



Section 101

Street Design

This section establishes the uniform policies and procedures for the preparation of street design plans and construction requirements in the City of Irvine.

It is not intended as a textbook, or substitute for engineering knowledge, experience, or judgment but rather as a guideline to uniformity and to provide the designer with sufficient information for the preparation of desired plans with a minimum amount of uncertainty.

Please refer to the latest posted amendment for any updates or modifications to the standards herein.



Public Works

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Public Works

Section 101 Street Design

101.1 GENERAL

All improvements are to be constructed in accordance with the latest City Council adopted edition of the Standard Specifications for Public Works Construction, special provisions, and the appropriate standard plan of the City of Irvine.

A State of California Registered Civil Engineer shall sign the title sheet for each set of improvement plans submitted for approval.

Plans submitted for checking shall be complete in all phases of design. Incomplete plans will not be accepted.

Any named travelway shall be a street. Public or Private Street shall be built to City standards. Departure from the public circulation system to Private Street shall be denoted (i.e., specially designed entrance theme, archways, architectural or sculptured features, fountains, etc.).

101.2 PLAN PREPARATION

A. General

1. The City of Irvine requires all street improvement plans to be prepared on 24 inch x 36 inch mylars with a ½ inch margin on all sides except the left side which will be 1 ½ inches. Deviations from these specifications shall be requested from the City Engineer prior to commencement of work. The title sheet, a blank detail sheet, and a blank plan and profile sheet format are available in AutoCAD on the City's web site: http://www.cityofirvine.org/cityhall/pw/deveng/title_sheets/default.asp
All street improvement plans shall be prepared using the latest version of AutoCAD (previous compatible versions may be allowed with City Engineer approval). A media device (i.e. CD, DVD, USB, etc.) shall be supplied to the City upon completion of the design and a separate media device shall be supplied to the City upon completion of the Record Drawings. The files provided shall include a file defining the layer descriptions used.
2. All sheets must be numbered consecutively, "Sheet ___ of ___," in the lower right-hand corner.
3. Improvement Plans and profiles must be drawn at a scale of 1" = 40' or 1" = 20'. If the design cannot be conveyed clearly at 1" = 40' scale, plans and profiles shall be drawn at a scale of 1" = 20'. If legibility is in question, the design engineer shall seek concurrence with the City Engineer on appropriate scale prior to commencing work. The City traffic signal plans and intersection plans shall be drawn at a scale of 1" = 20'.
4. All lettering shall be 1/10 inch minimum height and be legible when plans are provided in PDF format.
5. North arrows shall point to top or right of the sheet.
6. All stationing shall refer to centerline of the street unless otherwise noted and shall read from left to right, and run up-station from south to north or west to east. No negative stationing is allowed:
 - a. Right end of one sheet joins left end of next sheet.
 - b. Stationing has preference over north arrow.
 - c. All streets have continuous stationing.

- d. When continuing a street with existing stations use the existing stationing, rather than starting new stationing.

B. Title Sheet

The first sheet shall be a Title Sheet and include:

1. Project location on location map.
2. Index map showing the following:
 - a. Street configuration within tract.
 - b. Lot configurations.
 - c. Tract boundaries.
 - d. Street names.
 - e. Index of sheets.
 - f. City limit lines, if contiguous to tract.
 - g. North arrow.
 - h. Scale.

It may be necessary to include a separate sheet following the Title Sheet for the index map if the information required on the index map cannot be shown on a relatively small map on the title sheet.

3. Basis of bearings – should be same as on tract map.
4. Benchmark – O.C.S. or City number, description date (year of adjustment) and elevation to three decimal places. All street improvement plans shall convert to and use North American Vertical Datum 1988 (NAVD 1988) as the benchmark reference.
5. Engineering firm name, address, telephone number, date plans prepared, signature, number and expiration date of Registered Civil Engineer.
6. Title block containing tract number and tentative tract number, if applicable; otherwise, give street name and limits of improvement.
7. Signature blocks for City Engineer, City Traffic Engineer, IRWD and Fire Marshall, if applicable.

8. City Plan Check Number and Capital Improvement Project (CIP) number, if applicable.

C. Detail Sheet

The detail sheet shall be the second sheet (or third, if second sheet is required for index map) and shall include:

1. Typical sections for each geometric variation of roadways. Typical section shall conform with approved tentative map and shall show:
 - a. Existing pavement to be joined or removed.
 - b. Paving, curb and gutter to be constructed, and details of join to existing pavement.
 - c. All necessary geometric dimensions including, but not limited to:
 - 1) Sidewalk width and location.
 - 2) Centerline to curb face, including crossfall.
 - 3) Centerline to right-of-way.
 - 4) Level line from centerline crown to top of curb with vertical dimension.
 - 5) Utility easement width.
 - 6) Landscape easement width.
 - d. Structural section, but figures should be omitted until the City has accepted recommendation in the soils report.
 - e. Reference to appropriate standards.
2. Interim conditions.
3. Overall Construction notes for entire project.
4. Construction details not included in City Standard Plans. Details will be required to demonstrate compliance with Title 24 and A.D.A.
5. Completed title block.
6. Street name sign schedule.

7. Quantities.

D. Plan and Profile Sheet

1. Profile shall be on top half of sheet and include:
 - a. Centerline profile.
 - b. Existing ground at centerline and right-of-way (not necessary if site has been mass graded).
 - c. Top of curb profiles including curb returns.
 - d. All grades. Negative grades so indicated.
 - e. Elevations at grade breaks, at street intersections, and as necessary.
 - f. Stationing, increasing from left to right.
 - g. Scale (horizontal and vertical).
 - h. Vertical curves including tangent grades, P.V.C. station and elevation, elevations at 25 feet and at control points.
 - i. Elevations on curb returns at control points.
 - j. Hydraulic grade line for the 25-year storm for storm drains lines.
 - k. Identification of all storm drain lines
 - l. Sewer profile.
 - m. All Utility line crossings and sub-structures, which could interfere with road or other underground construction.
2. Plan View shall include:
 - a. North arrow.
 - b. Existing improvements shown dashed and screened to the background with all City plan file numbers shown.
 - c. Improvements to be constructed, including joins.

- d. Street names.
- e. Station equations at all intersections.
- f. Stationing shall match stationing established by earlier plans.
- g. Stations at each 100 feet marked on all construction centerlines, and aligned with profile.
- h. Centerline bearings for all streets and highways.
- i. All proposed and existing utilities.
- j. Tract number, boundary and lot lines for each adjacent parcel.
- k. Applicable construction notes shown on each sheet.
- l. Match lines clearly shown and referenced.
- m. Curve data for all curves.
- n. Identification of all storm drain lines.

101.3 PLAN SUBMITTAL

A. First Check

1. Six sets of 100% design plans.
2. Two sets of hydrology reports and hydrology map.
3. Two sets of hydraulic calculations.
4. Two copies of Engineer's cost estimate on City form.
5. One copy of each approved Tentative Map, Record Map, Grading Plan and Conditions of Approval.
6. Plan Check Fee.
7. Completed Construction Permit form – with all bond information included (application will be rejected if bond information is not included on permit form).

All material must be submitted in complete and final form. No partial or incomplete submittals will be accepted.

B. Subsequent checks

1. Three sets of 100 % design plans.
2. Previous checkprint.
3. Two sets of revised hydrology and hydraulics.
4. Previous hydrology and hydraulics comments.

C. Final Submittal for Approval

1. Original – One set of bond paper signed by all parties.
2. Three additional copies of the Original set plans.
3. Previous checkprint.
4. One set each of approved hydrology report and hydraulics.
5. Inspection Fees.
6. One set of AutoCAD files of the improvement plans.

7. One set of electronic copy in a PDF format (Adobe Acrobat).

D. Permit Issuance

A minimum of four (4) plan sets in bond paper and one (1) electronic plan set (PDF format) shall be submitted for approval.

E. Revisions

1. Revisions to approved improvement plans are subject to approval by the City Engineer.
2. It is recommended that proposed revisions shall be drawn in red pencil on blue lines of the approved plan and submitted to the City for approval prior to the changes being made on the originals.
3. Revisions shall be specified with a delta number inside a clouded area wherever they occur on the plan. The revision box on the title sheet and the revision box on the sheet where the revision appears shall show the delta number and revision description, the affected plan sheet numbers, and the Design Engineer's initials in the revision block. Upon approval, the City Engineer will sign in the revision box on the title sheet.
4. Revisions shall only be made by an engineer from the firm that prepared the original plan. When another engineering firm has a need to make revisions on a plan, permission must be obtained, in writing, from the original engineering firm.
5. Revisions shall only be shown for changes made after approval of the City Engineer. Revision blocks or designations are not to be used for changes made prior to final approval and signature by the City Engineer.

F. Improvement Acceptance

Prior to acceptance of street improvements, one set of electronic plans in PDF format and AutoCAD format and all related documents pertaining to the street improvements shall be submitted to the City Inspector for Record Drawings.

101.4 STREET DESIGN

A. General

Design shall be in conformance with good engineering practices and this Design Manual. Minimum design speed guidelines shall be:

Private way	20 MPH
Local street	25 MPH
Local collector	35 MPH
Commuter arterial	45 MPH
Secondary arterial	50 MPH
Primary arterial	55 MPH
Major arterial	60 MPH

B. Horizontal Alignment

1. All street centerlines should intersect at 90-degree angles. Angles deviating more than 15 degrees from a 90-degree angle will not be allowed. Sight distances shall be in accordance with Standard Plan No. 403.
2. Knuckles (Std. Plan 106) and Street Bend (Std. Plan 106A) will only be allowed on Local streets when approved by the City Engineer.

C. Vertical Alignment

1. Minimum, grades on public and private street shall be 1.0% at centerline unless otherwise approved by the City Engineer.
2. Grades shall not exceed 7% unless otherwise approved by city Engineer.
3. Maximum grade break shall be 0.5%.
4. Vertical curves shall be the following minimum lengths:

Local streets	50 feet
Collectors	100 feet
Arterials	200 feet
5. In no case shall a grade break along a vertical curve exceed 0.5% in a 25-foot length.
6. Stopping and passing sight distances shall be in conformance with the latest Caltrans Highway Design Manual.

7. Lighted undercrossings can use Comfort Design Criteria for Sag Vertical Curves with written approval from the City Engineer.

D. Pavements

1. The minimum acceptable structural section is 0.25 feet of AC over 0.5 feet of AB for streets using one lift AC, or 0.35 feet of AC over 0.5 feet of AB for streets using an asphalt concrete base course of 0.25 feet of AC with a finish course of 0.1 foot of AC. Special design considerations shall be given to intersections and driveways adjacent to arterial streets.
2. Expansive soils will require additional design considerations.
3. All asphalt concrete type surfaces shall receive an asphalt type seal coat prior to acceptance by the City.
4. All arterial highways shall have a two-inch Asphalt Rubberized Hot Mix (ARHM) for the final cap.

E. Cross Gutters

The use of cross gutters is not allowed. Storm drain systems shall be configured to intercept low flows at street intersections.

F. Driveways

1. The City Engineer shall approve location and width of commercial and industrial driveways, for each individual project.
2. Driveways shall be constructed in accordance with Standard Plan Numbers 204, 205, or 206 unless prior approval is obtained from the City Engineer.

G. Parkways

Walkways shall be constructed in accordance with Standard Plan Number 201, and shall have a cross slope of 1/4 inch per foot (**2%**) toward the curb and gutter. It will be necessary to provide grades and alignments on meandering walkways in accordance with the design features desired. Parkway slopes shall be as recommended in the soils report and in accordance with the design features desired. A one-foot minimum horizontal off-set shall be provided between edge of walkway and beginning of any slope. Extreme differentials in grade between the parkway and the land immediately adjacent to the parkway may require the construction of retaining walls.

H. Miscellaneous

1. Survey Monuments

Survey monuments shall be placed at all arterial street intersections in accordance with Standard Plan Number 214 and Standard Plan Number 214A, as shown on the tract or parcel map, and as required by the City Engineer.

2. Street Name Signs

The type, size, and location of street name signs shall be as shown on Standard Plan Numbers 216 and 216A. The developer shall provide street name signs.

3. Striping

Striping plans shall be included in the improvement plans and drawn at a 1" = 40' scale. Striping shown on plan shall be accordance with the latest California Manual on Traffic Control Devices (CA MUTCD).

4. Signing

All signs shall conform to the latest California Manual on Uniform Traffic Control Devices for Streets and Highways (CA MUTCD). All signs sizes shall be the standard size. All new signposts shall be 4"X4" redwood stained "Irvine Brown" pursuant to City of Irvine Public Works requirements. Street name signs and advance street name signs shall have silver letters and borders on "Irvine Brown" background.

Construction signing shall conform to the latest CA MUTCD for Temporary Traffic Control, and American Public Works Association's (APWA) Work Area Traffic Control Handbook (W.A.T.C.H.) Manual and all Occupational Safety & Health Administration (O.S.H.A.) requirements.

5. Barriers

Guidelines for the use of barriers, as shown on Standard Plan No. 400 shall be for purposes of protecting the motorist from a hazardous condition. A barrier shall not be used when its use could create a more hazardous condition or cause a loss to life, limb, or property.

6. Street Requirements

Street requirements shall also be designed in accordance with the Orange County Fire Authority Planning and Development Services Guidelines for Emergency Access. In the event there is a conflict between these Guidelines and the City of Irvine Standards and Design Manual, the City Engineer shall determine which design shall apply.

101.5 DIGITAL SUBMISSION REQUIREMENTS FOR FINAL MAP

To facilitate the transfer of information into the City's Geographic Information System (GIS), all final maps submitted will be required to include digital graphic files in addition to the hard copy maps. Digital submittals will be verified prior to final approval of your map.

Design Guidelines

1. Prepare drawing in full size (1 to 1), using real earth coordinates (map space). Coordinate system should be State Plane Coordinate System, California zone 6, SPCS 83 FIPS zone 0406, in accordance with County of Orange Ordinance 3809 and Digital Submission of Cadastral Surveys Information and Specifications.
2. Tie final map boundary to a minimum of two existing horizontal control points. Drawing must show location of the control points and bearing/distance/curve information from the project location to the control points. Contact the Development Engineering Division at (949) 724-6464 to obtain information regarding existing control points.
3. Design with a continuous line; **never break lines within a curve**. You may still display the line work with any available line type on the drawings.
4. Submit drawing file for each individual sheet; in addition, submit one file, which encompasses the design of the entire project (tract).

File Format and Media Requirements

Digital files are acceptable in either an AutoCAD drawing file (.DWG) format, a data exchange file (.DXF) format, or an ARC/INFO export file (.E00) format. Contact the GIS Section at (949) 724-6343 if you desire to submit drawings in any other format. Digital files should be submitted on a media device (CD, DVD, USB, etc.). Please also include an index of drawings and data decompression software needed to extract your files.

Checking of Digital Submittals

In addition to meeting the County of Orange requirements, digital data will be checked for the following:

1. Correct layering
2. Correct coordinate system
3. Consistent digital and hard copy maps

101.6 DIGITAL SUBMISSION REQUIREMENTS FOR GRADING PLANS

To facilitate the transfer of information into the City's Geographic Information System (GIS), all grading plans submitted will be required to include digital graphic files in addition to the hard copy plans. Digital submittals will be required prior to final approval of your plans for permit issuance, and verified before final Certificate of Occupancy.

Design Guidelines

1. Prepare drawing in full size (1 to 1), using real earth coordinates (map space). Coordinate system should be State Plane Coordinate System, California zone 6, SPCS 83 FIPS zone 0406, in accordance with County of Orange Ordinance 3809.
2. Tie design to a minimum of two existing horizontal control points. Drawing must show location of the control points and bearing/distance/curve information from the project location to the control points. Contact the Development Engineering Division at (949) 724-6464 to obtain information regarding existing control points.
3. Separate existing and new construction into different layers. Prefix layer name with "EX-" for existing information, "PROP-" for new construction and "UTIL" for utility lines.
4. Separate text, shade, hatch, symbol, title block, legend, and drawing index on different layer from design line works.
5. Use standard AutoCAD fonts, menu, and line type. Contact City of Irvine for availability of customized items.
6. Design with a continuous line; **never break lines within a curve**. You may still display the line work with any available line type on the drawings.
7. All **new** traffic ways will be required to show centerline information, including public streets, private streets, interior streets, aisles, private drives, and signalized intersections.
8. Provide bearing/distance/curve information for all **new** centerline and right-of-way lines.
9. Use a single line to construct each building footprint to form a closed polygon.
10. Submit drawing file for each individual sheet. In addition, submit one file, which encompasses the design of the entire project (street or tract).

Data Layering Requirements

Drawings should have the minimum layers identified as follows:

<u>Layer</u>	<u>Description</u>
BLDG	building footprints
BNDRY	tract boundary lines
CATCH-B	catch basin
CL	street centerlines
CURB	curb lines
GAS	gas lines
GUTTER	gutters
EASEMENT	easement lines
ELECT	electrical lines
ELEV	elevation and contours
LOT	lot lines
M-HOLE	manhole
SIDEWALK	sidewalks
SD	storm drain centerlines
SD-WALL	storm drain walls
SEWER	sewer lines
RW-PUB	public right-of-way lines
RW-PRI	private right-of-way lines

Designer when needed may define additional layers.

File Format and Media Requirements

Digital files are acceptable in either an AutoCAD drawing file (.DWG) format, a data exchange file (.DXF) format, or an ARC/INFO export file (.E00) format. Contact the GIS Section at (949) 724-6343 if you desire to submit drawings in any other format. Digital files should be submitted on a media device (CD, DVD, USB, etc.). Please also include an index of drawings and data decompression software needed to extract your files.

Checking of Digital Submittals

Digital data will be checked for the following:

1. Correct layering
2. Correct coordinate system
3. Consistent digital and hard copy plans

101.7 DIGITAL SUBMISSION REQUIREMENTS FOR STREET IMPROVEMENT PLANS

To facilitate the transfer of information into the City's Geographic Information System (GIS), all street improvement plans submitted will be required to include digital graphic files in addition to the hard copy plans. Digital submittals will be verified prior to final approval of your plans.

Design Guidelines

1. Prepare drawing in full size (1 to 1), using real earth coordinates (map space). Coordinate system should be State Plane Coordinate System, California zone 6, SPCS 83 FIPS zone 0406, in accordance with County of Orange Ordinance 3809.
2. Tie design to a minimum of two existing horizontal control points. Drawings must show location of the control points and bearing/distance/curve information from the project location to the control points. Contact the Development Engineering Division at (949) 724-6464 for information regarding control points.
3. Separate existing and new construction into separate layers. Prefix layer name with "EX-" for existing information, "PROP-" for new construction and "UTIL" for utility lines.
4. Separate text, shade, symbol, title block, legend, and drawing index on different layer from design line works.
5. Use standard AutoCAD fonts, menu and line type. Contact City of Irvine for availability of customize items.
6. Design with a continuous line; **never break lines within a curve**. You may still display the line work with any available line type on the drawings.
7. All **new** traffic ways will be required to show centerline information, including public streets, private streets, interior streets, aisles, private drives, and signalized intersections.
8. Provide bearing/distance/curve information for all **new** centerline and right-of-way lines.
9. Submit drawing file for each individual sheet. In addition, submit one file (index plan drawing), which encompasses the design of the entire project (street or tract).

Data Layering Requirements

Drawings should have the minimum layers identified as follows:

<u>Layer</u>	<u>Description</u>
BNDRY	tract boundary lines
CATCH-B	catch basin
CL	street centerlines
CURB	curb lines
GAS	gas lines
GUTTER	gutters
EASEMENT	easement lines
ELECT	electrical lines
LOT	lot lines
M-HOLE	manhole
SIDEWALK	sidewalks
SD	storm drain centerlines
SD-WALL	storm drain walls
STRIP	signing and striping
RW-PUB	public right-of-way lines
RW-PRI	private right-of-way lines

NOTE: Designer when needed may define additional layers.

In addition to the above layering, also refer to City of Irvine street, landscape, right-of-way standards & design manual and section 104 for traffic signal design requirements.

File Format and Media Requirements

Digital files are acceptable in either an AutoCAD drawing file (.DWG) format, a data exchange file (.DXF) format, or an ARC/INFO export file (.E00) format. Contact the GIS Section at (949) 724-6343 if you desire to submit drawings in any other format. Digital files should be submitted on a media device (CD, DVD, USB, etc.). Please also include an index of drawings and data decompression software needed to extract your files.

Checking of Digital Submittals

Digital data will be checked for the following:

1. Correct layering
2. Correct coordinate system
3. Consistent digital and hard copy plans