ENGINEERING AND PLAN PREPARATION MANUAL FOR PUBLIC FACILITIES

City of Lake Saint Louis, Missouri
Department of Public Works

July 2, 2010

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Errata Sheet

Section Number	*Revision or Addition*	*Revision Date*

(2010)

All Text..... Complete Revision and Update to the Design Criteria 7-2-2010

(2013)

1.4.3.....Design Exemptions (New Section).....8-19-2013
1.4.4..... Plan Submittal (Section Number Change) 8-19-2013

1 Introduction

1.1 Purpose

This manual sets forth design criteria and procedures and Construction Specifications for City of Lake Saint Louis, Missouri (City) public improvement projects.

1.2 Scope

This manual is relevant for anyone preparing engineering plans or constructing a public improvement for the Public Works Department or a development within the City for which site plan and or improvement plan review is performed by the Public Works Department.

1.3 *Definitions*

Current Edition: When a publication from another agency is adopted as the standard for the City, *current edition* shall mean the currently effective edition of the manual or publication as of the date of the first Planning and Zoning meeting for which the project is presented. This effective date shall reset if the Planning and/or Board of Alderman approvals for a development expire.

Public Improvement: Any Improvement or modification to the built or natural environment intended to serve the public interest or to be accessed or used by the general public regardless of ownership such as, detention basins, streets (public or private), parking lots, etc.

1.4 Procedures

1.4.1 Design Philosophy

The criterion in this manual represents requirements which must be met for the design of public improvements unless approved exceptions or variance are obtained in accordance with procedures outlined in this manual.

Engineering design is primarily a matter of sound application of acceptable engineering criteria and standards. While the criteria contained in this manual provide a basis for uniform design practices for typical design situations, precise standards which would apply to individual situations may not be appropriate. The design engineer must rely on good engineering practices and analysis.

Situations will exist where these criteria will not apply. The inappropriate use of and adherence to these criteria does not exempt the engineer from the professional responsibility of developing an appropriate design. The engineer is responsible for identifying those criteria which may not apply to a particular design, and for obtaining the necessary exemption or variation to achieve proper design.

1.4.2 Preliminary Procedures

Prior to submitting preliminary plans for Planning and Zoning consideration a prospective applicant shall schedule a pre-application meeting with the Department of Public Works and Community Development. At this meeting, the prospective applicant shall provide general information on the proposed development, including site location, existing site conditions, and a sketch plan of the proposed development. A Public Works Representative shall report to the applicant the Staff's evaluation of the sketch plan with respect to its compliance with these regulations.

The pre-application meeting is a required, but informal, procedure intended to benefit the prospective applicant by allowing for an exchange of ideas and information, and to provide an opportunity to review the requirements of these regulations with the prospective applicant. No formal approval from the Department of Public Works or other city staff is required prior to proceeding with the Preliminary Development Plan submittal.

Contents of Sketch Plan: A sketch plan on a topographic survey shall show in simple sketch form the proposed layout of streets, lots and any other features the applicant has knowledge of such as access to utilities in relation to existing conditions. The sketch plan may be as simple as a freehand pencil sketch made directly on a print of the topographical survey.

1.4.3 Design Exemptions

A design exemption permits techniques and standards that differ from these criteria for the design of an improvement. In most cases, the need for an exemption results form a conflict between these criteria and other accepted engineering techniques or standards.

The applicant can make a request for a design exemption by completing an application form provided by Public Works. The design exemption must be supported and accompanied by published engineering guidelines, technical papers, standards, etc. The design exception will then be reviewed and approved by the Department of Public works, and only become effective after concurrence from the Board of Aldermen.

1.4.4 Plan Submittal

Once a new phase, revision to an existing phase, or site plan for a new project is approved by the Board of Aldermen, a review set of improvement plans and calculations shall be submitted to the Public Works Department. Upon approval two full size (22” x 34”) and two half size complete sets of improvement plans along with one record set of appropriate design calculations (if changes have been made to the previous review set) shall be submitted to the Department of Public Works for the City’s use. Additional sets of plans and calculations as necessary for the applicant’s uses shall be submitted to the city to be stamped “approved” and returned. The improvement/site plans shall be provided with a cover letter indicating the individual to whom contents are to be addressed, and a completed and signed application checklist. The current application checklist can be found on the internet at:

http://www.lakesaintlouis.com/

1.5 Revisions and Updates

Manual holders are encouraged to submit comments and suggestions for changes to:

City of Lake Saint Louis
Public Works Department
307 Parkway Industrial Dr.
Lake Saint Louis, Missouri 63367
Fax 636.695.4227

Revisions to the manual will be made on an as needed basis and will be posted on the City's web site at:

http://www.lakesaintlouis.com/

2 Survey

2.1 Standards

All surveys shall be conducted in accordance with Missouri State standards.

2.2 Datum

All surveys shall be referenced to NAD 83 Missouri East Plane and NAVD 88.

2.3 Benchmark and Control Points

If the project is located in a flood hazard area, then benchmarks shall also be tied to the appropriate FEMA Flood Insurance Study benchmark so that the flood hazard elevations can be determined for the project. The referenced FEMA benchmark and elevation shall be noted on the plans with an equation to correlate the NAVD 88 elevation.

All control points shall be referenced to no less than three (3) tie points. Control and tie points shall be noted in the plans.

For surveys of projects that are constructed from a construction centerline or survey baseline (i.e., roadways and water lines) a control point shall be established at regular intervals of no less than one (1) for every 1,000 feet of centerline. No less than two (2) control points shall be established.

For all other surveys, no less than two (2) control points shall be established with a maximum of 1,000 feet between the points.

2.4 Field Work Requirements

2.4.1 General Requirements

As a minimum, all field surveys shall include:

- Locate and depict all right-of-way lines, property lines, and easements within the project limits
- Locate (horizontally and vertically) all visible utilities.
- For all storm and sanitary structures, determine flow line elevations, pipe dimensions, and pipe materials for all incoming and outgoing pipes. This information must be complete to establish all pipe slopes within the project limits.
- Locate and depict all existing improvements including, but not limited to, pavements, curbs, pavement markings, traffic signals, structures, fences, trees 4” or larger (include diameter), landscaping, signs, and mail boxes.
- Locate all grade features (tops and toes of curbs, walls, and banks; pavement crown points; flowlines of swales, ditches, and creeks; grade breaks, and so forth) in sufficient detail to accurately model the terrain.

2.4.2 Requirements for Centerline Survey Projects

In addition to the general requirements, projects that are constructed from a construction centerline or survey baseline shall include the following minimum requirements:

- Cross sections at regular intervals, no less than 50 feet, required to accurately depict the terrain. Sections shall be tied to existing stationing, if available.
- Driveways from the roadway centerline to the structure or 50 feet, whichever is less. For concrete driveways, the survey shall locate the joints.
- Stormwater drainage ways shall be located no less than 100 feet either side of the centerline.
- Intersecting side streets shall be surveyed no less than 200 feet either side of the centerline.

2.4.3 Requirements for "As Built" Surveys

An "As Built" survey shall be provided for all public improvements according to the following requirements:

2.4.3.1 Requirements.

The as-built plans shall include the following: the size, type and manufacturer information of material used, horizontal and vertical coordinates of all utilities visible from the surface, alignment of underground facilities, flowline elevations of all sewers, all permanent improvements, and all changes/deviations from the plans. As-built plans shall be prepared by a licensed surveyor in the State of Missouri.

2.4.3.2 Deliverables.

1. **Reproducible As-Built Plans.** The Developer shall supply one (1) mylar set of as-built plans signed and sealed by a licensed surveyor in the State of Missouri. The plans shall include a title sheet that bears the name of the project, location map, list of abbreviations, legend of symbols, index of sheets, name of the company that prepared the plans, date, and labeled 'As-Built Plans'.

2. **Electronic Files.** The Developer shall supply the following files:

   2.1. A completed original CAD drawing in .dgn (MicroStation Version 7 or earlier), .dwg (AutoCAD Release 2000 or earlier), or .dxf (drawing exchange format). This file shall include all layers and graphic elements included in the paper document (i.e., text, legend, scale, labels, etc…). This file will include features classified in the standard layers defined below. The completed CAD drawing file shall contain text in standard fonts that can be read without third-party software. All data must be mapped to scale and a graphic scale placed in the drawing.

   2.2. A completed original CAD drawing in .pdf (portable document format). The file shall include all layers and graphic elements included in the paper document (i.e. text, legend scale, labels, etc…). The .pdf file must be printed to scale and a graphic scale placed in the drawing.

2.3. A metadata text file containing the information specified below. The metadata file includes submittal information as well as technical parameters that may be necessary to review if problems in the data conversion occur. The ASCII text file shall be labeled 'metedat.txt'.

2.4. All electronic files shall be delivered on a CD-ROM disc, DVD-ROM disc or other portable storage device. A 'read me' text file labeled 'index.txt' shall be included that gives a brief description of the files contained on the disc. The disc shall be labeled with the title of the project, a project contact name and telephone number, and a submittal / file creation date.

3. Acceptance of Deliverables. The City reserves the right to approve or reject all or any part of the deliverables and require the Developer to resubmit any rejected deliverables to conform to these specifications.

2.4.3.3 Standards.

A) Coordinate System. The North American Datum of 1983 (NAD 83/93), Missouri East Zone, US Survey Feet, shall be used for the horizontal datum. The National American Vertical Datum of 1988 (NAVD 88), US Survey Feet, shall be used for the vertical datum. Available Geodetic Control Network shall be researched through the NGS National Geodetic Survey (NGS), National Spatial Reference System (NSRS) database. All GPS related projects shall reference these materials.

B) Electronic Graphic File Standards.

Layer Name	Feature Type	Description
WTRPIPE	Polyline	Water Main
WTRHYDT	Point	Water Hydrant
WTRPIPETXT		Type (distribution or transmission), Diameter, Material
WTRHYDTTXT		Type (2 or 3 way), Manufacturer, Year
SANIMH	Point	Sanitary Manhole
SANIPIPE	Polyline	Sanitary Main
SANIMHLTXT		Type (standard, terminal, etc.), Material, Depth
STMSTMH	Point	Storm Manhole
STMSTCRBIN	Point	Curb Inlet
STMSTIN	Point	Inlet
STMSTOTFL	Point	Outfall
STMSTFL	Point	Flared End
STMSTRTPND	Polygon	Retention Pond
STMSTTXT		Material, Depth

C) Metadata Text File Specifications.

This file must contain the following information:

Submittal Date
Subdivision Name
County
City
Parent Parcel Number
Number of Lots

Type of Geodetic Control

GPS
Unit Type
PDOP of Control Points
Differentially Corrected Y/N

Traverse to Monument
Referenced Monument Name/Number
Distance to Monument

Prepared by (Firm Name)
Signed by (Individual Name)
Contact Information (Name, Phone, Address)
Software Version Used

4. **Release of Escrow and Acceptance of Work.** Recommendation for final escrow release and acceptance of any public improvement shall not be made by the Public Works Department prior to the approval of "As Built" Drawings in conformance with these requirements.

3 Roadways

3.1 Functional Classifications

Functional Classifications shall be determined by the methods described in **FHWA Functional Classification Guidelines** this document is available on the internet at:

http://www.fhwa.dot.gov/planning/fcsec1_1.htm

Streets in the City of Lake Saint Louis will likely fall into the following categories, but others may be used:

Arterial Street: A multi-lane facility designed for movement of a relatively large volume of traffic, which serves the major centers of activity within the City. Arterial streets typically intersect the corporate boundaries and provide connections between local and collector streets and the freeways.

Major Collector Street: A multi-lane facility, which distributes traffic from arterials through the City to the ultimate destination, typically distributing traffic to minor collector and local streets from arterials. Major collector streets provide access to residential, commercial, and industrial areas.

Minor Collector Street: A street located within a residential or non-residential subdivision, which collects from and distributes traffic to local streets and connects to major collector and arterial streets.

Residential Local Street: A street contained within a residential subdivision or which primarily serves a residential area or as determined by the Director of Public Works.

Non-Residential Local Street: A minor, local street not located within a residential or commercial subdivision that carries low volumes of traffic.

3.2 Design Criteria

3.2.1 Governing Standards

All improvements associated with a street or transportation facility and constructed within City Right-of-Way or contemplated to be dedicated to the City that are funded by Developers, the City, or in partnership with an outside funding agency shall be designed in accordance with the current St. Louis County Department of Highways and Traffic design standards, except as modified by this document. St. Louis County standards are on the internet at:

http://www.co.st-louis.mo.us/hwyweb/DesignCriteria/Index.html

3.2.2 Typical Section Elements

The criteria for typical section elements are summarized for each roadway classification in the following tables.

Table 3.2.2-1
Right-of-Way and Pavement Width Requirements – Exterior Roadways

Roadway Classification	Right-of-Way Width (feet)	Pavement Width (feet) [1]
Arterial		
5-Lane with Continuous Center Turn Lane	90	65
4-Lane with Raised Center Median	100	75
4-Lane	80	53
Major Collector		
3-Lane with Continuous Center Turn Lane	65	41
2-Lane with Raised Center Median	75	51
2-Lane with On Street Parking Both Sides	65	41
Minor Collector		
3-Lane with Continuous Center Turn Lane	56	36
2-Lane with On Street Parking Both Sides	56	36
Non-Residential Local (2-Lane)	50	29
Residential Local (2-Lane)	50	26 or 32 [2]

[1] Width is measured from back of curb to back of curb.

[2] Residential local streets shall be at least 26 feet wide, but the Planning and Zoning Commission may require a minor street to be 32 feet wide if it finds that it is in the best interest of the city for safety and traffic control purposes. Parking shall be allowed only on one side of a Minor (26' wide) Residential Local Street.

Table 3.2.2-2 Pavement Design Requirements	
Arterial	Full Depth Asphalt Pavement 2" Type 'C' Asphaltic Concrete Wearing Surface 11" Type 'X' Bituminous Concrete Base Course 6" Type 5 Aggregate Base Rigid Pavement 9" Portland Cement Concrete 6" Type 5 Aggregate Base
Major Collector	Full Depth Asphalt Pavement 2" Type 'C' Asphaltic Concrete Wearing Surface 9" Type 'X' Bituminous Concrete Base Course 6" Type 5 Aggregate Base Rigid Pavement 8" Portland Cement Concrete 6" Type 5 Aggregate Base
Minor Collector	Full Depth Asphalt Pavement 2" Type 'C' Asphaltic Concrete Wearing Surface 9" Type 'X' Bituminous Concrete Base Course 6" Type 5 Aggregate Base Rigid Pavement 8" Portland Cement Concrete 6" Type 5 Aggregate Base
Non-Residential Local	Full Depth Asphalt Pavement 2" Type 'C' Asphaltic Concrete Wearing Surface 7" Type 'X' Bituminous Concrete Base Course 6" Type 5 Aggregate Base Rigid Pavement 7" Portland Cement Concrete 6" Type 5 Aggregate Base
Residential Local	Full Depth Asphalt Pavement 2" Type 'C' Asphaltic Concrete Wearing Surface 6" Type 'X' Bituminous Concrete Base Course 6" Type 5 Aggregate Base Rigid Pavement 7" Portland Cement Concrete 6" Type 5 Aggregate Base

All subdivision streets, including alleys shall be constructed to the Local Road Pavement Design Requirements except those determined to be a higher functional classification. If the City and Developer do not agree to the functional classification assigned a roadway by City Staff, the Developer shall provide a traffic study at his cost to the city. The traffic study must be performed by a professional registered in the state of Missouri and utilize current AASHTO definitions. Any road receiving funding from an agency other than the Developer or the City

shall be constructed to the Minor Collector Pavement Design Requirements or other requirements as prescribed by the funding agency.

3.2.3 Underdrains

Transverse underdrains (shallow perforated pipe in a filter fabric sleeve bedded in clean rock) shall be provided at and connected to all stormsewer structures. Underdrains shall traverse the entire pavement width.

3.2.4 Horizontal and Vertical Geometrics

Table 3.2.3-1
Horizontal and Vertical Geometric Criteria

Criteria	Arterial	Major Collector	Minor Collector	Non-Residential Local	Residential Local
Design Speed (MPH)	45	40	35	30	30
Anticipated Posted Speed (MPH)	40	35	30	25	25
Profile Grade					
Maximum	6%	8%	8%	8%	8%(3)
Minimum	2%	2%	2%	1%	1%
Horizontal Curve					
Minimum Centerline Radius	955’	375’	275’	200’	100’
Minimum Tangent Length Between Reverse Curves	(1)	(1)	100’	0’	0’
Vertical Curve					
Crest Stopping Sight Distance	350’	300’	250’	250’(4)	225’(4)
K Value	(2)	(2)	(2)	40’	30’
Length	(2)	(2)	100’	90’	50’
Minimum Pavement Radius at Intersecting Streets	32’	32’	32’	32’	32’

(1) Tangent lengths shall be as needed for superelevation. For radii not requiring superelevation, the minimum tangent length shall be 300 feet.
(2) Refer to Section 20.50 in the **Design Criteria for the Preparation of Improvement Plans**, current edition, by the St. Louis County Department of Highways and Traffic.
(3) With express approval of the Public Works Department, profile grades up to 10% may be allowed.
(4) Shorter Stopping Sight Distance may be appropriate where driveway or entrances are not allowed.

3.2.5 Roadside Slopes

Cut and fill slopes to tie the roadway template to the adjoining properties shall be a maximum of 4:1 (horizontal to vertical) for residential properties and a maximum of 3:1 for all other properties.

The use of retaining walls is encouraged to avoid grading on residential properties.

3.2.6 Intersection Sight Distances

Intersections shall be designed in accordance with Section 40.25 of the **Design Criteria for the Preparation of Improvement Plans**, current edition, by the St. Louis County Department of Highways and Traffic to provide proper sight distance. The design criteria for intersection sight distances may be found on the internet at:

http://www.co.st-louis.mo.us/hwyweb/DesignCriteria/Index.html

3.2.7 Superelevation

The design engineer shall exercise caution in the application of superelevations on all streets. Typically residential streets may be constructed without superelevation. Major streets shall be designed in accordance with the current St. Louis County Department of Highways and Traffic design standards, however to allow proper intersection grading, or to reduce impacts to adjacent properties superelevation rates should be reduced if the design engineer decides it is appropriate for the location.

3.2.8 Driveways

3.2.8.1 General

Driveways shall be located in accordance with the site plan requirements and be subject to review and approval of the Public Works Department. All driveways shall be designed so that the edges of curb openings are a minimum of five (5) feet from the nearest edge of street inlets and ten (10) feet from the corner radius point. Edges of the curb opening shall not project beyond the side property line extended normal to the pavement.

The maximum driveway slope shall be 10%, unless approved by the Director of Public Works.

Driveway approaches shall be constructed of concrete from the curb to the right-of-way line. Reconstructed driveways shall be constructed using the same material prior to construction of the project, unless otherwise agreed upon with the property owner in consideration for right-of-way and/or easements. Slope and thickness specifications for all driveway entrances constructed in the right-of-way shall conform to current St. Louis County Department of Highways and Traffic standard drawings.

3.2.8.2 Residential Driveways

The minimum width at the right-of-way line shall be 12 feet. For driveways leading to two car garages the driveway width shall not exceed 20 feet measured at the edge of right-of-way. For driveways leading to a three or more car garage the driveway width shall not exceed 30 feet measured at the edge of right-of-way.

In no event shall the maximum driveway width exceed 43% of the lot frontage.

3.2.8.3 Commercial Driveways

The minimum width of a commercial driveway at the right-of-way line shall be 24 feet. The maximum width of a commercial driveway at the right-of-way line shall be 35 feet.

Commercial Driveways shall be constructed with a radius between the edge of pavement and edge of driveway of at least 10 feet, and not more than 20 feet. Under certain circumstances such as for entrances with heavy traffic, those serving large vehicles, or those designed to limit traffic to right in – right out movements only may be approved with larger radiuses than 20 feet by the Director of Public Works.

The number of commercial driveways for a property shall be based on street frontage and shall not exceed the number shown in the table below:

Lot Frontage (feet)	Maximum Number of Driveway Entrances
Less than 200	2
200-500	3
500-1000	4
More than 1000	One driveway per each 200 feet of frontage

Properties which have frontage on two or more streets may have driveway entrances on each street in accordance with the above criteria such that the sum of Lot Frontage on all front yards will indicate the maximum number of driveways entrances for the entire site.

3.2.9 Clear Heights

A minimum 20’ clear passage over all traveled ways shall be provided on all new and reconstructed roads except local residential streets. A minimum of 15’ high clear passage (built improvements) over all traveled ways shall be provided on all roads. At no point in the right of way shall an obstruction lower than 12’ be permitted.

3.2.10 Roadside Safety

3.2.10.1 Design Criteria

The current edition of the **Roadside Design Guide** by the American Association of State Highway and Transportation Officials (AASHTO) is to be used to determine the criteria and design requirements for:

- Roadside safety
- Roadside topography and drainage features
- Sign and luminaire supports and similar roadside features
- Roadside barriers (i.e., guardrail, concrete traffic barriers, and so forth)
- Bridge railings and transitions
- Barrier end treatments and crash cushions

Roads with a design speed of less than 35 miles per hour may be granted an exception to the requirements of the Road Side Design Guide. The Director of Public Works may require as part of a variance request a certification of appropriateness, sealed by a Professional Engineer, registered in the State of Missouri for configurations found not to be in conformance with the Road Side Design Guide.

3.2.11 Access Management

3.2.11.1 Standard

Access Management shall be addressed as part of the Site Plan Approval process. The **Access Management Guidelines** as developed by Saint Louis County Highways and Traffic are adopted as the basic guidelines for access management in the City of Lake Saint Louis. Where Site Plan Approval is not required the Director of Public Works will utilize these guidelines in reviewing access to public streets.

http://www.co.st-louis.mo.us/hwyweb/Publications/Access_Management_Guidelines/Access_Management_Guidelines_06-2008.pdf

3.2.12 Signing and Pavement Markings

3.2.12.1 Design Criteria

All Signage and Pavement Markings shall be designed in accordance with the current US Department of Transportation Manual of Uniform Traffic Control Devices.

3.2.12.2 Specifications

All Signage and Pavement Markings constructed within City Right-of-Way or contemplated to be dedicated to the City shall be constructed in accordance with St. Louis County Standard Specifications for Highway Construction except as listed below:

All street identification signage shall be as follows: 9" extruded aluminum blank (0.80 gauge) with Brown high intensity prismatic sheeting ; 6" or larger “Clearview” lettering shall be used

for the street name; 3" "Clearview" lettering shall be used for abbreviation of street, drive, court, lane, avenue, etc. All lettering shall be high intensity prismatic sheeting (ASTM 4956 Type IV). Minor cul-de-sacs intersecting with residential streets may use 6" blades, 4" lettering and 2.5" abbreviations.

Stop Signs and Street ID Signs shall be mounted on 12' 2-3/8" Pipe Posts.

All other signs including "No Parking" signs, shall be mounted on 12' galvanized steel "U" channel posts. Posts shall be 2# per foot minimum with 3/8" holes on 1" centers along the entire post starting 1" from the top of post. Green painted posts will not be accepted. All signs that are more than 36" in height will be mounted on 14' galvanized "U" channel posts of the same type as described above.

A variance from the specifications for public street I.D. signage can only be obtained through the Board of Alderman. If granted, an agreement between the developer and the City must be executed delegating perpetual maintenance of the nonconforming I.D. signage to the subdivision's homeowners association.

Street I.D. signage at the intersection between a public street and private street shall carry a small tag labeled "Private Street" on the Street I.D. blade for the private street.

"No Parking" signs shall be 12" x 18" .080 gauge aluminum blanks with High Intensity Prismatic sheeting (red letters and border on white background). R7-1 signs with single arrows, as appropriate, will be provided at the start and end of a no parking area with the signs being installed at an angle between 30 degrees and 45 degrees at locations as directed by the City's Traffic Engineer or the Engineer's designee. R7-13 no parking this side of street signs shall be used for all other locations with the signs being installed at a 90 degree angle to the street curb line.

3.2.13 Street Lighting

Street lighting shall be provided in subdivisions and on roadway improvement projects in accordance with Cuivre River specifications.

Street lights are to be placed at regular intervals of 300 feet or less. The interval may be adjusted to avoid placing light standards in intersections, driveways, pedestrian curb ramps, and so forth.

3.2.14 Work Zone Traffic Control

Plans for controlling vehicular and pedestrian traffic during construction of projects shall be designed in accordance with the latest editions of the **Manual on Uniform Traffic Control Devices (MUTCD)**, published by the Federal Highway Administration and the **Roadside Design Guide** by the American Association of State Highway and Transportation Officials (AASHTO). The Missouri Department of Transportation also publishes additional guidance for work traffic control.

3.3 Engineering Design Process and Plan Development

3.3.1 Conceptual Design Phase

3.3.1.1 Roadway Improvement Projects

Generally, the conceptual design process should accomplish or complete the following activities:

- Completely and fully define and document the objectives of the project and the scope of activities to accomplish them. Depending on the complexity of the project, this may include public involvement.
- Establish and document the functional classification, design controls, assumptions, design standards, exceptions, and variations.
- Gather and document the following traffic data:
    - Average Daily Traffic (ADT) for current year, opening year (completion of construction), and design year (opening year plus 20 years, unless otherwise directed by the Director of Public Works).
    - Existing hourly traffic volumes over minimum 24 hour period, including peak hour turning movements and pedestrian counts.
    - Projected annual traffic growth rate.
    - Truck percentage (T) for daily and peak hour.
    - Design speed and proposed posted speed.
    - Recommendation for design vehicle to be provided for intersection turning movements.
    - Special or unique traffic conditions.
    - Signal warrant analysis for all unsignalized intersections based on opening year traffic conditions.
- Identify and document additional engineering support services.
- Establish conceptual alignment, geometry, and typical sections. On complex projects, the conceptual vertical grades and cross sections may need to be established.
- Establish conceptual construction phasing and traffic control options for complex projects.
- Determine and document if right-of-way is required. Existing right-of-way and property lines are to be determined from St. Charles County's GIS maps. For more information on obtaining the GIS parcel mapping, write, call, or e-mail the County at:

    Information Systems Department
    GIS Services Division
    201 N. Second St., Room 310
    St. Charles, MO. 63301
    Phone: 636-949-7480 or 636-949-7417
    Email: gisservices@saintcharlescounty.org

- Develop and document cost estimates for budgeting purposes.

3.3.1.2 Subdivision Roadway Requirements

See **1.4.2 Preliminary Procedures**

3.3.1.3 Plan Submittal

See **1.4.3 Plan Submittal**

4 Bicycle and Pedestrian Facilities

4.1 Typical Section Elements

4.1.1 Width

Except as otherwise specifically approved as part of a planned development, the minimum sidewalk width shall be five feet on local streets and six feet on other streets. Bicycle and Mixed Use Paths shall have a width of no less than eight feet of paved surface.

4.1.2 Design Standards

Bicycle and Pedestrian Facilities shall be designed in accordance with the current AASHTO Guide for the Development of Bicycle Facilities and comply with ADA Title III regulations as adopted by the Department of Justice or US Department of Transportation as applicable.

4.1.3 Detectable Warnings

Detectable Warnings shall be used as required by ADA Title III regulations. Products from approved manufacturers must be used in areas of public maintenance. Below is a list of approved manufacturers and products.

SIDEWALK HANDICAP DETECTABLE WARNING SURFACE APPROVED MANUFACTURER LIST

The flowing manufactures and products are pre-approved for use on construction projects in the City of Lake Saint Louis. Products not listed below must be reviewed and approved by the Public Works Director prior to acceptance for use on a project.

Detectable warning surfaces shall be red or brick red in color. Other colors may be used upon written permission of the Public Works Director.

For New and Retrofit Applications:

ADA Armor-Tile
Engineered Plastics, Incorporated
300 International Drive, Suite 100
Buffalo, NY 14202
Phone: (800) 682-2525
Fax: (800) 769-4463
www.armor-tile.com

CASTinTACT
Distributed by N-Direct
1833 E. Baseline Rd.
Box 237
Gilbert, AZ 85234
Phone: (480) 226-2074
Fax: (910) 762-7220
www.altermat.com

E-Z-Set Ceramic Composite Detectable Warning Panels
Detectable Warning Systems, Inc.
6435 Joshua Tree Avenue
Orange, CA 92867
Phone: (866) 999-7452
Fax: (714) 974-3246
www.detectable-warning.com

ADA Brick Paver Units (for use on brick or concrete sidewalks/islands only)
Whitacre-Greer Fireproofing Company
1400 S. Mahoning Ave
Alliance, OH 44601
Phone: (800) WGPAVER
(330) 823-1610
Fax: (330) 823-5502
www.wgpaver.com

Detectable Warning Pavers
Tile Tech Pavers
1914 West Pico Blvd
Los Angeles, California 90006
Tel: (213) 380-5560
Fax: (213) 380-5561
www.tiletechpavers.com

For Retrofit Application ONLY:

Polyurethane Truncated Dome Mats
Detectable Warning Systems, Inc.
6435 Joshua Tree Avenue
Orange, CA 92867
Phone: (866) 999-7452
Fax: (714) 974-3246
www.detectable-warning.com

TopMark Thermoplastic Detectable Warning Material
Distributed by Flint Trading, Inc.
P.O. Box 160
Thomasville, NC 27361-0160
Phone: (336) 475-6600
Fax: (336) 4785-7900
www.flinttrading.com

5 Traffic Signals

All Traffic Signals regardless of funding sources, shall be designed in accordance with the current Missouri Department of Transportation (MoDOT) design standards. MoDOT standards are on the internet at:

http://epg.modot.org/index.php?title=Category:902_Signals

Material Specifications shall be Missouri Department of Transportation (MoDOT) standard with the current City Standard Controller, Video Detection, finishes, etc. These items shall be pulled from the most recent comparable City Job Special Provisions and will be supplied upon request. Generally signals shall include video detection, battery backup, powder coated finish on all hardware.

6 Stormwater

6.1 Stormwater Facility Design

All Stormwater collection and conveyance improvements shall be designed in accordance with Current Metropolitan Saint Louis Sewer District (MSD) Rules and Regulations and Engineering Design Requirements for Sanitary Sewage and Stormwater Drainage Facilities, February 2006 including all amendments and updates; or current version with the following modifications:

- Storm Sewer Design:
  - Max. Discharge Velocity at Outlets: 3 feet per second after the use of energy dissipaters.
  - Flow Requiring a Piped System or Designed Channel: 3 cubic foot per second and above
  - Creeks: Creeks to be piped under any public road shall be sized to account for a 50% blockage of the pipe for pipes and boxes with a design size (including the percent blocked) up to 6 feet in diameter. For pipes and boxes 6 feet and larger the percent blocked may be reduced at the direction of the Director of Public Works.
- Storm Water Overflow Systems:
  - Definition: The purpose of the over-flow system is to provide a drainage path to safely pass flows which cannot be accommodated by the design system without causing flooding of adjacent structures.
  - 100 Year Storm Events: Flood areas shall be evaluated and shown on the plans so that if the designed storm sewers are exceeded by a storm event, the flooded area will contain the 100 year, 20 minute and 100 year, 24 hour event. The depth in parking lots may not exceed 8 inches and no part of any flooded area may be within 30 feet of a building. A permanent drainage easement is required for all areas within the flood area of a 100 year storm event and must be recorded on the subdivision plat.
  - 100 year Flood Elevation: 1 vertical foot of freeboard shall be maintained between the 100 year high water elevation and the low sill elevation of any adjacent structure or building.
  - Overflow Facilities: Sewers or structures designed to act as part of an overflow system for flood areas shall be designed for the 100 year, 20 minute peak flows. Normal free board and velocity requirements will not be considered, only the conditions listed above as part of an overflow system.
- Detention Facility Design:
  - Storm Water Detention Easements: Storm water detention easements or restrictions are required for all detention facilities. These easements or restrictions must be recorded on the subdivision plat and must note that maintenance of the facility or facilities are the responsibility of the property owner or owners.
  - Drainage Facility Surface Material: Except as required elsewhere in this document (native plantings). All drainage facilities including, but not limited to detention basins, ditches, and swales must be sodded or stabilized with riprap or

other erosion control materials. Seed and mulch alone may not be installed in the portions of a drainage facility designed to convey or store a flow greater than 3 cfs.

- Stormwater Management Criteria:
  - Section 4.080.01
    - Section 2, subsection b.; amend date to July 2, 2010.
    - Section 3 as amended in Section 16, subsection c.A.2.; amend date to July 2, 2010.
    - Section 3 as amended in Section 16, subsection c.A.3. is removed.
    - Section 3 as amended in Section 16, subsection c.C.2.; amend date to July 2, 2010. Redevelopment sites directly tributary to Lake Saint Louis or Lake Sainte Louise are exempt from providing treatment for channel protection (CP_v).
  - Section 4.080.04
    - A maintenance plan is required with the submittal of stormwater detention site improvement plans.
  - Section 4.080.05
    - Sand filters shall <u>not</u> be acceptable BMP options, including Design variants F-1, F-2, F-3, and F-5 in Subsection 4.a.
  - The MSD "Landscape Guide for Stormwater Best Management Practice Design in St. Louis, Missouri" shall be used in the process of selecting and planting native plant species for the stormwater BMPs in Lake Saint Louis, Missouri. Any alternate plantings used in the stormwater landscaping plan that are not listed in the MSD Landscape Guide shall be approved by City Staff.
  - Water Quality for Redevelopment – High Density Redevelopment sites such as Commercial, and multi family or mixed use sites shall present a water quality plan with planning and zoning submittals. This plan shall demonstrate the ability of the applicant to return the stormwater runoff quality to near natural conditions through capture of rubbish, grit and oil.

6.2 Stormwater Facility Construction

All Stormwater collection and conveyance improvements shall be constructed in accordance with The Metropolitan St. Louis Sewer District (MSD) Standard Construction Specifications for Sewers and Drainage Facilities, 2000 with the following exceptions:

(A) *Maintenance of Backfilled Areas:* Back-filled areas shall be maintained to the grade of the surrounding terrain, by the developer or contractor for a period of one year after completion of the respective contract/project.

(B) *Material:* The following types of pipe may be used for stormwater sewers intended for public use within the city unless specifically instructed otherwise by the Director of Public Works in writing:

- Concrete pipe – 12 inch and larger
- Reinforced concrete pipe – 12 inch and larger
- Polyvinyl chloride pipe – 12 inch and larger
- Fiberglass pipe (RPM) – 12 inch and larger
- High density polyethylene – 12 inch-24 inch

Stormwater sewers crossing public right of way shall be reinforced concrete pipe.

(C) *Bedding Under and Around the Pipe:* All pipe shall be bedded in MSD 1 or 2 bedding unless otherwise directed by the City.

(D) *Earth Backfill, Flowable Fill and Jetting:* The permissible trench backfill materials and compaction methods and criteria are subdivided into those associated with sewer maintenance and new construction of sewers. All trenches not considered part of new construction as defined below will be backfilled according to the maintenance standards and at the direction of the Director of Public Works.

(1) *Maintenance:* Where maintenance/repairs require excavation to existing sewers.

(a) *Flowable Fill (inside paved areas):* Where maintenance is required to existing sewers in paved areas, flowable fill will be used as backfill (except as approved by the city) from the top of the bedding material (6 inches above the pipe) to the surface, or to within one foot of grade in landscaped areas.

(b) *Earth Back fill (outside paved areas):* As an alternative to flowable fill, earth backfill (meeting MSD standards) may be used outside paved areas, from the top of the bedding material (6 inches above the pipe) to the surface. Earth backfill should be placed in maximum 8-inch loose lifts and shall be mechanically compacted to a minimum density equal to that of the adjacent, undisturbed earth.

(2) *New construction:* To include sewer construction in new residential subdivisions, new residential lots and new commercial developments with the exception that any excavations within existing paved areas or any off-site construction excavations are to be treated as a maintenance excavation as stated above.

(a) *Earth Backfill (outside paved areas):* Earth backfill for new construction may be used outside paved areas, and must be properly jetted to achieve proper compaction. (See Jetting in subdivision (d) below)

(b) *Earth Backfill (inside proposed paved areas):* Shall not be used.

(c) *Granular Backfill (inside proposed paved areas):* Granular backfill under proposed paved areas and two feet beyond proposed edge of pavement shall consist of

well graded ¾-inch minus crushed limestone. Granular materials shall be free from organic, deleterious or earth materials such as silt or clay. Granular materials must be properly jetted to achieve proper compaction. (See Jetting in subdivision (d) below)

(d) *Jetting:* Granular materials and earth materials associated with new construction outside of pavements may be jetted, taking care to avoid damage to the newly laid sewers. The jetting shall be performed with a probe route on not greater than 7.5-foot centers with the jetting probe centered over and parallel with the direction of the pipe. Trench widths greater than 10 feet will require multiple probes every 7.5-foot centers.

1. *Depth:* Trench backfill less than 8 feet in depth shall be probed to a depth extending to half the depth of the trench backfill, but not less than 3 feet. Trench backfill greater than 8 feet in depth shall be probed to half the depth of the trench backfill but not greater than 8 feet.

2. *Equipment:* The jetting probe shall be a metal pipe with an exterior diameter of 1½ to 2 inches.

3. *Method:* Jetting shall be performed from the low surface topographic point and proceed toward the high point, and from the bottom of the trench backfill towards the surface. The flooding of each jetting probe shall be started slowly allowing slow saturation of the soil. Water is not to be allowed to flow away from the ditch without first saturating the trench.

4. *Surface bridging:* The contractor shall identify the locations of surface bridging (the tendency for the upper backfill crust to arch over the trench rather than collapse and consolidate during the jetting process). The contractor shall break down the bridged areas using an appropriate method such as the wheels or bucket of a backhoe. When the surface crust is collapsed, the void shall be backfilled with the same material used as trench backfill and re-jetted. Compaction of the materials within the sunken/jetted area shall be compacted such that no further surface subsidence occurs.

(E) *Cast Iron Covers:* Concrete covers on structures will not be allowed. Only cast iron covers are permitted.

(F) *Joints:* All pipe joints and joints on new structures shall use city approved rubber compression type joints. Water stops are required at all points of connection not using rubber compression type joints such as connections to existing structures.

7 Sanitary Sewer

Contact Public Water Supply District No. 2 for design and construction standards.

http://www.waterdistrict2.com/rules.html

8 Water Distribution

Contact Public Water Supply District No. 2 for design and construction standards.

http://www.waterdistrict2.com/rules.html

9 Bridges and Structures

9.1 Design Standards

All Bridges and Structures constructed within City Right-of-Way or contemplated to be dedicated to the City that are funded by Developers, the City, or in partnership with an outside funding agency shall be designed in accordance with the current St. Louis County Department of Highways and Traffic design standards. These design requirements shall be supplemented by the AASHTO Guide Specifications for Pedestrian Bridges as applicable St. Louis County standards are on the internet at:

http://www.co.st-louis.mo.us/hwyweb/DesignCriteria/Index.html

10 Construction

10.1 Construction Specifications

All Roads, Bridges and Structures constructed within City Right-of-Way or contemplated to be dedicated to the City that are funded by Developers, or the City, or in partnership with an outside agency shall be constructed in accordance with St. Louis County Standard Specifications for Highway Construction, current addition.

http://www.co.st-louis.mo.us/hwyweb/Specs Book/index.html

10.2 Modifications to St. Louis County Standard Specifications

10.2.1 Concrete

10.2.1.1 ***Fine aggregate for Pavement –*** Class A, B, and C sand may be utilized for paving concrete. No manufactured sand may be utilized for paving concrete.

10.2.2 Asphalt

10.2.2.1 ***Mix design –*** MODOT or St. Charles County Mix Designs may be used in place of those listed in St. Louis County Standard Specifications. Contractors must submit mix designs for approval 14 days prior to placement of material.

10.2.2.2 ***Collector and Arterial Roads –*** Collector and Arterial Roads constructed of asphalt must use a "super pave" mix design for the surface course.

10.3 Testing

All material tests, geotechnical reports, site evaluations, etc. required in the Standard Specifications shall be provided by the contractor/developer. This work is separate from the construction supervision and inspection which will be provided by the City.

11 Right-of-way Management

11.1 Permits

Except as otherwise provided in the City Code or for an emergency; no person, service provider, contractor, subcontractor or right-of-way user shall perform excavation or work in the right-of-way without a right-of-way permit.

The permit form is available from the Department of Public Works or online at the following address:

http://www.lakesaintlouis.com/

11.1.1 Permit Fees

Before any permit required by the City Code is issued; the applicant must pay a permit fee of fifty dollars ($50.00) for each one hundred (100) linear feet of excavation or part thereof. (Ord. No. 2195 §2, 8-1-05)

11.1.2 Improvements in Right-of-way

Permit Conditions:

1) Mailboxes and driveway aprons shall be exempt from the requirements of this Section; the property owner is responsible for maintenance. If mailboxes or driveways need to be removed for the purpose of right-of-way construction, they shall be replaced at no expense to the homeowner.
2) The property owner shall bear all responsibility for the maintenance of items not exempt in the City Code and ensure that these items do not threaten the public safety and will remove it at no cost to the City immediately on demand of the Public Works Director. If non-exempt items are removed for the purpose of right-of-way construction, the City is not responsible for replacement of the non-exempt item.
3) Non-governmental signage or permanent structures shall not be permitted pursuant to the City Code.
4) The permitee (right-of-way user) must protect the public health, safety and welfare, ensure the structural integrity of the right-of-way, protect the property and safety of other users of the right-of-way and minimize the disruption and inconvenience to the traveling public.
5) Limitations may be established on the amount of excavation or work which may occur at one time and the amount of right-of-way which may be obstructed during construction.
6) All excavations and all right-of-way work which in any way impacts vehicular or pedestrian traffic must be properly signed, barricaded and otherwise protected at the right-of-way user's expense.
7) The Public Works Director may deny an application for a right-of-way permit based on requirements listed in the City Code.

11.1.3 Utility Relocation

In addition to these provisions the following assertions of control over right-of-way and cost for relocations are made by the City:

1) Access to City Right-of-way by utilities is permitted and regulated as prescribed by State Law with various controls exercised by the City.
2) The City's right-of-way and certain easements acquired as part of the subdivision platting process are subject to a hierarchy of uses for which the prevailing use and first priority of access is reserved for the City's roadway and transportation system.
3) Stormsewers conveying drainage from a City Street or Transportation system are an appurtenance to the street or transportation system. These Stormsewers shall therefore enjoy the same position as the street or transportation system and are a component of that facility.
4) The City will reimburse a utility company for relocations associated with a Roadway or Transportation project only where a clear right to reimbursement can be demonstrated. This is typically only the case where a utility company has facilities located in an easement outside of the right-of-way, or where a utility easement acquired separately from the subdivision platting process precedes the establishment of street right-of-way.
5) Restoration of all Utility Cuts in right-of-way shall follow the methods outlined in the stormwater section of this manual. These cuts shall follow the restoration of trenches methods in the *Maintenance* section.

12 Sediment and Erosion Control

The design criteria and approach for sediment and erosion control associated with all projects public and private within the City of Lake Saint Louis shall follow the current edition of **Design Criteria for the Preparation of Improvement Plans** by Saint Charles County, MO. The manual can be found online at the following address:

http://cd.sccmo.org/commdev/index.php?option=com_docman&task=doc_download&gid=102

The current edition of the Saint Charles County, MO **Design Criteria for the Preparation of Improvement Plans** shall be used in all cases for Sediment and Erosion Control specifications except for the following criteria:

Permanent Vegetation Acceptance Specification:

The specification is performance-based. A minimum plant density of 20 plants per square foot is required within 60 days of sowing or by May 1 if sowed between September 1 and March 1. It is suggested a ring 42.5 inches in circumference be used to check plant density. Visual acceptance may be made after confidence of plant density is achieved after numerous counts are made. Locations, plant density and plant species observed are to be recorded. Documentation of acceptance and rejection must be recorded.