



GRADING PERMIT

PLANS PREPARATION

GUIDELINES AND CHECKLISTS

This checklist provides general guidelines for development improvement plans preparation. The Public Works Department reserves the right to reject the submittal package without performing any plan checks if the improvement plans are not prepared per these guidelines.

All plans shall be in full D-size dimension of 24 inches by 36 inches, and shall be prepared with a standard engineering scale of 1"=10', 20', 30', 40'. Plans shall be prepared on the XY coordinate system that is used by City of Orange GIS system (NAD 1983 StatePlane California VI FIPS 0406 Feet). Lettering shall be neat and legible, and shall have plotted size of 0.1" for normal size text, and a width ratio of 1. A plotted size of 0.15" shall be used for oversize text callouts, special cases or where emphasis is needed. A plotted size of 0.2" must be used for Minor Street Names, Matchline Text, Titles & Title Block Text. A plotted size of 0.3" shall be used for Major street names. All existing features shall be in screened/grey color, and all proposed features shall be in solid/black color. All line styles shall conform to City of Orange template and Standard Plan No. 101.

The followings are the improvement plans checklists for private developments. Consultation with Public Works Engineering Division-Design Section is necessary for major improvements within public right-of-way and for the improvements that will be dedicated to the City. Use City of Orange title sheet and include all applicable items.

A. TITLE SHEET CHECKLIST

No.	DESCRIPTION	DONE	N/A
A.1	City of Orange template title sheet is used.		
A.2	City of Orange signature block is provided in the bottom right hand corner.		
A.3	Project Name & City Project number is shown in title block.		
A.4	Vicinity Map is provided.		
A.5	Site plan is provided		
A.6	Legal description is provided		
A.7	Index of sheets is provided. Graphic index is shown if more than 2 sheets are needed to show the project site (large projects).		
A.8	Name, address, & phone number of the engineering firm is provided		
A.9	Name, address, & phone number of the owner/developer is provided		
A.10	Name, address, & phone number of the soil engineer is provided		
A.11	Benchmark datum, identification, location & elevation is noted		
A.12	Basis of bearings is provided		
A.13	Signature, R.C.E. number, and stamp of Registered Civil Engineer is provided (all sheets).		
A.14	Name and phone number of developer's agent responsible for project is provided (available on 24 hour basis)		
A.15	City of Orange general notes are provided		
A.16	City of Orange Grading Notes are provided		
A.17	City of Orange Erosion and Sediment Control Notes provided		
A.18	Total project size and disturbed soil area (in acres) are shown		
A.19	Earthwork volumes are provided in cubic yard (cut, fill, import, and export)		
A.20	Legend, and abbreviations are provided		
A.21	Revision Block is provided (all sheets)		
A.22	WDID is provided (if the disturbed soil area is more than one acre).		

B. GRADING SHEET CHECKLIST

The Civil Engineers shall be responsible for the establishment of line (horizontal control) grade (vertical control) and drainage of the development areas and provide such information on the grading plans. Adequate information and details shall be provided on the grading plan to facilitate plan checking and field inspection. The following items are the minimum requirements. A separate sheet for demolition

and removals will be required if the grading plans get too busy. Show existing and proposed street improvements. Minor street improvements may be shown on grading; i.e. minor curb & gutter work, drive approach, sidewalk, etc. Major street improvements must be shown on a separate Street Improvement Plan and MUST be prepared by a Registered Civil Engineer.

No.	DESCRIPTION	DONE	N/A
B.1	North arrow is shown (oriented to either top or right of sheet).		
B.2	Scale is noted.		
B.3	Graphic scale is shown.		
B.4	Lot numbers are shown.		
B.5	Lot lines and right-of-way lines are shown and labeled.		
B.6	Orientation of notes should either be horizontal or vertical. Vertical notes should read from bottom to top of sheets.		
B.7	Existing topographic features (including trees) are shown, and existing contours are provided at least 15' beyond project boundaries on all sides.		
B.8	All existing underground facilities are shown (e.g. septic tanks, irrigation lines, etc.) using short dashed lines or a halftone image. Note disposition of existing facilities.		
B.9	All existing and proposed easements are shown and identified.		
B.10	Elevations of all facilities within easements are shown.		
B.11	No drainage across lot lines.		
B.12	Existing and proposed contours are shown with 1' intervals.		
B.13	Proposed elevations are consistent with proposed Storm Drain plans.		
B.14	Grading complies with recommendations of Soils Report.		
B.15	Pavement structural section is noted. On-site structural section is to be recommended by Soils Engineer (including R-Value and Traffic Index). Minimum on-site structural section for parking lots is 4" A.C. over 4" A.B., 4" A.C. unless otherwise recommended by soil engineer.		
B.16	Location of the trash enclosure is shown and City of Orange Standard plan is noted.		
B.17	Retaining walls and/or double walls with planting strips are shown.		
B.18	Fences and freestanding walls are shown.		
B.19	Pad and finished floor elevations are noted for the onsite buildings/structures and offsite buildings/structures within 15' of property lines.		
B.20	Minimum pad elevation complies with Orange County Local Drainage Manual requirements.		
B.21	Finished grade elevations are shown around buildings, and comply with CBC requirements. Grades away from the building comply with CBC requirement (5% minimum and 21% maximum for pervious surface, and 2% minimum for impervious surface within 10 feet of the building foundation).		
B.22	Pervious pavement is not proposed in close proximity to structures foundation. The required setbacks comply with Geotechnical Engineer recommendations.		
B.23	Finish grades conform to the following minimum drainage gradient standards: 1% minimum for swales (earth or asphalt), sheet flow, and asphalt pavement. 0.5% for concrete drain in earth area, and 0.3% for concrete gutter in asphalt paved area.		
B.24	Maximum 5% crossfall is provided in parking lots.		
B.25	Maximum 2% slope is provided for parking stalls.		
B.26	Deepened footings are noted (if applicable).		
B.27	Finished grade elevations are shown at the property lines, and 2% minimum slope away from property lines is provided.		
B.28	Swales are a minimum 3' away from structures.		
B.29	Building downspout locations are shown.		
B.30	Landscape mounding is shown.		
B.31	Adequate number of spot elevations including lot corner elevations are noted.		
B.32	Existing and proposed drainage facilities are shown (inlets, swales, curb and gutter, etc.)		
B.33	Flow line elevation and slope is provided for swales and gutters.		

No.	DESCRIPTION	DONE	N/A
B.34	Distances, dimensions, bearings for all proposed improvements are indicated.		
B.35	Top of curb (TC) and flow line (FL) elevations are noted for all curb and gutters.		
B.36	High points (HP) and low points (LP) are noted on the plans.		
B.37	Cross sections as necessary and on all project boundaries are provided.		
B.38	Dimensions are noted on all lot lines (bearing, distance, curve data, etc.)		
B.39	Street centerline or crown elevations are noted.		
B.40	Street grades match Street plans (if applicable).		
B.41	Overland flow direction and slope is shown.		
B.42	Motorcycle stalls are shown paved with concrete.		
B.43	All sidewalks and walkways meet disabled access requirements.		
B.44	Slopes shall be part of downhill lot (pertains to Tract Maps and Parcel Maps).		
B.45	No drainage over slopes.		
B.46	Unprotected cut and fill slopes are at a maximum of 2:1 (Horizontal:Vertical)		
B.47	Slope top and bottom set back from lot lines are shown. See "Setback Detail" in the Manual of Grading for setback requirements.		
B.48	All slopes shall be rounded into existing terrain to produce a contoured effect. All cut or fill slopes greater than 25 feet in vertical height must have paved water carrying terraces at a maximum of 25 feet intervals, minimum of Six feet wide with minimum 5% slope, and maximum of 300 feet in length. For cut or fill slopes greater than 60 feet up to 100 feet in vertical height, one terrace shall be 12 feet in width. All terraces shall drain into a down drain, paved gutter, pipe or other watercourse adequate to convey the water to safe disposal area.		
B.49	All manufactured slopes must be protected along the top from surface water run-off by berms or interceptor drains. A single run of interceptor drain shall not exceed 150 feet to a down drain, and shall have a minimum 5% slope.		
B.50	Retaining walls will be required where cutting or filling along property lines may cause damage, but always where the cut or fill exceeds one (1) vertical foot.		
B.51	Driveway slopes are shown.		
B.52	Residential drive approach is per City Std. 116. Maximum width 24', Minimum width 12'.		
B.53	Commercial /Industrial Drive Approach is per City Std. 115. Maximum width 35', Minimum width 25'.		
B.54	Maximum grade for residential driveways is 12% with proper transition to drive apron. Maximum grade for commercial driveways is 10%.		
B.55	Long driveways to structure must be approved by Fire Department, and may require turn-around.		
B.56	The proposed cross slope for the sidewalk and parkway within public right-of-way is 2% maximum (including back of driveway aprons), and the cross slope is noted.		
B.57	Street names, dimension from street centerline to the property line and curb line is noted.		
B.58	Location of sewer lateral, stormdrain, water meter(s), fire hydrant, backflow device(s) and other utility appurtenances are shown on the grading plans for reference, and existing utilities are labeled (size, material, and record drawing number for water, sewer and storm drain).		
B.59	Quantities are provided (separate quantities for onsite and offsite improvements).		

C. SEWER SHEET CHECKLIST

No.	DESCRIPTION	DONE	N/A
C.1	North arrow is shown (oriented to either top or right of sheet).		
C.2	Scale is shown.		
C.3	Graphic scale is shown.		
C.4	City of Orange Sewer Notes are provided.		
C.5	Plan view is provided (including street name, street width and right-of-way width).		

No.	DESCRIPTION	DONE	N/A
C.6	Orientation of notes should either be horizontal or vertical. Vertical notes should read from bottom to top.		
C.7	Conforms to approved site plans or tentative submittal.		
C.8	Conforms to conditions of approval.		
C.9	Lot numbers are shown.		
C.10	Lot lines and right-of-way lines are shown and labeled.		
C.11	Existing and proposed easements are shown (if applicable).		
C.12	Septic system design conforms to Onsite Wastewater Treatment System (OWTS) policies provided by the State Water Resources Control Board, and to the County of Orange OWTS requirements.		
C.13	Septic system drain field/seepage pit is not within 100' of the infiltration BMPs.		
C.14	Lateral is shown perpendicular to sewer main, and size, material and minimum slope of the sewer lateral conform to City of Orange Standard Plans No. 206 and 207		
C.15	Minimum cover over lateral conforms to City of Orange Standard Plan No. 206		
C.16	Placement of sewer lateral under driveway is discouraged (show driveways on sewer plan).		
C.17	Curve data table and line table are provided.		
C.18	B.C. & E.C. stations and elevations are shown (primarily on the profile, but they can be shown on the plan view if the pipe profiles are not needed).		
C.19	Water and storm drain pipe locations are shown (for reference).		
C.20	Profiles are provided for all pipes 8" or larger, and flowline/sewer alignment stationing is noted at all junctions and manholes.		
C.21	All underground utilities and structures are shown on plan and profiles.		
C.22	Utility Crossings (water, storm drain, etc.) are detailed on plan and profile. Top elevation of the pipe running below, and bottom elevation of the pipe running above, and the separations are shown and conform to the minimum requirements.		
C.23	Special construction at crossings is detailed (if applicable). All traverse trenching shall be slurry backfill.		
C.24	Pipe bedding is noted and conform to the City standards.		
C.25	Slopes between manholes and cleanouts are noted.		
C.26	Adequate cleanouts are provided consistent with California Plumbing Code requirements.		
C.27	Manhole/cleanout is required at grade break and at bends.		
C.28	Manhole/cleanout rim elevations are noted and street stationing is noted for the manholes within public right-of-way.		
C.29	Manhole/cleanout invert elevations are provided (at inlet and outlet).		
C.30	Manholes/cleanouts are numbered consecutively.		
C.31	Water/sewer separation conform to City of Orange Standard Plan No. 204		
C.32	Depth or flowline elevation of sewer lateral at property line is shown.		
C.33	Finished grade and existing grade over sewer lines is shown on profile.		
C.34	Existing or proposed trees are not in the close proximity of the sewer lateral (less than 5').		
C.35	Sewer laterals does not cross lot lines unless there are no other reasonable options. A private easement is dedicated to the lot benefiting from the lateral.		
C.36	Sewer main shall be Vitrified Clay Pipe (VCP) with minimum 8" diameter.		
C.37	Sewer main is located 5 feet on the South or West side of the street center line (per City Standard Plan No. 102).		
C.38	Sewer main design complies with OCS Design Construction Requirements for Sanitary Sewers, and with City of Orange Sewer Collection System Master Plan, and is documented in a sewer study.		
C.39	Scale for sewer main plan and profile is 1" = 40' (horizontal), and 1" = 4' (vertical). Any other scale should receive pre-approval from the Engineer.		
C.40	Minimum 10' wide easement is provided for the public sewer lines that are located on the private properties.		
C.41	Sewer main pipe size, material, slope, bedding is noted.		

No.	DESCRIPTION	DONE	N/A
C.42	Maximum velocity is 10 fps and minimum velocity is 2 fps.		
C.43	Maximum depth of flow to diameter of pipe is less than 0.5 for pipes smaller than 18", and is less than 0.75 for pipes 18" in diameter or larger. Maximum peak wet weather depth of flow to diameter of pipe is less than 0.9 for all pipes.		
C.44	Minimum slope for 8" sewer main is 0.4%, for 10" sewer main is 0.25%, for 12" sewer main is 0.15%, for 15" sewer main is 0.12%, for 18" sewer main is 0.1%, for 21" sewer main is 0.09%, and for sewer main larger than 21" is 0.08%.		
C.45	Minimum depth of cover over mainline sewers is 7 feet.		
C.46	Manhole spacing for pipes 8" to 12" is maximum 400', and for pipes 15" in diameter is maximum 500', and for pipes 18" and larger is maximum 600'.		
C.47	Manhole is provided at change of slope, change of direction, junctions, change of pipe size, termination of sewer line, and at change of pipe material.		
C.48	Drop of 0.1' across all manholes is provided. Drop of 0.2' at intersecting main lines junction is provided.		
C.49	Sewer manhole base configuration is shown (channels are shown per City Standard Plans No. 201 and 209).		
C.50	Straight horizontal alignments between manholes are provided, or curvature is approved by the City Engineer and minimum radius of curvature complies with City Engineer recommendations.		
C.51	Quantities are provided (separate quantities for onsite and offsite improvements).		

D. STORM DRAIN SHEET CHECKLIST

No.	DESCRIPTION	DONE	N/A
D.1	North arrow shown (oriented either to top or right of sheet).		
D.2	Scale is noted.		
D.3	Graphic scale is shown.		
D.4	City of Orange Storm Drain Notes are provided.		
D.5	Lot numbers are shown.		
D.6	Lot lines and right-of-way lines are shown and labeled.		
D.7	Orientation of notes should either be horizontal or vertical. Vertical notes should read from bottom to top of sheets.		
D.8	All existing and proposed easements are shown.		
D.9	Conforms to approved site plans or tentative submittal.		
D.10	Conforms to conditions of approval.		
D.11	Runoff to street is directed over drive approaches - maximum one (1) acre drainage per drive approach. Parkway culvert is used if area drained is over one (1) acre.		
D.12	Complete details of connection to existing storm drain facility is shown on plans.		
D.13	Runoff directed into County or State facilities is approved and the permit is included in the submittal (for reference).		
D.14	Plan view is provided.		
D.15	Distance from street centerline to centerline of pipe is shown.		
D.16	City of Orange standard inlets are provided and dimensions are shown. Minimum 0.5' freeboard is provided for the catch basins within public right-of-way.		
D.17	Junction structures are shown and standard plan numbers are noted.		
D.18	For residential properties drainage pipe is a minimum 4" P.V.C. Schedule 40 or equal, and the minimum inlet size is 4" diameter for deck drains, 6" diameter with dome atrium drain grate for planter area, and 12" square for lawn or larger areas. The inlet manufacturer is specified and/or the detail is shown.		
D.19	Profile is shown for all pipes 8" and larger, and design flow (Q) and velocity (V) are noted on each pipe segment (hydraulic data table is acceptable in lieu of showing the information on the profile).		
D.20	Length between manholes is noted on profile or plan view (if profile is not required).		

No.	DESCRIPTION	DONE	N/A
D.21	Slope between manholes is noted on profile to 4 decimal places (or on plan view if profile is not required).		
D.22	Size, material, class, and bedding of pipe(s) are noted.		
D.23	Curve data table and line table are provided.		
D.24	B.C. & E.C. stations and elevations are shown (primarily on the profile, but they can be shown on the plan view if the pipe profiles are not needed).		
D.25	All underground utilities and structures are shown on plan and profiles.		
D.26	All utility crossings are detailed. Special construction at crossings is detailed (if applicable). Top elevation of the pipe running below, and bottom elevation of the pipe running above, and the separations are shown and conform to the minimum requirements.		
D.27	Adequate cleanouts are provided consistent with California Plumbing Code requirements.		
D.28	Hydraulic grade line (HGL) is shown for 10 year, 25 year or 100 year event (as appropriate). HGL is at least 2' below the street gutter grade.		
D.29	Manhole/cleanout rim elevations are noted and street stationing is noted for the manholes within public right-of-way.		
D.30	Manhole standard plan is noted.		
D.31	Existing and proposed easements are shown (if applicable).		
D.32	Design complies with OC Hydrology Manual and OC Local Drainage Manual, and is documented in the Drainage Report (A Letter of Drainage Assessment may be substituted in lieu of a Drainage Report for any proposed development site that meets the qualifying criteria).		
D.33	Design is consistent with priority or non-priority WQMP and the BMPs are shown (if applicable).		
D.34	Septic system drain field/seepage pit is not within 100' of the infiltration BMPs.		
D.35	Conform to setback requirements for structural post-construction BMPs.		
D.36	Storm drain is located 5 feet on the North or East side of the street center line (per City Standard Plan No. 102).		
D.37	Manhole spacing for 30" diameter storm drain pipe or smaller is maximum 300', for diameter larger than 30" but smaller than 45" diameter is maximum 400', and for 45" and larger diameter is maximum 500'.		
D.38	Manhole is not located at street intersections.		
D.39	Manhole is provided when the upstream conduit has a steeper slope than the downstream conduit and the change in grade is greater than 10 percent.		
D.40	Storm drain pipes within public right-of-way shall be RCP. The minimum diameter of publicly maintained conduit is 18 inches. Privately maintained conduit in public right-of-way is minimum 18" in diameter.		
D.41	Minimum 10' wide easement is provided for the public storm drain lines that are located on the private properties.		
D.42	Inlet marking "NO DUMPING-DRAINS TO OCEAN" is noted for all inlets within public right-of-way unless if it is included on the City of Orange standard plan that is used.		
D.43	Quantities are provided (separate quantities for onsite and offsite improvements).		

E. STREET IMPROVEMENT SHEET CHECKLIST

No.	DESCRIPTION	DONE	N/A
E.1	Key map is provided.		
E.2	Graphic sheet index is included if there is more than two street sheets in set.		
E.3	Sheet index is provided.		
E.4	City of Orange General Notes for Street Improvements are provided.		
E.5	Typical street cross sections are provide and traffic index (T.I.) is noted on each section.		
E.6	North arrow is provided (oriented either to top or right of sheet).		

No.	DESCRIPTION	DONE	N/A
E.7	Scale is noted. Graphic scale is shown. Graphic index is shown if more than 2 sheets are needed to show the street improvements.		
E.8	Conforms to tentative submittal (tentative map or site plan) and conditions of approval).		
E.9	Plan view is shown with street name(s) and width(s) noted.		
E.10	Orientation of notes should either be horizontal or vertical. Vertical notes should read from bottom to top of sheets.		
E.11	Sidewalk(s) are shown. Full horizontal and vertical control is required for meandering sidewalks. All street appurtenances (e.g. transformer pads, street lights, street name signs, etc.) must be shown in relation to the proposed sidewalk.		
E.12	Intersection station(s) and elevation(s) are shown.		
E.13	Cross gutter flow line elevations is shown.		
E.14	Lot lines are shown and lot numbers are noted.		
E.15	Curve data and curb return data is listed.		
E.16	Elevation(s) and station(s) of B.C.s, E.C.s, P.R.C.s, B.C.R.s and E.C.R.s are noted.		
E.17	Curb return radius is 25' minimum for local streets, and 32' minimum for arterial streets		
E.18	Center line radius for local streets is 250' minimum, and the minimum curve length shall be 250' to avoid appearance of a kink. Center line radius for arterial streets conform to City of Orange Standard No. 103.		
E.19	Curb ramps is shown per City Standards.		
E.20	Catch basin station(s) are noted.		
E.21	Local depression details are provided.		
E.22	References to standard plans are noted.		
E.23	Sheet cross references are provided.		
E.24	Existing facility drawing references are noted.		
E.25	All existing underground/aboveground utilities are shown.		
E.26	Medians are stationed with curve data listed.		
E.27	Street cross sections match City standards. Minimum 1.7% cross slope is provided for all types of streets. Cross fall more than 3.6% is approved by City Engineer.		
E.28	Pavement structural section is noted and matches the Soils Engineer recommendations (R-Value and Traffic Index are shown on the plans), but shall not be less than City's recommended standard sections (6"AC over 8" AB for Primary and Major Arterial Roads, and 6" AC over 6" AB for all other roads and streets).		
E.29	Minimum 5' set back from the centerline of the pedestrian crossing is provided for the median end.		
E.30	Street lights are shown and stationing is provided for the lights.		
E.31	Driveway width(s) and station(s) are shown.		
E.32	Minimum 1' of pavement section replacement is provided adjacent to new curb and gutter, and minimum 3' of pavement section replacement is provided adjacent to new sidewalk access ramps. 1" is added to the thickness of the existing AC and AB layers.		
E.33	Elevations at join line(s) are noted.		
E.34	Street cross sections provided at 50' intervals.		
E.35	Traffic signal plans are provided.		
E.36	Traffic signing and striping are provided (On separate sheet(s) from street construction plans)		
E.37	Cul-de-sac and dead-end streets length is less than 600'.		
E.38	Stationing for Plan and Profile are aligned.		
E.39	Original ground profile at centerline and right-of-way lines is shown.		
E.40	Proposed centerline profile is shown and labeled.		
E.41	Profile of both curbs are shown and labeled.		
E.42	Profile of both median curbs are shown and labeled.		
E.43	Grades are shown to 3 decimal places, i.e. R=1.032%		
E.44	Profile of centerline is carried out to centerline of the nearest cross streets.		

No.	DESCRIPTION	DONE	N/A
E.45	Length on curb for horizontal curves is noted.		
E.46	Vertical curves provided for algebraic grade changes of 0.5% and greater.		
E.47	Minimum vertical curve length is 50' for Local Streets, 100' for Collectors, and 200' for Arterials.		
E.48	Stopping and passing sight distances is in conformance with the latest Caltrans Highway Design Manual.		
E.49	Grades at centerline of local streets is 1.0% minimum and 10% maximum unless otherwise approved by the City Engineer.		
E.50	High points and low points are shown.		
E.51	Elevation(s) and station(s) of BVC's & EVC's are shown.		
E.52	Elevations for quarter points on street curb returns are shown.		
E.53	Existing and proposed right-of-way easements or dedications are shown (if applicable).		
E.54	Quantities are provided (separate quantities for private and public improvements).		

F. EROSION AND SEDIMENT CONTROL SHEET CHECKLIST

No.	DESCRIPTION	DONE	N/A
F.1	North arrow is shown (oriented either to top or right of sheet).		
F.2	Scale is noted.		
F.3	Graphic scale is shown.		
F.4	Lot numbers are shown.		
F.5	Lot lines and right-of-way lines are shown and labeled.		
F.6	Orientation of notes should either be horizontal or vertical. Vertical notes should read from bottom to top of sheets.		
F.7	Existing and proposed drainage facilities are shown (inlets, swales, curb and gutter, etc.)		
F.8	Run-on from adjacent areas is shown (if applicable)		
F.9	On-site and off-site flow directions are shown.		
F.10	Appropriate BMPs are provided to eliminate sediment & debris from entering public facilities, consistent with Orange County Stormwater Program Construction Runoff Guidance Manual http://www.ocwatersheds.com/documents/bmp/constructionactivities		
F.11	BMP details are provided.		
F.12	24 hour phone number for emergencies is provided.		
F.13	Quantities are provided (separate quantities for onsite and offsite improvements).		

EngineerRCE#.....Signature.....Date:.....