinations about whether to provide either left or right turn lanes for individual movements at signalized or future signalized intersections should be based on evaluation of level of service with goals to provide acceptable level of service, or in cases where this is not feasible for existing intersections, to maintain an appropriate level of service.

Step 8 Capacity Analysis

Capacity analysis shall be performed for each study intersection using methodologies described in the Highway Capacity Manual (HCM), 6th edition, or latest edition. All capacity analysis should be performed using city-approved software programs. The capacity analysis results should be reported using HCM methodologies.

8.1 Capacity Analysis Criteria

The capacity analysis will be completed using the criteria defined below:

Level of Service (motorized): TIS should include computation of motorized LOS for the study intersection(s) using the methods described in the HCM. The traffic

analysis should be completed using approved traffic engineering software listed below. LOS should be reported for each movement (or lane group) at the intersection.

Approved Traffic Engineering Software:
• Synchro/Sim Traffic Suite, version 11 or latest edition
• Highway Capacity Software (HCS), version 2023 or latest edition
• Vissim for special conditions
• Any other traffic engineering software must be approved in advance by city staff.

City staff can request additional analysis and/or access to electronic files for specialized software for more complicated traffic studies. Example software may include, but limited to, PTV Vissim, PTV Vistro, or SIDRA software. LOS should be reported for each movement (or lane group) at the intersection.

Traffic simulation should be conducted for closely spaced intersections, or complex traffic conditions. All traffic analysis files should be submitted electronically to the City as part of the TIS submittal.

Impact thresholds for overall intersection LOS are:
LOS D – is typically acceptable on all arterials and collectors
LOS C – is typically acceptable on all other roadways (the highest class of road defines an intersection)

Individual turning movements should operate with LOS E or better for all intersections. For locations with LOS F, additional information or explanation should be provided (i.e. vehicle queue length, signal warrant and geometric or traffic control recommendations should be included in the TIS). A TIS that results in LOS F for individual intersections or movements may not preclude acceptance of the TIS and the development by the City.

Vehicle Queuing: TIS should provide 95th percentile queue length for the individual turning movements. This information is beneficial in determining appropriate turn lane lengths or issues of driveways/streets being blocked by the traffic queue from an adjacent study intersection.

8.2 Intersection Analysis

a. Unsignalized Intersections: HCM results should be reported for unsignalized capacity analysis. Analysis should include the following information:

    1. Existing and proposed lane configurations and traffic control.
    2. Existing volume data should be included in the analysis. Factors shall include PHF, heavy vehicle (truck) percentage, and approach grades.
    3. The results of the capacity analysis should be summarized in a figure showing the lane configurations and individual movement level of service.
    4. Vehicle queue lengths can be reported to the nearest 5-foot intervals with the minimum queue assumed to be 25 feet for queues reported between 0.0 and 1.0 vehicles. HCM output results should be converted from number of vehicles in queue to vehicle queue length

(1 vehicle = 25 feet). Vehicle queue information should be provided in the TIS to note when vehicle queues from intersections block left-turn lane(s) and/or other nearby intersection(s). Vehicle queue information should be obtained from a traffic analysis program.

5. The vehicle queue information should be noted if the queue lengths extend beyond the available turn lane storage. Vehicle queues for the Project access point(s) or side street(s) should not extend into the circulatory roadway within the development. Internal development intersections should not spill back onto the public street system.

b. Signalized Intersections: Capacity analysis should include the following items:

1. Basic Inputs: Existing traffic volume data – PHF, heavy vehicle percentage, number of lanes, lane widths, approach grades, location to nearest traffic signal, and other inputs (i.e. on-street parking, storage bay lengths, number of pedestrians, etc.)
2. Existing signal timings, if available. If no timings are available, the analysis should be completed with a 120 second cycle length.
3. Existing left-turn signal phasing should be documented and used in the analysis (i.e. protected left-turn, permissive left-turn, protected/permissive left-turn, etc. Lawrence typically uses leading protected-permissive left turns when needed.).
4. For signals located within a corridor, the same cycle length should be used. Half cycle lengths can only be used if approved by City staff
5. Existing clearance intervals should be used when available. If clearance intervals are not available, a clearance interval ranging from 5 to 6 seconds should be used. Typical clearance intervals for modeling purposes are 2 seconds all-red with 4 seconds yellow. Actual clearance intervals can be calculated using ITE Signal Timing Methodologies.
6. Signalized capacity analysis results should be summarized on figures to illustrate the number of lanes, individual movement Level of Service, 95th percentile vehicle queue length, and overall intersection Level of Service.
7. Lane utilization factors can be adjusted to help replicate the existing conditions for lane unbalance. Adjustments such as these should be documented in the appendix. This condition typically occurs near major intersections or near interchanges.
8. Traffic simulation results are typically the best way to document the vehicle queue behavior and interaction between multiple intersections. For a study corridor, a minimum of 10 traffic simulation runs should be completed to provide the vehicle queue information.
9. Vehicle queue information should be provided in the TIS to note when vehicle queues from intersections block left-turn lane(s) and/or other nearby intersection(s).
10. All capacity analysis results should be analyzed using HCM methodologies and reports should be included in the TIS appendix.

c. Roundabout: Roundabouts shall be evaluated and compared with traffic signal operation at all potential locations including arterial-arterial, arterial-collector and collector-collector intersections. HCS should be used to

analyze any existing or proposed roundabouts. Existing and proposed site-generated traffic volume data should be included in the analysis. Factors shall include PHF, heavy vehicle (truck) percentage, approach grades, and other required inputs. Vehicle queue information should be included in the analysis results. City staff can request additional analysis using SIDRA or VISSIM software for more complicated TIS's. Roundabouts should provide v/c ratios of 0.85 or below for all approaches for the design year.

d. Non-Standard Interchange or Intersection Concepts: Should a non-standard interchange or intersection concept be proposed, the capacity analysis should be completed using Vissim or other approved method to adequately evaluate the traffic operation.

Step 9 Site Circulation

TIS should include a review of the on-site circulation. This would include an assessment of the proposed access points onto the existing street network. The review should evaluate driveway throat lengths, vehicle turn radii, sight distance, internal driveway distance from the internal street network and connection points to the external system.

Vehicle Circulation: Vehicle turn radii assessment may require a review of truck access. Truck access should be evaluated to document the design vehicle that can enter and exit the development without causing impacts outside the proposed street network. Autoturn or other approved methods shall be used to assess the truck circulation. The design vehicle should be approved by City staff. At minimum, any non-residential development shall be able to accommodate an SU-40 design vehicle in areas outside of the downtown Form District and SU-30 in the Downtown Form District. The City Bus design vehicle should be used if a Lawrence Transit bus is anticipated to enter the site based on the proposed route. Bus turnouts may be planned for specific corridors or intersections, or adjacent to major generators.

Drive-Thru Vehicle Queue: Understanding the anticipated vehicle queue concerns is essential for site circulation review. For development sites with a proposed drive-thru, vehicle queue analysis should be completed using queuing theory analysis to estimate the anticipated number of vehicles for the drive-thru facility. The queuing analysis should be completed using current service rates from similar facilities and the arrival rates for the proposed development site (ITE trip generation rate). Assurances should be provided that the site can still function with the estimated drive-thru vehicle queue.

Step 10 Pedestrian and Bicycle Considerations

While transportation impact studies primarily address automobile traffic, recognition of other vehicle types and travel modes is appropriate, particularly in a community that strives for multi-modal choice. The following text by no means represents a comprehensive list of site planning elements but each must be addressed.

Pedestrians
Sidewalks along public streets or off-street paths provide mobility for pedestrians. Pedestrians should be provided with the opportunity to readily travel between these public infrastructure and adjacent land uses. All development plans should provide this connectivity.

Lawrence Pedestrian Plan:
https://www.lawrenceks.org/wp-content/uploads/2025/03/LawrencePedPlan.pdf

Bicyclists
Similar to pedestrians, development sites should provide reasonable opportunities to travel between adjacent public streets or bicycle trails and the land use. This does not imply that separate facilities are needed; rather, the conditions within a development site should be comparable to conditions adjacent to and near the site. Adequate and properly placed parking facilities for bicycles are a key component to encouraging bicycle travel. The Lawrence Bikes Plan should be consulted to determine if additional bicycle facilities are required.

Lawrence Bikes Plan: https://assets.lawrenceks.org/mpo/bicycle/BikePlan.pdf

APPENDIX

The Traffic Impact Study (TIS) should be prepared according to generally acceptable professional practice and should address the study elements listed below. City of Lawrence staff must approve all major assumptions. The TIS should provide sufficient text, maps, graphics, and tables to describe the study findings, recommendations, and appendices.

1. **Introduction and Study Scope**: This section should explain the context of the TIS and the scope of work.

2. **Existing Conditions**: The TIS should document existing transportation conditions covering infrastructure/service inventory, existing demand/usage, safety issues, and operational performance.

3. **Development Project Description**: This section should provide the following information:
    a. Proposed site location, layout, access (motorized and non-motorized), land uses, and development phasing
    b. Existing site access (motorized and non-motorized), land uses (types, intensities, building arrangement), and parking
    c. Information on nearby parcel access and land use, and their relationship to the proposed development project
    d. Trip generation using the latest edition of the ITE Trip Generation Manual and ITE Trip Generation Handbook procedures
    e. Traffic assignment and distribution should be summarized and illustrated onto figures

4. **Traffic Operation Analysis Sections**: The traffic operational analysis should be summarized for each of the traffic volume scenarios. Discussion should include individual motorized Levels of Service (LOS) by movement and vehicle queueing along with the overall intersection LOS, if applicable. This section should include traffic signal warrant analysis and any turn lane recommendations.

    a. **Existing Conditions (No Development):** The TIS should present the existing background transportation conditions. The existing conditions analysis should provide a summary of the current traffic operations and current geometrics.

    b. **Existing Conditions plus Site Generated Traffic (Full Build Only):** This section should present the opening day conditions with the proposed development project added. If the Project will cause traffic operation issues to the existing street network, mitigation measures should be identified, and their effect on the performance of the relevant mode should be identified. Acceptable levels of service are defined in Section 13.0

    c. **Existing Conditions plus Site Generated Traffic (Major Phases to Full Build):** A Project with trip generation levels that exceed 500 peak hour trips will require additional traffic operation analysis scenarios.

Depending on the number of phases, additional phased conditions may need to be developed for the TIS. Operations not meeting the acceptable levels of service will need to be mitigated.

d. **Future Year Background Traffic (No Build):** This analysis scenario is to provide a base scenario to compare against "Full Build Project" conditions.

e. **Future Year Background Traffic plus Site Generated Traffic (Full Build):** This analysis scenario is to determine the ultimate impact the Project will have on the street network for the future year scenario. Operations not meeting the acceptable levels of service will need to be mitigated.

5. **Site Plan Review**
   a. Site Plan Circulation
   b. Access Management Review
   c. Intersection sight distance evaluation
   d. Pedestrian circulation and connection
   e. Bicycle consideration
   f. Transit
   g. Drive thru

6. **Summary and Recommendations:** This section should provide a summary of the study process and geometric improvement recommendations.

7. **Appendix:** All trip generation assumptions, internal capture rates, and traffic analysis reports should be provided in an appendix with sufficient detail to recreate the process and assumptions at a later date.

APPENDIX H: BICYCLE & PEDESTRIAN DESIGN GUIDELINES

Bicycle and Pedestrian Design Guidelines

Presented to: City of Lawrence

Prepared by: TREKK Design Group

January 9, 2023

TREKK Project No. 22-0146

TREKK

Table of Contents

1. Introduction and Objective 0
2. Pedestrian and Shared-Use Path Crossings 0
   - 2.1. Pavement Markings 0
     - 2.1.1. Intersections 1
     - 2.1.2. Midblock Crossings 2
   - 2.2. Signage 2
     - 2.2.1. Intersections 2
     - 2.2.2. Midblock Crossings 2
   - 2.3. Application of Crossing Treatments 2
3. On-street Bicycle Facility Crossings 6
   - 3.1. On-Street Pavement Markings 6
   - 3.2. Signage 8
4. Signalization Devices and Lighting 8
   - 4.1. Traffic Signals 8
     - 4.1.1. Signal Timing 8
     - 4.1.2. Pedestrian Signals 9
     - 4.1.3. Pedestrian Actuation 9
     - 4.1.4. Leading Pedestrian Intervals (LPI) 9
     - 4.1.5. Left Turn Signal Phasing 9
     - 4.1.6. Right Turn on Red (RTOR) 9
   - 4.2. Bike Signals 10
     - 4.2.1. Recommended Locations 10
     - 4.2.2. Bike Clearance Time 10
     - 4.2.3. Bicycle Actuation 10
     - 4.2.4. Needed Features 10
   - 4.3. Rapid Rectangular Flashing Beacons (RRFB) 11
   - 4.4. Pedestrian Hybrid Beacons (PHB)/HAWK 11
   - 4.5. Street Lighting for Crossings 11
5. Road Diets and Road Reconfiguration 11
   - 5.1. Road Diet Evaluation 11
   - 5.2. Road Reconfiguration 13
6. Minimizing Turning Radii 13
   - 6.1. Design, Control, and Managed Vehicles 13
   - 6.2. Effective Radius 15
   - 6.3. Accommodating Large Vehicles 16
     - 6.3.1. Mountable Curb/Curb Apron 16

6.3.2. Stop Bar Location 17
6.3.3. Parking Set Back 18
6.4. Channelized Turn Lanes 19
6.5. Benefits of Smaller Curb Radii 19
6.6. Slowing Left Hand Turns 20
6.6.1. Medians 20
6.6.2. Hardened Centerlines 20
6.6.3. Application 21
7. Roundabout 21
7.1. Bicyclists 22
7.1.1. In-roadway or Separated Pathway Considerations. 22
7.1.2. Design Criteria. 22
8. Transit and Railroad Crossings 25
8.1. Bicyclists 25
8.1.1. Railway Track Crossing 25
9. Idaho Stops 26
9.1. States with Idaho Stop 27
9.2. Pros and Cons of the Idaho Stop. 28
9.2.1. Pros 28
9.2.2. Cons 28
9.3. Recommendation for Idaho Stop 28

List of Figures

Figure 2-1: Lawrence Crosswalk Standard Details 1
Figure 2-2: Lawrence Pedestrian Crossing Contextual Guideance 3
Figure 2-3: FHWA Application of Pedestian Crash Countermeasures by Roadway Features 4
Figure 2-4: FHWA Safety Issues Addressed by Countermeasure 5
Figure 2-5: Guidelines for the Installation of Pedestrian Sinalization Devices 6
Figure 5-1: 4 to 3 Lane Road Diet Evaluation 12
Figure 6-1: Recommended Design Vehicles 14
Figure 6-2: Effective Radius Example 15
Figure 6-3: Corner Extension using Speed Humps 16
Figure 6-4: Cement Pillow, Portland 17
Figure 6-5: Recessed Stop Bar 18
Figure 6-6: Parking Set Back 18
Figure 6-7: Mountable Apron and Raised Crosswalk 19
Figure 6-8: Reduced Pedestrian Crossing Distances 20
Figure 6-9: Hardened Centerline Example 21
Figure 7-1: Sample Pavement Marking 23
Figure 7-2: Sample Roundabout Crossing Signs 24
Figure 8-1: Sample Bike Path Alignment Across Rails 25
Figure 8-2: Example of Pedestrian Crossing, Memphis 26
Figure 8-3: Example of Flashing-Light Signal Assembly for Pedestrian Crossings 26
Figure 9-1: States with Idaho Stop Laws 27

List of Tables

Table 3-1: Bicycle Crossing Marking Recommendations 7
Table 5-1: Road Diet Questions 12
Table 5-2: Conceptual Roadway Configuration Cross Sections 13
Table 6-1: Left Turn Hardening Questionnaire 21

1. Introduction and Objective

Through stakeholder and community engagement processes, the City of Lawrence, Kansas, identified the need to improve pedestrian and bicycle crossings within the City. The transportation planning process developed the Lawrence Pedestrian Plan and the Lawrence Bike Plan that supports the ultimate vision outlined for the region in the Transportation 2040 plan. This Bicycle and Pedestrian Design Policy and Guidelines document will build on the existing City of Lawrence Plans and City design standards.

2. Pedestrian and Shared-Use Path Crossings

Pedestrian crossings are often considered the most dangerous movement for the streets' most vulnerable user. The safety of these crossings is impacted by street width, corner radius, sight lines, vehicle volume and speed, lighting, and familiarity of the design. Consistency in design concepts and locations are important to manage expectations for drivers and pedestrians.

In urban settings, crossings should be available every 400 – 600 feet to discourage jaywalking along collector and arterial routes. On local urban streets and rural roads, crosswalks should be placed based on context of the land use. Some specific cases for local streets include small retail centers, schools, and parks.

All pedestrian facilities must comply with the American Disabilities Act (ADA) to ensure all users are able to move safely within the public right-of-way. The ADA Accessibility Guidelines (ADAAG) has been the main tool for state and local governments to ensure compliance. This was supplemented by the Proposed Public Right Of Way Accessibility Guidelines in 2011 to improve ADAAG's guidance for streets, but has never been fully adopted at the federal level. The Kansas Department of Transportation (KDOT) fully adopted PROWAG in 2018 updating all relevant design standards. Municipalities develop transition plans to show a level of investment to comply with ADA requirements over a reasonable period of time.

Shared-use paths function as higher volume pedestrian facilities. The paths must be wide enough to accommodate pedestrians and bicyclists traveling at variable speeds in both directions. This is especially important at street crossings. Each shared-use path crossing should follow pedestrian crossing guidelines for a facility with a higher volume of travel. This includes all recommendations for curb extensions, median refuges, curb ramp widths, signalization, markings, and signage. The high-visibility continental crosswalks on shared use paths are recommended to be a minimum of 12 feet wide to accommodate speedy crossings without conflict in opposing direction.

Signage and markings for pedestrian crossings are governed by the Manual of Uniform Control Devices (MUTCD).

2.1. Pavement Markings

The City of Lawrence uses continental and parallel line style crosswalk markings. All crosswalks must be a minimum of 6 feet wide and the stop bar at least 4 feet from the crossing. Crosswalks should be wider in areas with higher volumes of pedestrian traffic. Standard details for Crosswalks are shown in Figure 2.1.

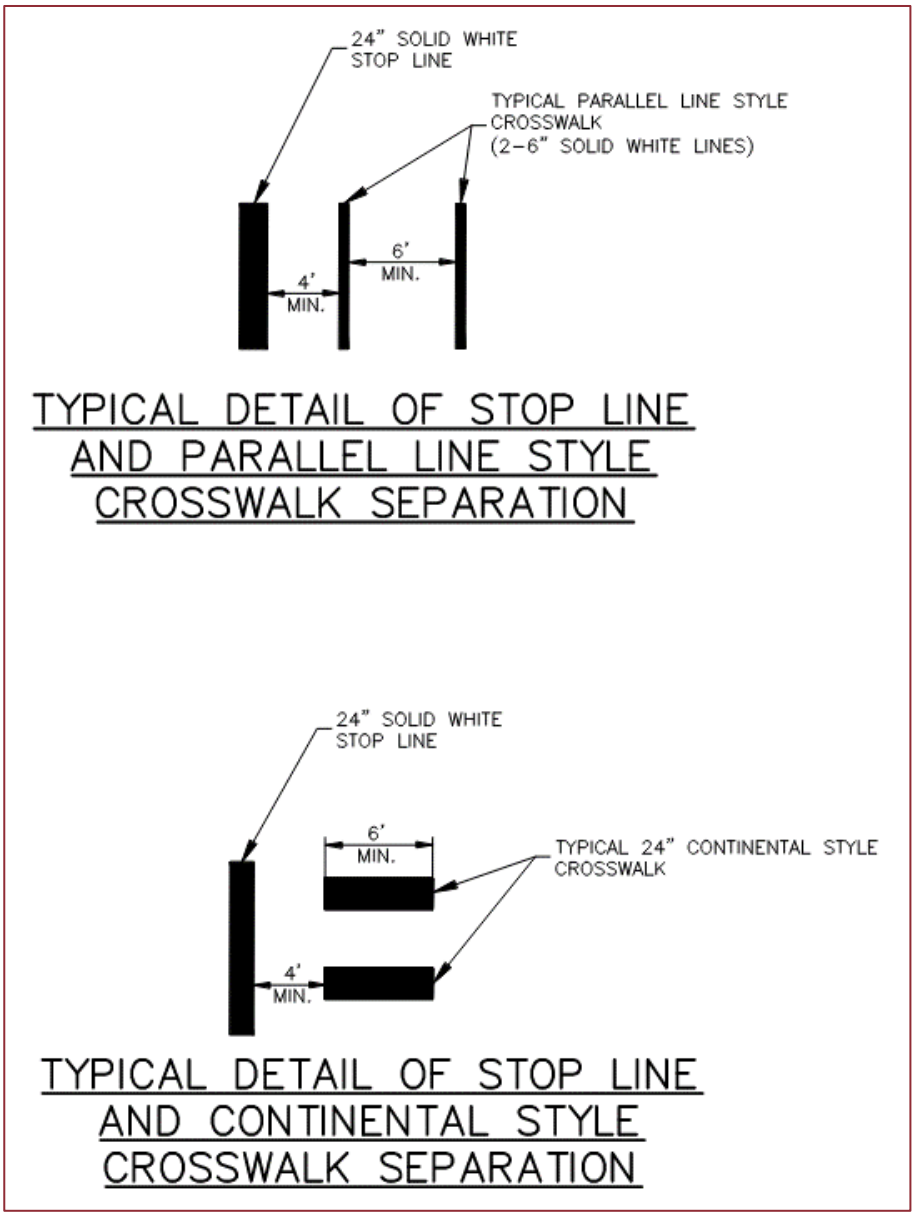


Figure 2-1: Lawrence Crosswalk Standard Details

2.1.1. Intersections

Pedestrian crossings at intersections on high volume roads controlled by stop/yield signs or signal devices should be marked with standard crosswalks. Low volume residential stop/yield control intersections do not require marked crosswalks. The exception to this recommendation is school crosswalks, or other crossings with vulnerable users, where enhanced visibility should be considered by using continental style markings.

The high-visibility continental crosswalks are appropriate for arterial/arterial, arterial/collector, and collector/collector intersections. Arterial/collector corridors with high volumes of turning vehicles to/from local residential streets may be marked with parallel crosswalks to improve visibility. Local intersecting streets operating with signed or signalized control should use parallel crosswalks. The parallel markings should also be used to outline artistic crosswalks. These crossings may be further enhanced with curb extensions and pedestrian refuge islands.

2.1.2. Midblock Crossings

Midblock crossings should be marked with high-visibility continental crosswalks. These crossings are inherently not at expected locations requiring improvements to visibility. Additional improvements which may include signal devices, curb extensions, median refuge islands, and/or raised crosswalks may be applicable based on the street type and volume of vehicles and pedestrians. Guidance on the selection of these treatments is provided in section 2.3 Application of Crossing Treatments.

Stop bars should be placed 4 feet in advance of the mid-block crosswalks for streets that include only one travel lane in each direction. Mid-block crossings for streets with 2 or more travel lanes in each direction should place the stop bar 20 – 50 feet from the crosswalk, and prohibit parking between stop bar and crosswalk, to allow visibility of the pedestrian in both travel lanes.

2.2. Signage

Signage is an important piece of design that helps raise awareness of shifts in roadway functionality and locations of possible conflict. The consistent placement of signage and the frequency of use improves reaction responsiveness of road users. Overuse of signage reduces compliance with signs as roadway users can no longer distinguish the signs at travel speed and the repetitive nature allows the signs to transition to background noise within the visual streetscape.

2.2.1. Intersections

Pedestrian signage for controlled intersections should follow standard recommendations and guidelines included in the MUTCD.

2.2.2. Midblock Crossings

At midblock crossings, pedestrian signage requirements increase based on the speed of vehicular traffic and size of the roadway. All crosswalks at uncontrolled midblock crossings should be marked with a Pedestrian Crossing sign (W11-2) and Diagonal Arrow (W16-7p) at the edge of crosswalk nearest oncoming traffic. A Stop Here for Pedestrians sign (R1-5c) is placed at the stop bar. On streets with higher speeds, greater widths, or poor sight visibility an additional Pedestrian Crossing sign with an Ahead plaque (W16-9P) should be placed to notify oncoming drivers.

2.3. Application of Crossing Treatments

Street crossing designs are impacted by numerous factors. Each crossing is affected by its locations, the surrounding land uses, area context, traffic volumes, vehicular speeds, modal interactions, geometric design, and access control. This section will provide an overview of four tools to determine the appropriate crossing treatments for Pedestrian and Shared-Use Path Crossings.

Guidance on the selection of crossing treatments is currently provided on the Pedestrian Crossing Contextual Guidance table (Figure 2-2) in Appendix A: Bikeway Design Guide (pg. 93) of the Lawrence Bike Plan.

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE

At Unsignalized Intersections

FACILITY TYPE	Local Streets 15-25 mph		Collector Streets 25-30 mph			Arterial Streets 30-45 mph							
	2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
Crosswalk Only (high visibility)	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
Crosswalk with warning signage and yield line	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
Active Warning Beacon (RRFB)	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
Hybrid Beacon	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
Full Traffic Signal	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
Grade Separation	X	X	EJ	EJ	EJ	X	EJ	EJ	✓	✓	✓	✓	✓

Legend	
Most Desirable	✓
Engineering Judgement	EJ
Not Recommended	X

Figure 2-2: Lawrence Pedestrian Crossing Contextual Guidance

This table provides open and flexible guidance focusing on how to apply improvements based on facility type and lane configuration. Most situations have multiple possible solutions that would be chosen based on engineering judgment. The adaptability of this table provides a first step during conceptual planning to narrow down the selection of treatments.

The FHWA Safe Transportation for Every Pedestrian (STEP) program includes guides, countermeasure tech sheets, training, and educational tools. The Guide for Improving Pedestrian Safety at Uncontrolled Intersection Crossing Locations provides guidance on the evaluation and application of safety countermeasures to improve pedestrian safety. The guide includes a similar tool to Lawrence's Contextual Guidance table to help with the selection of the appropriate countermeasures (Figure 2-2).

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5 7	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

Figure 2-3: FHWA Application of Pedestrian Crash Countermeasures by Roadway Feature

This table focuses on the 9 treatments that have shown improvements to pedestrian safety through FHWA research studies. High visibility crosswalks are the only countermeasure that reaches the recommendation level of always being used in certain conditions. The 9 countermeasures are arranged based on Average Annual Daily Traffic (AADT), posted speed limit, and roadway configuration. To further narrow down the selection FHWA also provides Safety Issues Addressed by Countermeasure (Figure 2-4).

Pedestrian Crash Countermeasure for Uncontrolled Crossings	Safety Issue Addressed				
	Conflicts at crossing locations	Excessive vehicle speed	Inadequate conspicuity/ visibility	Drivers not yielding to pedestrians in crosswalks	Insufficient separation from traffic
Crosswalk visibility enhancement	✓	✓	✓	✓	✓
High-visibility crosswalk markings*	✓		✓	✓	
Parking restriction on crosswalk approach*	✓		✓	✓	
Improved nighttime lighting*	✓		✓		
Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*	✓		✓	✓	✓
In-Street Pedestrian Crossing sign*	✓	✓	✓	✓	
Curb extension*	✓	✓	✓		✓
Raised crosswalk	✓	✓	✓	✓	
Pedestrian refuge island	✓	✓	✓		✓
Pedestrian Hybrid Beacon	✓	✓	✓	✓	
Road Diet	✓	✓	✓		✓
Rectangular Rapid-Flashing Beacon	✓		✓	✓	✓

Figure 2-4: FHWA Safety Issues Addressed by Countermeasure

This table provides additional insight on what safety issues may be addressed by certain countermeasures. When used in conjunction with the previous table the appropriate countermeasure becomes clearer for each location. A specific case would be the decision between a RRFB and PHB on a 3-lane roadway with a median. If there is a history of reported incidents between vehicles and pedestrians and/or bicycles due to excessive speeding at this location the choice would be a PHB. This is backed by research that shows side of the road mounted signage/signal devices do not affect safety outcomes involving high speed driving. This is also true for sight distance improvements, which may encourage a driver to increase their speed. The only effective methods that have been shown to reduce speeding incidents are techniques that require drivers to interact along their path of travel.

To further refine the selection process Figure 2-5 provides technical guidance for the selection of pedestrian signal devices. This tool was developed by the City of Boulder by updating information provided by the MUTCD with observational research findings. The application of this table with the previous tools will provide a uniform and consistent methodology for design for safe crossings at midblock locations.

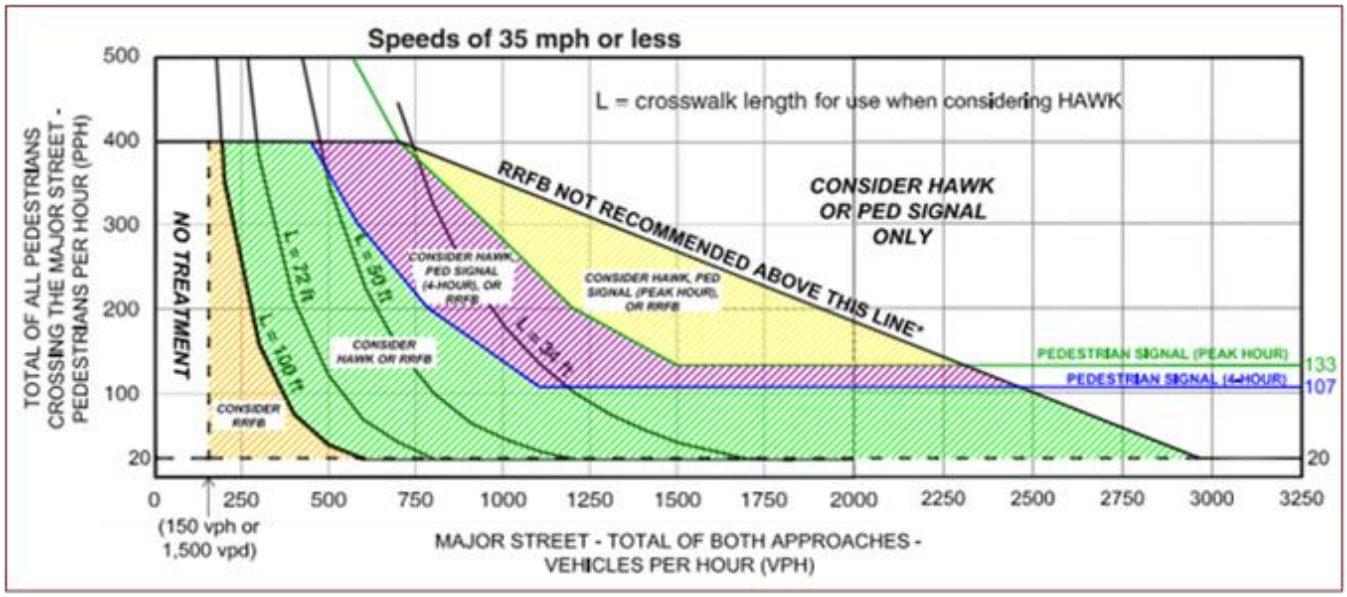


Figure 2-5: Guidelines for the Installation of Pedestrian Signalization Devices

3. On-street Bicycle Facility Crossings

With the growth of bicycling and bicycle infrastructure over the past decade the design of the intersection has become the focus regarding safety. Following this trend, recommended guidelines have been published including Don't Give Up at the Intersection (NACTO), Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges (ITE), Guidance to Improve Pedestrian and Bicyclist Safety at Intersections (NHCRP 926), and countless other documents from AASHTO, FHWA, state, and local governments. The main objective of each of these documents is to reduce the speed of all modal interactions, improve sight distance and visibility, and increase awareness of the location of conflict points.

The approach to each intersection varies in design to accommodate the multimodal needs, context, type of bike facility, and availability of space on the street. Most early guidance recommended moving bicyclists to the left of the right turning vehicles using transitions or mixing zones. Bike boxes are another method that places bicyclist in front of vehicles giving them a small head start. Over the past 5 years, cities have begun adopting Dutch cycling principles of offsetting the bicycles to the right of the travel lanes at the intersection. This concept is most prevalent in protected intersection designs that provide a queuing space for turning vehicles to wait for crossing bicyclists and pedestrians and remain out of through traffic.

3.1. On-Street Pavement Markings

On-street Bicycle Pavement markings are an important part of the bike crossing design. Best practice requires the selection of several types of marking to differentiate the volume/risk associated with each crossing. Varying the treatments keeps drivers and bicyclists from becoming complacent seeing the same markings crossing every street. Table 3-1 provides the street markings recommended for Lawrence's bicycle crossings for on-street facilities. Shared use paths should follow the recommendations for pedestrian crossings.

Table 3-1. On-Street Bicycle Crossing Marking Recommendations

	Arterial	Collector	Major Driveway	Minor Driveway	Local > 40 ft	Local ≤ 40 ft
Arterial	Green	Green	Green	Chevron	Chevron	None
Collector	Green	Chevron	Chevron	None	None	None
Local	Green	Dashes	None	None	None	None

Green: Dashed 2-ft green markings with 6-ft spacing
Chevron: Double chevron at 4-ft width
Dashes: Edge Markings including 2-ft x 4-in white stripes placed every 6-ft
None: Markings are not necessary, due to low volume of conflicting movements and operating speeds

The green bicycle markings will focus along arterial streets concentrating in areas where bicycles interact with a higher volume of motor vehicles. This includes the intersections of two arterials or an arterial with a collector or major driveway. Major driveways will be high trip generators like large box stores, high density shopping centers, and some fast-food chains. Local streets with bike lanes crossing an arterial would also be green, but only local streets, greater than 40-ft wide, will be marked with chevrons on the bike lane along an arterial.

Green markings should also be used in bike boxes and two-stage turn queue boxes on all streets. Bike lanes and cycle tracks, along arterials, should include green paint in shared right turn lanes and mixing zones approaching the intersection. Chevrons or sharrows are suitable for these applications on collector streets.

In shared street configurations bicycle sharrows should be placed in the center of the outside travel lane. For streets with wide outside lanes that allow parking, the sharrow should be placed 12 feet from the curb to allow parking and reduce the possibility of dooring incidents. It is recommended that Streets including sharrows are designed and signed for an operating speed of 25 mph or less.

Reverse angle parking should be placed on any street that includes bike facilities separating the parking from the travel lane. The conventional front-in angled parking reduces sight visibility for the vehicle driver attempting to back out of the parking space. Reorienting the parking allows the driver to see bicyclists in bike lanes and shared lanes that would have been behind the vehicle. Cities across the nation have shown a decrease in overall crashes and almost no pedestrian/bicycle crashes in locations with reverse angle parking.

3.2. Signage

Most bike signs consist of Bike Lane (R3-17) and Bike Route (D11-1) signs which mainly serve as directional guidance to bicyclists and to raise the awareness of vehicle drivers. The MUTCD and numerous supplementary manuals from FHWA, AASHTO, and NACTO provide very clear guidance on the use and placement of signage relating the bicycle facilities.

Shared lanes have two common recommendations for signage; Share the Road (W16-1) and Bikes May Use Full Lane (R4-11). The Share the Road sign is used more frequently but has been attributed to driver misunderstanding and encouragement of unsafe riding practices by bicyclists. Surveys revealed that many drivers thought the Share the Road signs were telling bicyclists to share the road with cars and move to the far right. In some cases, the bicyclist traveling on the right edge of a lane forces them into the gutter pan, dooring zones, or uneven pavement when a car passes too close. The Bikes May Use Full Lane has now become the preferred sign of the bicycle community, informing the driver that bicyclists may ride anywhere in the lane providing them the opportunity to move around obstacles. It is recommended to use the Bikes May Use Full Lane sign on streets with sharrows or residential streets functioning as bicycle boulevards. Share the Road signs are still appropriate for locations that require the mixing of bicycles with automobiles, such as a shared right turn lane approaching an intersection.

The State of Kansas passed a law (House Bill 2192) in 2011 requiring passing vehicles to maintain a minimum 3-feet passing distance. The City of Lawrence may use the KDOT approved sign to raise awareness of the law. These may be placed temporarily along new on-street facilities and permanently at entry points into the city. These signs should be used as an educational tool and not be overused which may detract from the effectiveness of warning and regulatory signage.

4. Signalization Devices and Lighting

There has been a proliferation of signal and detection devices, communication systems, and new operating methodology with the growth of bicycle facilities and refocusing cities on pedestrian travel. To determine the appropriate device for each location it is important to consider the number of crossing pedestrians, length of the crossing, and the speed and volume of vehicles at the crossing. This section provides an overview of accepted signal devices and recommendations for their operation.

4.1. Traffic Signals

4.1.1. Signal Timing

a. Cycle Lengths

A short signal cycle length is preferred in areas with pedestrian traffic and short block lengths. A cycle length of 60 – 90 seconds will reduce pedestrian delays at signals based on typical walking speeds.

b. Pedestrian Crossing Time

The MUTCD recommends a walking speed of 3.5 feet per second to safely cross the street. This is the amount of time assigned to the red flashing hand. In areas with a higher density of older pedestrians, pedestrians with disabilities, and/or small children, the walking speed may need to be lowered to 3 feet per second. A field survey should be conducted of the area to determine the appropriate application.

4.1.2. Pedestrian Signals

Pedestrian countdown timers and audible beacons should be used at all intersections to support crossing compliance and the visually impaired.

4.1.3. Pedestrian Actuation

At wider crossings, pedestrian FLASHING WALK time when added to the 4 – 7 second WALK time, and 3 seconds solid red hand may control the signal phasing. To keep from having long delays with vehicular traffic, non-actuated pedestrian phases are only appropriate for areas with shorter crossing and consistent pedestrian traffic. Several manufacturers are testing devices to automate pedestrian detection, similar to vehicles, but most are still working on determining the pedestrian's path as they reach the intersection.

4.1.4. Leading Pedestrian Intervals (LPI)

The use of LPI provides a safer crossing for pedestrians by providing them 3 – 10 seconds to establish themselves in the intersection before right turn or permissive left turn movements begin. This technique works well at locations with high volumes of right turns and permissive left turns. Having appropriate gap spacing to allow affective permissive left turns allows the time that may have been attributed to a protected left phase to be shifted to the LPI balance the overall cycle length.

4.1.5. Left Turn Signal Phasing

Protected left turn movements at signalized intersections provide the safest crossing movement for pedestrians. Permissive left turns are the most dangerous for pedestrian crossings because the driver is focused on finding a gap in on-coming traffic and not focused on the crosswalk. Protected-Permissive Left Turns (PPLT) allow most queued vehicles to turn before changing to a yellow flashing arrow. This method provides a higher level of safety for pedestrians while improving operational capacity but should not be used in areas with poor sight visibility or high-volume pedestrian traffic.

4.1.6. Right Turn on Red (RTOR)

Permission for drivers to make a right turn at a red light was originally granted to save fuel and reduce air quality impacts. The growth of bicycle and pedestrian traffic has begun a reevaluation of this application. To improve safety many municipalities are prohibiting RTOR in certain circumstances to reduce possible conflicts between motor vehicles and pedestrians/bicyclists.

a. MUTCD Section 2B.54 Prohibition Guidance

   i. Inadequate sight distance to vehicles approaching from the left (or right, if applicable)

   ii. Geometrics or operational characteristics of the intersection that might result in unexpected conflicts

   iii. An exclusive pedestrian phase

   iv. An unacceptable number of pedestrian conflicts with right-turn-on-red maneuvers, especially involving children, older pedestrians, or persons with disabilities

   v. More than three right-turn-or-red accidents reported in a 12-month period for the particular approach

vi. The skew angle of the intersecting roadways creates difficulty for drivers to see traffic approaching from their left

b. Additional Prohibition Guidance

i. High pedestrian and bicycle use areas

ii. Leading Pedestrian Interval

iii. Shared-use path or two-way cycle track crossing at a signalized intersection

iv. An exclusive bike only phase

v. Transit que jumps

4.2. Bike Signals

Bicycle signals should be evaluated for intersections along existing and planned bicycle facilities. They shall be placed in a visible location for on-coming bicyclists. At intersections with long crossings, a near-side signal can be used to support the far-side signal. The near side signal may include a countdown to green to assure cyclists that the actuation is working and give them an early start.

4.2.1. Recommended Locations

a. Two-way Cycle Tracks

b. Contra-flow Bike Lanes

c. Intersections with high conflicting right/left turns

d. Intersections with complex geometry

4.2.2. Bike Clearance Time

Bicyclists need longer minimum green times due to slower acceleration. NACTO provides this clearance time as:

$$C_i = 3 + \frac{W}{V}$$

Where: W = Intersection Width

V = Typical Bicyclists Speed

The extra time required for this crossing may coincide with the yellow phase if a bicycle signal is available.

4.2.3. Bicycle Actuation

Bicycle signals not set for full recall should be on passive actuation. There are many devices that can be used for detection including some cameras, pucks, infrared detection, and special design induction loops.

4.2.4. Needed Features

Locations with active bike signal phases must prohibit Right Turns on Red (RTOR) and only allow protected left turns.

4.3. Rapid Rectangular Flashing Beacons (RRFB)

RRFBs have become one of the most popular signal devices to heighten awareness at crossings. These are most feasible for crossings on 2 – 3 lane roads with lower volumes and speeds. As the street gets wider additional tools should supplement the RRFB including pedestrian refuge islands and curb extensions. The median provides a place to put signs on both sides of on-coming traffic improving visibility. In special circumstances, roads exceeding 4 lanes but not meeting the requirements to install a PHB may install RRFBs on overhead mast arms to improve visibility and compliance.

4.4. Pedestrian Hybrid Beacons (PHB)/HAWK

PHBs or HAWK signals provide phased movement structure. Vehicles slow on yellow, stop on all red, and may stop and proceed with caution on the wig-wag red (similar to a stop sign). The length of the all red and wig-wag phases are determined based on pedestrian crossing time and density of pedestrians crossing. These signal devices should only be installed at locations that meet the guidelines presented in the MUTCD.

4.5. Street Lighting for Crossings

Lighting at crossings is an important safety feature for pedestrians and bicyclists. National trends show high crash rates, with a higher percentage of sever crashes, at night and in other low light conditions. Streetlights should be installed in conjunction with signals to allow each crosswalk and their approach to be fully lit.

5. Road Diets and Road Reconfiguration

In built out cities the ability to reconfigure the roadway, often during annual resurfacing, provides one of the most cost-effective and quickest methods to build bicycle infrastructure and improve multimodal safety. These retrofits may include road diets to reuse under utilized space and improve safety by reducing travel speed, minimizing conflict points, and improving sight lines. Streetscape changes may also be made with full hardscaping, changes to pavement markings, artistic incremental design techniques, and/or green stormwater infrastructure installations. This section will provide a brief overview of these concepts and it is recommended that additional study move forward to fully develop the policies and tools to fit the City of Lawrence.

5.1. Road Diet Evaluation

The first step for any changes to the streetscape layout requires an analysis of existing conditions. The FHWA identifies 4-lane and 6-lane roadways as prime candidates for conversion to 3-lane and 5-lane configurations. Researchers have shown that the addition of a turn lane reduces the number of weaving movements on a roadway and decreases the number of sideswipe and rear end collisions. These configurations have also been shown to decrease operating speeds and nearly eliminate excessive speeding. Some of the benefits of road diets are highlighted on the FHWA table Safety Issues Addressed by Countermeasure (Figure 2-4).

Several communities and states across the nation have enacted road diet policies that include guidelines for the evaluation and delivery of these facilities. A widely accepted process includes a stepped base approach using increasing levels of evaluation based on Average Daily Traffic (ADT). The methodology to evaluate a 3 to 4 lane conversion is included in Figure 5-1.

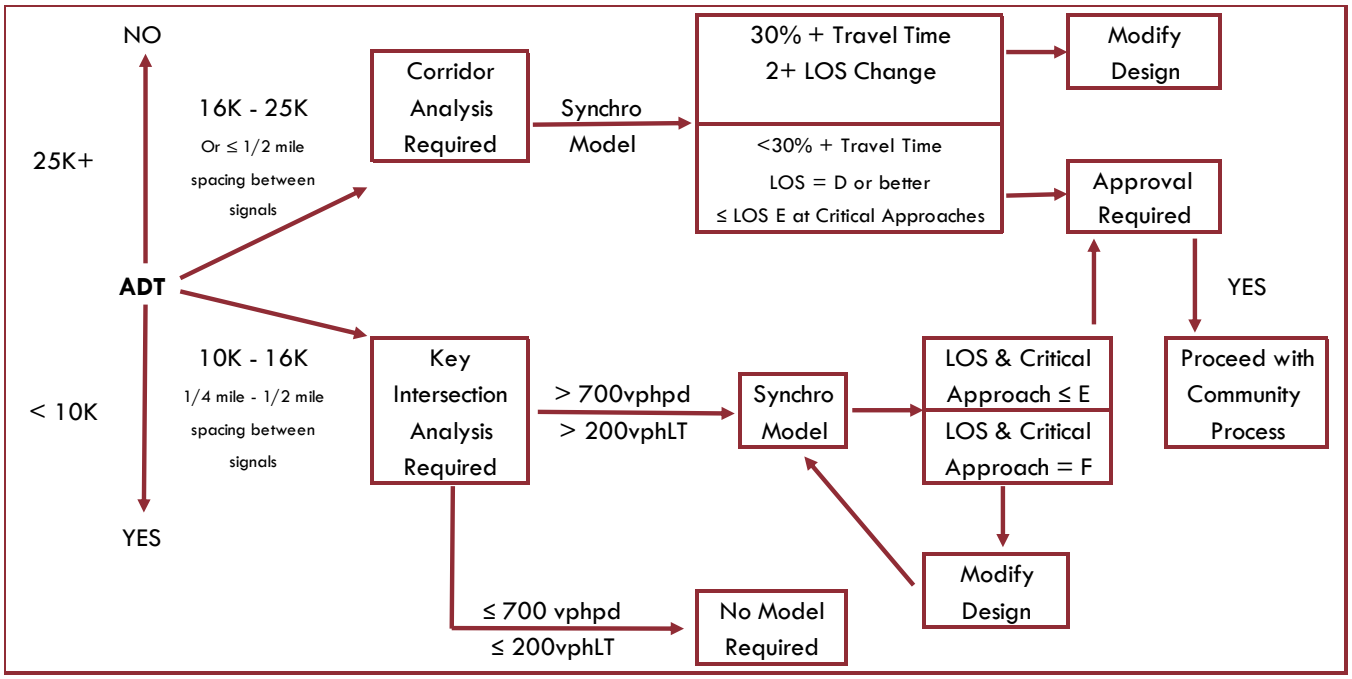


Figure 5-1: 4 to 3 Lane Road Diet Evaluation

This evaluation is often supplemented with an additional review to fit the contextual elements of the corridor. The following road diet questionnaire (Table 5-1), reproduced from the Tennessee Department of Transportation, identifies projects that will require contextual review by any answer being YES.

Table 5-1: Road Diet Questionnaire

Question	YES	NO
Is the current Average Daily Traffic (ADT) greater than 25,000?		
Is the current posted speed limit greater than 45 mph?		
Is the highway a diversionary route for an interstate highway?		
Is the existing per hour/per lane peak hour volume greater than 1700?		
Does the facility have a bus route with stops? (4 lanes to 3)		
Are there more than 10 driveways per mile present? (4 lanes to 3)		
Will the existing roadway pavement drainage be affected?		

Projects that require additional evaluation should be reviewed considering the following elements:

a. Multimodal needs

b. Project limits vs. corridor

c. Crash frequency or severity linked to:

   i. Lack of turn lanes

   ii. Higher than desirable operational speeds

   iii. Poor access management

   iv. Bus stop locations (4 lanes to 3)

v. Driveway density (4 lanes to 3)

d. Increased presence of vulnerable users

e. Community support for alternative modes of transportation accommodation

f. Proximity to freeways

g. Designation as an evacuation route or other emergency use

h. Existing and future land use along the corridor

5.2. Road Reconfiguration

Road reconfiguration may include a road diet or a reallocation of existing space. Many cities have moved away from the standard interstate lane width of 12 feet for their roadways and have adopted standard 10 foot lanes for general traffic and 11 foot outside lanes for transit and freight corridors. Additionally, a nationwide discussion over on-street parking has lead many communities to reallocate this space to multimodal transportation, parklets, green infrastructure, and pedestrian plazas. The following table (Table 5-2) provides a simplified general layout for Lawrence's streets based on roadway classification.

Table 5-2: Conceptual Roadway Configuration Cross Sections

	Pedestrian Realm		Travel Way										
				Parking Lane			Bikeway			Vehicle Lane			Median / Turn Lane Width
	Pedestrian	Utility	Gutter Pan	Requirement	Width	Count	Width	Type	Buffer Width	Width		Count	
Classification	Min. (feet)	Min. (feet)	(feet)		Min. (feet)		Min. (feet)		Min. (feet)	Min. (feet)	Max (feet)		Min. (feet)
Principal Arterial	6	4.5	2	NO	NA	NA	5	Protected	2	10	11	4	10
Minor Arterial	6	4.5	2	Optional	7	2	5	Buffered	2	10	11	2	10
Collector	5	4.5	2	Optional	7	2	6	Standard	NA	10	11	2	Optional
Local	5	4.5	2	Optional	7	2	NA	Optional	NA	9	10	2	NA

To fully apply this process TREKK's recommendation is to build upon this concept to account for land use, area context, street typology, development density, street width, design speeds, and multimodal network plans. Additionally, the City of Lawrence should develop and adopt a parking modification process that meets the community's needs.

6. Minimizing Turning Radii

Corner radii are a major influence on the speed of right turning vehicles at intersections. Smaller turning radii require vehicles to turn at a slower speed improving the ability of a driver to interact with pedestrians and bicyclists crossing the adjoining street. In urban settings, smaller corner radii are preferred and actual corner radii exceeding 15 feet should be the exception (NACTO Urban Design Guide). This section will focus on the decision factors for determining curb radii and methods to reduce the radii to improve safety for crossing pedestrians and bicyclists.

6.1. Design, Control, and Managed Vehicles

A critical element in the determination of curb radius is the design vehicle. The 2019 NACTO published Don't Give Up at the Intersection, focusing on how to improve bicycle and pedestrian safety at urban intersections. One of the recommendations included the addition of two new vehicle types for design consideration the Control Vehicle and the Managed Vehicle.

Design vehicles should be the largest vehicle that frequently accesses the street and fits the context. The following design vehicles (Figure 6-1) are recommended by the National Association of City Transportation Officials (NACTO) and have been adopted by many of the member cities.

Street Type	Design Vehicle
Neighborhood and Residential Streets	**DL-23**
Downtown and Commercial Streets	**SU-30**
Designated Truck Routes	**WB-50**
Designated Bus Routes	**BU-40**

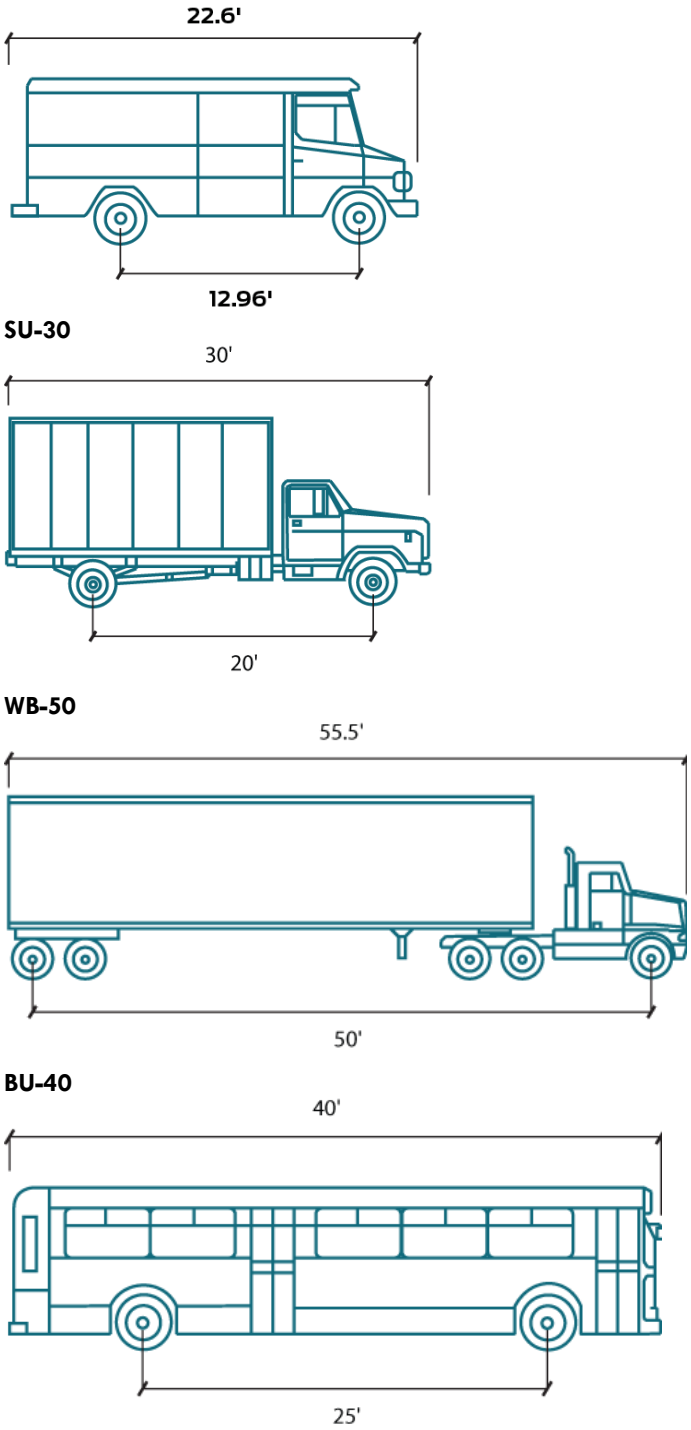


Figure 6-1: Recommended Design Vehicles (NACTO)

At the intersection of different street types, the minor receiving street will take precedence. Following this practice, the corner radius of a local residential street intersecting a freight route will be designed for a DL-23. The design vehicles' turn speed should be evaluated around 5-8 mph to help ensure all vehicles make slow turns.

A control vehicle is the largest non-frequent turning vehicle that needs to be accommodated at an intersection. For most streets this will be a large fire truck. To accommodate these vehicles while encouraging slower turning movements from more frequent smaller vehicles, techniques such as mountable curbs, offset stop bars, and parking prohibitions should be reviewed. The turning movements for these vehicles should be evaluated at less than 5 mph and may require additional field review to confirm software analysis.

Managed vehicles are the most common vehicle to use a street and often smaller than the design vehicle. This will typically be a standard passenger vehicle. The design should encourage a managed vehicle operator to travel at 10 mph, or less, when making a turn. In some cases, this may require mountable curbs for the design vehicle.

6.2. Effective Radius

The effective radius accounts for the offset of a turning vehicle from the roadway curb. On a street with bike lanes and on-street parking the travel lane is 12 to 14 feet from the curb. This increases the turning radius of the vehicle (Figure 6-2), allowing it to travel at a higher speed.

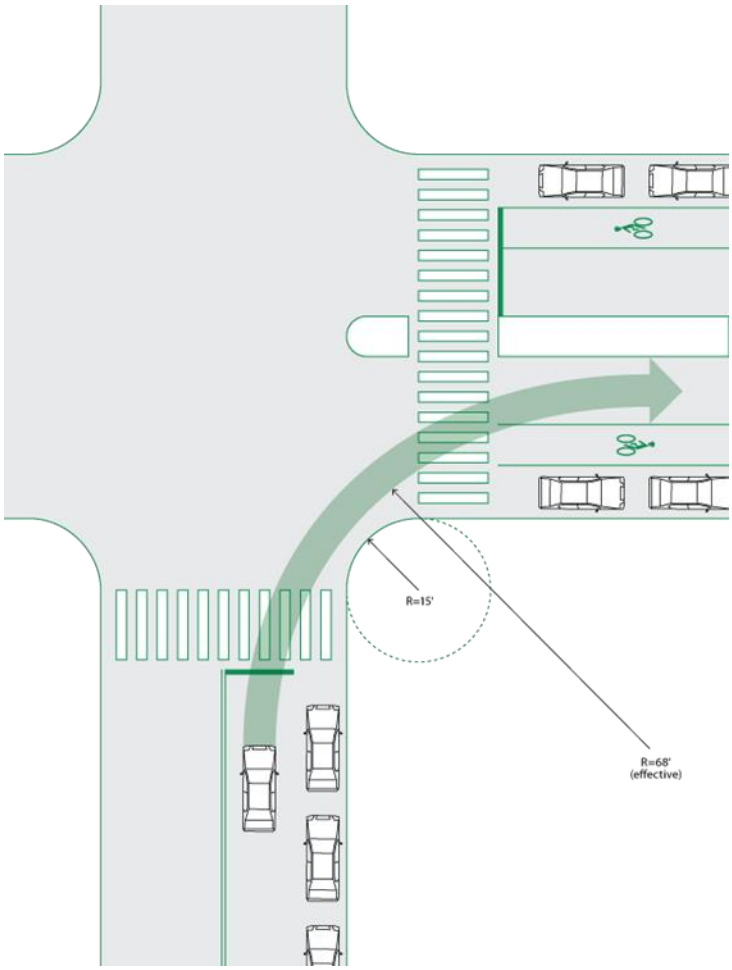


Figure 6-2: Effective Radius Example (NACTO)

Designing for turns using the effective radius provides additional space for curb extensions and minimizing the built radius. It is important to reduce the effective radius to minimize vehicle turning speeds. Alternate methods include placing small speed humps at the corner, vertical deflection devices at the end of lanes, mountable curbs, and textured pavement.

6.3. Accommodating Large Vehicles

Figure 6-3: Corner Extension using Speed Humps (Source: Google)

Heavy trucks and buses may use the full intersection to make turns when these movements are not frequent. These movements may require a 3-point turn or an external helper to complete the turn.

Transit routes with headways of 30 minutes or less should be designed with a receiving lane width to accommodate the vehicle's turning movement without encroaching into the oncoming lane. The transit frequency and on time performance is important for the overall operation of the transit system and passenger experience. As the most efficient form of travel design should always take into consideration transit operations.

The following section will provide some possible techniques to accommodate large vehicles without affecting their operation but keeping turning speed low.

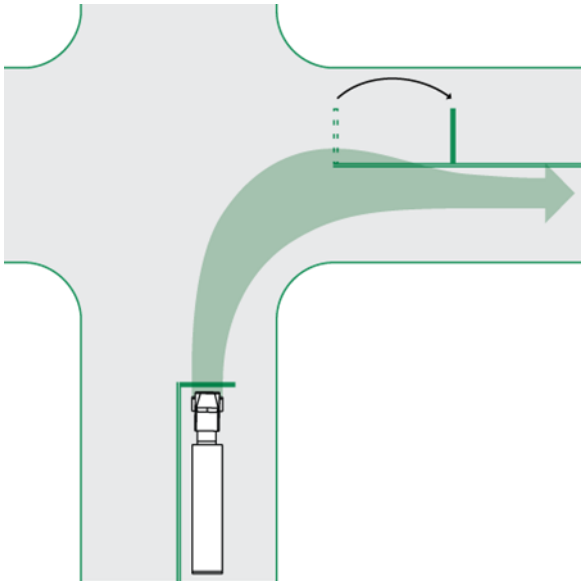
6.3.1. Mountable Curb/Curb Apron

The smaller corner radii required to keep passenger vehicles operating at slow speeds while turning, the corner will prevent most large vehicles. Using a mountable curb provides the additional needed space for the large vehicle while still restricting the speed of smaller passenger vehicles. The rear wheels of the large vehicle will roll over the mountable curb allowing the turn at a lower speed. This same technique has been used in the US on roundabouts and is consistently used in European countries. Figure 6-4 is an example of this technique.

Figure 6-4: Cement Pillow, Portland (NACTO)

6.3.2. Stop Bar Location

To accommodate large vehicle turning movements that will encroach on the opposing travel lane at controlled intersections the stop bar should be moved away from the intersection as seen in Figure 6-5. Stop bars set back 20 feet or more from an intersection should include Stop Here on Red (MUTCD R10-6) for signalized control or a Stop Here (R1-5b) for stop sign control and STOP pavement markings.



6.3.3. Parking Set Back

Parking should be set back at least 20 feet from each crosswalk to allow visibility for pedestrians entering the street. A larger offset (Figure 6-6) may be needed to accommodate the control vehicle at each intersection. Turning analysis should be evaluated to determine the appropriate location to begin parking. This space would need to be maintained through parking enforcement and/or the installation of small vertical deflection devices to encourage compliance.

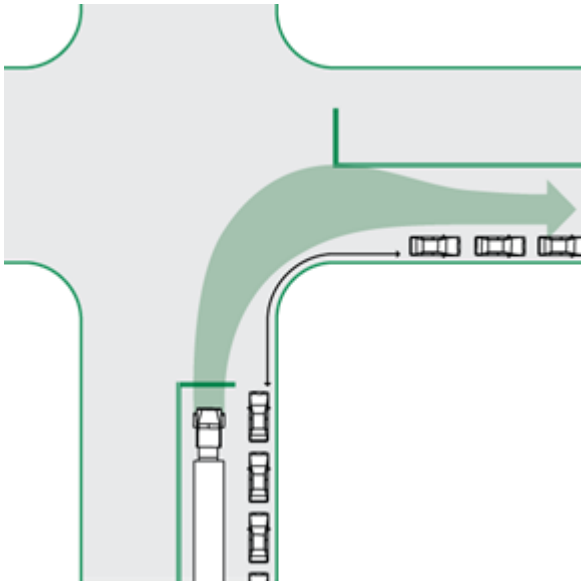


Figure 6-6: Parking Set Back (NACTO)

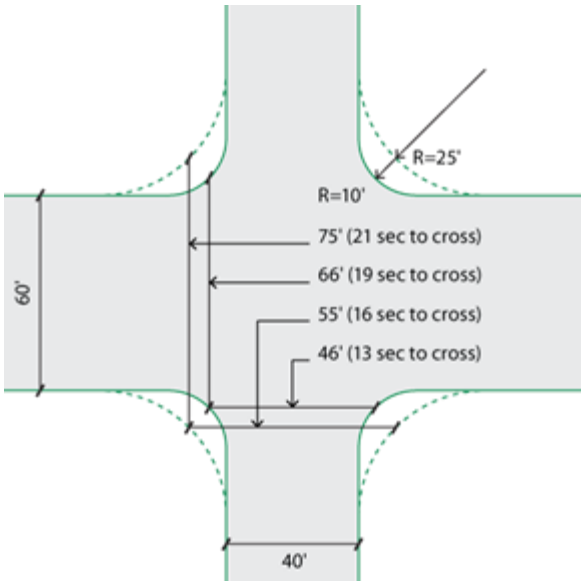
6.4. Channelized Turn Lanes

Channelized right turn lanes should be designed for slow speeds (5-10mph). Crossings should be marked with high-visibility continental crosswalks, a stop bar, standard pedestrian crossing assembly, and Stop Here for Pedestrian (R1-5c) signage. For high volume crossings or locations with documented safety issues some cities have begun using mountable curbs, raised crosswalks, and/or signalization devices. Often the curb apron takes the place of the area gored around the island. For channelized turn lanes for interstate access the City of Lawrence will need an agreement with KDOT.

Figure 6-7: Mountable Apron and Raised Crosswalk (Source: Google)

6.5. Benefits of Smaller Curb Radii

- Improved pedestrian ramp alignment
- Slower turning movements
- Reduced pedestrian crossing distances
- Additional space for traffic signal equipment
- Reduction of needed right-of-way
- Improved multimodal intersection safety



6.6. Slowing Left Hand Turns

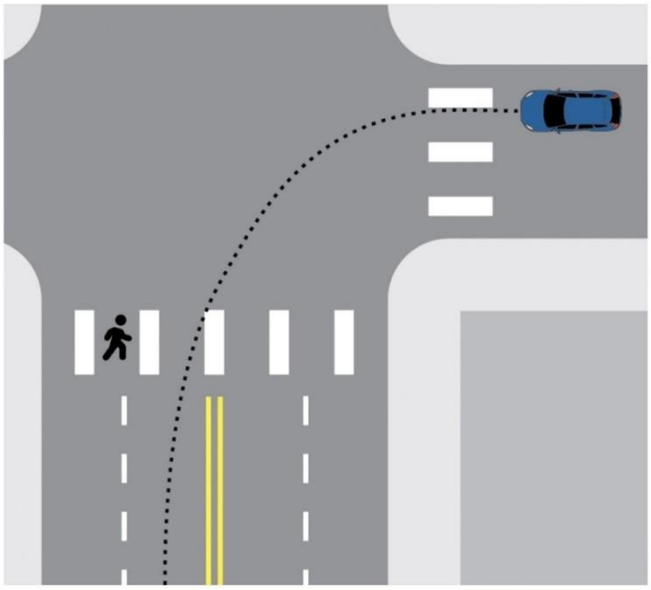
Left hand turns have not received the same focus in the past as right turns. New guidance has begun to encourage methods to slow vehicles making left hand turns. Wider left-hand turns decrease the turning radius, slowing speeds and improving visibility of the crosswalk.

6.6.1. Medians

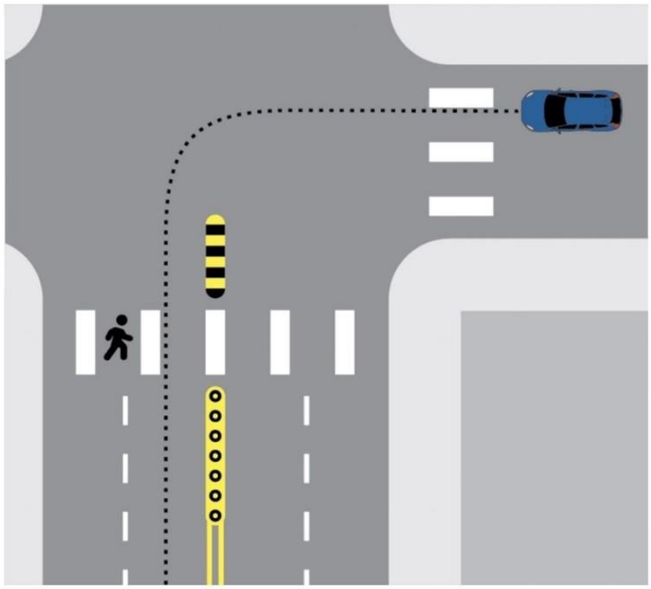
The placement of medians with a pedestrian refuge improves the safety of pedestrians crossing an intersection. The ability for a pedestrian to stop in the median provides them the ability to react to each direction of travel independently. The curbed median being placed on both sides of the crosswalk also requires left turning vehicles to make wider turns to avoid the structure.

6.6.2. Hardened Centerlines

In locations that do not provide the space for a center median, cities have begun using centerline hardening as a design method. A recommended practice is the use of mountable devices near the intersection and vertical delineators on the segment side of the crosswalk. These devices should include yellow retroreflective markings.



Before centerline hardening



After centerline hardening

6.6.3. Application

While these techniques for slowing left hand turns may be installed at any intersection and city should evaluate the site to ensure that limited funding is allocated to the areas with the greatest need. It is important to factor in crash history, left turn operation, pedestrian volume, left turn volume, gap acceptance for permissive left turn movements, and sight distance. The following questionnaire (Table 6-1) indicates when further study for installation when any question receives a YES answer.

Table 6-1: Left Turn Hardening Questionnaire

Question	YES	NO
Is there record of 3 pedestrian crashes over the previous 3 years?		
Is there record of a pedestrian fatality over the previous 5 years?		
Are permissive left turns allowed at the intersection?		
Do more than 150 vph make left turns?		
Is this area considered a high pedestrian zone?		
Is there a concentration of vulnerable users in the area?		
Does vehicular speed exceed 30 mph?		

7. Roundabout

The FHWA's Roundabouts: An Informational Guide (NHRCP 672) addresses the planning, design, construction, maintenance, and operation of roundabouts. It also includes information that will be useful in explaining to the public the trade-offs associated with roundabouts. The City of Lawrence has adopted the Kansas Roundabout Guide, A Companion to NHCRP 672, as part of the local design criteria for roundabout design. Roadway intersections introduce potential conflict points with other

vehicles, but also raise a concern for non-motorized users, such as pedestrians and bicyclists. Residents of Lawrence have indicated that they feel most comfortable bicycling where there are buffered or designated bicycle lanes (source 2019 Lawrence Bikes report) that elevate the level of comfort for the rider. Navigating through an intersection safely and efficiently both motorized and non-motorized users can be addressed with varying accommodations and requires additional considerations. This section specifically covers how the roundabout, one of the safest intersection types for vehicles, can also function safely for non-motorized users when properly designed and constructed. The FHWA's Roundabouts: An Informational Guide should be referred to for more information and recommendations.

7.1. Bicyclists

7.1.1. In-roadway or Separated Pathway Considerations.

a. Entry Speeds.

Roundabouts are generally designed with an entry speed of 20-30mph where merging and diverging can be easily managed. Experienced, confident in-road bicyclists typically travel 12-20mph. Compatible speeds between users is a key factor in determining whether the bicyclists should be provided with an alternate pathway through the intersection. If travel speeds and confidence levels are not compatible, user separation is advisable.

b. Traffic Volumes.

The number of lanes in a roundabout is influenced by the amount of vehicular traffic traveling through the intersection. Multilane roundabouts increase the number of decisions to be made by drivers. Allowing low confident bicyclists to travel within the multilane roundabout, increases potential for collisions between users. When traffic volumes dictate more than a single lane roundabout, guiding the bicyclists through the intersection on a separated path is recommended.

Typically, vehicle volumes are greater than bicycles or pedestrians. In some cases, the reverse can be true. When there is a high disparity between the number of vehicles and the number of bicyclists navigating the roundabout, it is recommended to provide separation between users.

7.1.2. Design Criteria.

a. Bike Ramps to Separated Pathway (sidewalk).

The FHWA's Roundabouts: An Informational Guide recommends a 35% -45% angle on the ramp to discourage a high speed bicycle entry to the sidewalk. This is to decrease potential conflicts with pedestrians and other bicyclists on the sidewalk.

In order to not confuse visually impaired pedestrians on the sidewalks, the bicycle ramps are placed at least 50 ft prior to the crosswalk.

b. Pavement Markings and Signing.

If there is an existing bike lane designated on the roadway approaching the roundabout, the bike lane would terminate prior to entering the roundabout by providing a taper similar to what is shown in Figure 7-1. Bike Lanes are not marked in the roundabout and the bicyclists would travel through it the same as motorized vehicles. The bike lane would resume downstream from the roundabout. The ending and beginning of the bike lane is indicated by standard MUTCD Bike Lane Begins and Ends signing.

If there is an existing bike lane designated on the roadway approaching the roundabout and bicycles are to be separated, additional measures to navigate the bicyclists to the bike pathway would be taken. This includes the pavement markings and bike trail signs to guide bicycles to the designated pathway. The Urban Bikeway Design Guide provides solutions that can help create complete streets that are safe and enjoyable for bicyclists.

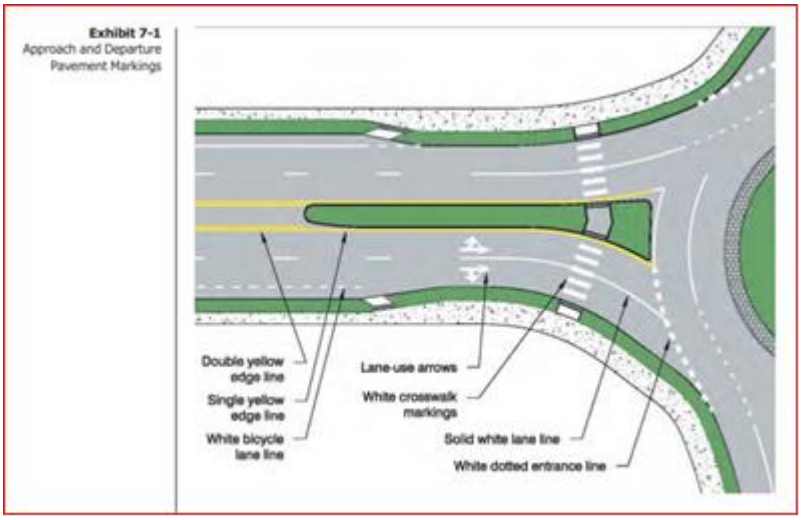


Figure 7-1: Sample Pavement Marking

c. Crossings In Roundabout.

Crossings within the roundabout are set back away from the circular pathway in order to not impede the movement through the roundabout.

Yield lines for vehicles entering the roundabout are generally placed on the outer edge of the circular pathway. The crosswalk should be located approximately 25 feet in advance of the Yield line. This provides space for a vehicle waiting to merge into the roundabout and not block the crossing.

Proper signing for approaching vehicles, bicyclists, and pedestrians, is applied using standard MUTCD guidelines and the NACTO report "Don't Give Up at the Intersection" report. Signing applications for vehicles approaching the roundabout provide include Circular Intersection warning, Yield, and Pedestrian Crossing warning. A sample signing layout is shown in Figure 7-2.

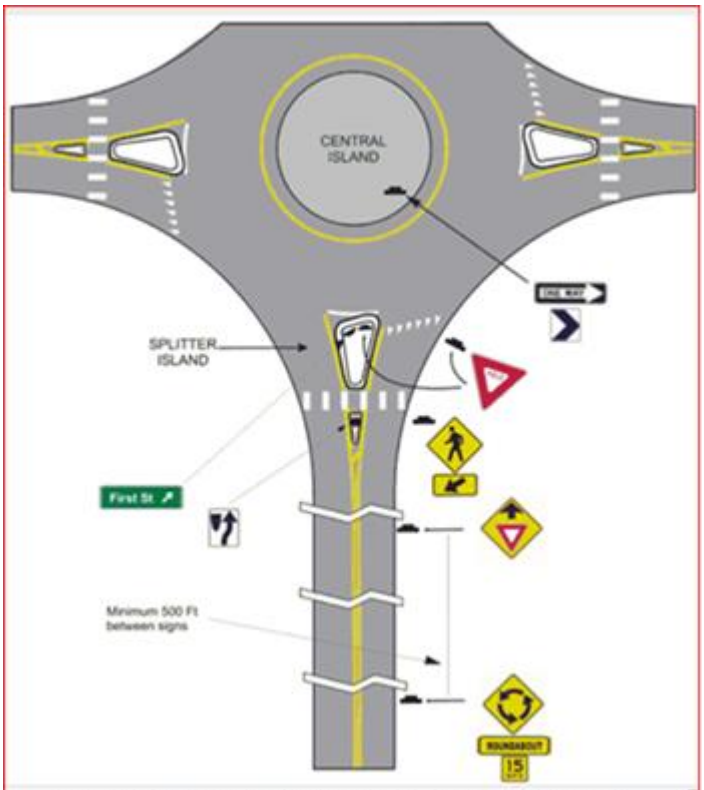


Fig. 903.6.37 Example of Markings for Roundabout Intersections With One-Lane Approaches

Not common, but in certain situations, more advanced traffic control features are necessary to enhance the warning for pedestrian and bicycle crossings at intersections, including roundabouts. When the vehicle volumes are high, multilane configurations are present, pedestrian and/or bicycle volumes are high, or the roundabout is complex in geometrics, crossing signals and Rectangular Rapid Flashing Beacons can be considered. This is outlined in the FHWA's Roundabouts: An Informational Guide and MUTCD.

8. Transit and Railroad Crossings

8.1. Bicyclists

Transit and railroad conflicts may be addressed through designs that clearly delineate the pathway for each user, including bicyclists and pedestrians. Key guiding principles include safety, accommodation and comfort, coherence, predictability, context sensitivity, and experimentation. The FHWA report "Achieving Multimodal Networks – Applying Design Flexibility and Reducing Conflicts" provides details and criteria to reduce conflicts between modes of travelers.

8.1.1. Railway Track Crossing.

Railway tracks can be a hazard for bicycle tires because of the gaps, known as flangeways, around the rails and during wet weather where the rails become slick. Certain countermeasures can help reduce the impact of these circumstances.

Alignment of the bike pathway to the tracks. It is recommended that the bike path cross the rails at a 60-90 degree angle or fill the flangeways with appropriate filler material. Additionally, advance warning signs for the bicyclists is advised. Figure 8-1 below from the FHWA report mentioned previously shows a typical layout for this situation.

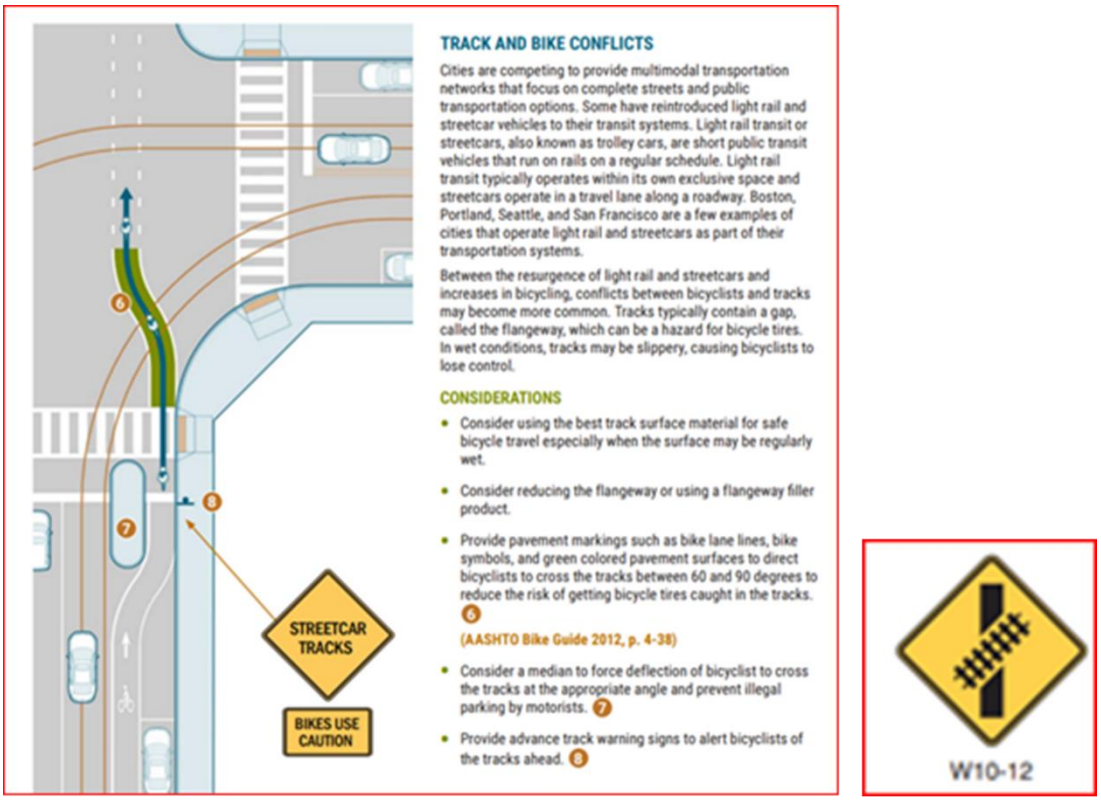
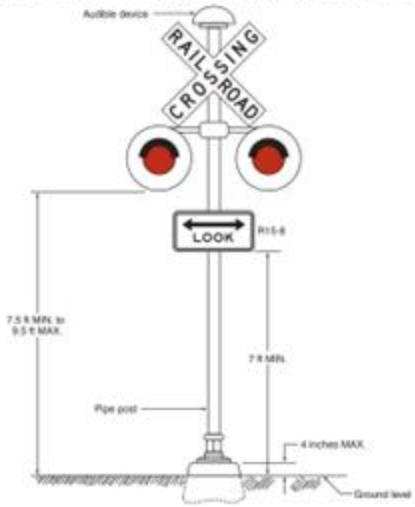


Figure 8-1: Sample Bike Path Alignment Across Rails

Pedestrian crossings over rails can be challenging for pedestrians as well. Recommendations include providing a suitable crossing plate or filler material to ensure a safe walking surface.

It may be necessary to install more advanced and active traffic control for pedestrians and bicyclists crossing rails, such as in high traffic, complex intersections, or areas of greater vulnerability. This includes providing gates and signals for pedestrian and bicycle movements. In some situations, a bridge or tunnel is recommended where more separation is warranted and eliminating the potential conflict is critical.

Figure 8C-4. Example of Flashing-Light Signal Assembly for Pedestrian Crossings

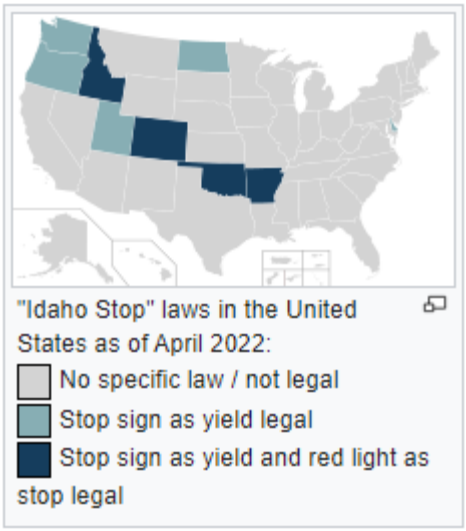


9. Idaho Stops

The Idaho stop is the common name for laws that allow cyclists to treat a stop sign as a yield sign, and a red light as a stop sign.[1] It first became law in Idaho in 1982, but was not adopted elsewhere until Delaware adopted a limited stop-as-yield law, the "Delaware Yield", in 2017.[2] Arkansas was the second state to legalize both stop-as-yield and red light-as-stop in April 2019. Studies in Delaware and Idaho have shown significant decreases in crashes at stop-controlled intersections. Additional historical information regarding this topic can be found at https://en.wikipedia.org/wiki/Idaho_stop

9.1. States with Idaho Stop

A limited number of states, counties, and cities across the nation have legalized this movement. Reasoning for this legalization varies. For example, Tennessee partially legalized this years ago because they allowed motorcycles to treat redlights as stop signs because the induction loops were not reading them at actuated signals. A group of cyclists sued the state to receive the same flexibility. Tennessee statute 55-8-110(8)(d) is only applicable to signals with actuation devices and the officer may issue a ticket if they believe the signal is functioning properly. The map below (Figure 9-1) shows the states that have passed specific "Idaho Stop" statutes.



In addition to the states identified on the map, an additional 9 states have passed laws similar to Tennessee requiring a belief that signal detection is malfunctioning to proceed.

1. Arizona
2. Illinois
3. Kansas
4. Minnesota
5. Missouri
6. South Carolina
7. Tennessee
8. Virginia
9. Wisconsin

Kansas statute 8-1508(c)(4) allows bicyclists to proceed through an inoperative and/or malfunctioning light after they have waited a reasonable period of time. These laws are typically passed at the state level with the exception of a few cities in Colorado. Standalone laws at the local level, with certain exceptions, can lead to confusion of how bicyclists or drivers will react at intersections throughout a region based on where they fall within a municipal boundary.

9.2. Pros and Cons of the Idaho Stop.

9.2.1. Pros

- Safety with regards to the odds of collisions involving a vehicle's blind spot
- More clear enforcement of unsafe drivers and riders
- Conservation of energy
- Vehicle detection limitations are minimized

9.2.2. Cons

- Inconsistent laws for all road users
- Less predictable behavior for cyclists
- Degraded safety
- Modern detection devices available

9.3. Recommendation for Idaho Stop

The City of Lawrence should continue to advocate for the full legalization of the Idaho Stop in the State of Kansas. The current law requires a subjective decision based on the signals functioning operation. Lawrence should not enact a law specific to their boundaries. A local law would place further uncertainty between the bicyclists and drivers on how the other party will act at signal devices. Each individual would need a clear understanding of the city's boundaries and extra educational programs would be needed for visitors.

References

Transportation 2040 Metropolitan Transportation Plan Lawrence – Douglas County
Approved on March 17, 2022 by MPO Policy Board

Lawrence Bikes Plan
Approved on August 15, 2019 by MPO Policy Board and Lawrence City Commission

Lawrence Pedestrian Plan
Adopted on June 12, 2022 by Lawrence City Commission and on May 12, 2022 by MPO Policy Board

Urban Street Design Guide (NACTO)

Transit Street Design Guide (NACTO)

Urban Bikeway Design Guide (NACTO)

Don't Give Up at the Intersection (NACTO)

Designing for All Ages & Abilities (NACTO)

Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges (ITE)

Prohibition of Turns on Red at Signalized Intersections (ITE)

Crosswalk Policy Guide (ITE)

Guidance to Improve Pedestrian and Bicyclist Safety at Intersections (NHCRP 926)

Guide for Improving Safety at Uncontrolled Crossing Locations (FHWA)

STEP: Improving Visibility At Trail Crossings (FHWA)

PEDSAFE – Pedestrian Safety Guide and Countermeasure Selection System (FHWA)

Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts (FHWA)

Small Town and Rural Multimodal Networks (FHWA)

Manual on Uniform Traffic Control Devices (AASHTO)