



Engineering Division
201 North Broadway, Escondido, CA 92025
(760) 839-4651, FAX (760) 839-4597

IMPROVEMENT PLAN CHECKLIST

To:

Date:

Project:

Address:

Plan No:

Check No:

Attn:

VIA:

The attached plans have been reviewed by this office and are being returned for correction. Please complete all corrections noted both on this check sheet and the attached plans.

The re-submittal shall include all redlined plans, this form, any fees or other documents indicated on the review and **6 copies**, of the corrected plans, folded to 9"x 12" format.

If you have any questions on this review, please feel free to contact me. This review sheet and the attached check print(s) need to be resubmitted along with the corrected plans before they can be rechecked.

From: _____

GENERAL REQUIREMENTS

1. The owner shall provide the City with a **utility coordination clearance letter**. (forms available at Engineering Department) The date of the letter needs to be added to the appropriate utility note.
2. This plan shall be approved by the Utilities & Fire Departments prior to Engineering Department approval. Copies of this plan were sent to the Utilities and Fire Department during the first plans check and any subsequent re-submittals Contact the Fire department at 706-839-5400 for any additional questions. Utility questions should be directed to the review engineer.
3. Submit an engineer's revised estimate of cost to be used in computing fees and bonds. All estimates shall be on City forms using current City bond prices. (both are available at Engineering Dept)
4. Fees:
 - a. Plan check and inspection fee balance \$_____
 - b. Street Light Energy Fee \$_____
 - c. Imaging Fee \$_____
5. The following security shall be posted for this project. Security may be in the form of cash bonds, surety bonds, certificates of deposit or letters of credit. (Surety bond, letter of credit and agreement forms are all available from the Engineering Dept)
 - a. Faithful Performance \$_____
 - b. Labor and Materials \$_____
 - c. Guarantee and Warranty Bond \$_____
 - d. Agreement for Completion of Improvements.

Note: "Record Drawings" shall be prepared by the engineer and a mylar copy along with a digital copy of the drawings shall be provided to the City prior to release of any improvement security.
6. The following material shall be submitted for the processing of a dedication or easement document:
 - a. (2 Copies) A legal description (Exhibit "A", page 1) 8 1/2" x 11" document.
 - b. (2 Copies) A plat (Exhibit "A", page 2) 8 1/2" x 11" size including the following items (AutoCAD File with Border available upon request):
 - 1) North Arrow and scale.
 - 2) Bearings and distances on property lines and portions to be acquired.
 - 3) Width of street right-of-ways.
 - 4) The total ownership parcel will be shown whether acquisition is an easement, partial or total transfers.
 - 5) Distinct property lines shown and identified.
 - 6) Radial bearings for all non-tangent curves.

- 7) Area of total ownership – in square feet on lot/block, or smaller parcels; in acreage and square feet for smaller parcels.
- 8) Area of portion to be acquired.
- 9) Area of any overlapping easements within area to be acquired.
- 10) Tie points identified on drawing.
- 11) Point of beginning or commencement identified and describable.
- 12) Detailed blow-up of areas too small to be easily discerned.
- 13) Brief legals of properties affected by acquisition (i.e., Por. Of Lot 3, Blk. 162, Rancho Rincon Del Diablo, per Map No. 723).
- 14) Through cross-hatching or other illustrative means showing existing easements which affect the acquisition/conveyance area. Recording information and the area of the existing easements that may affect the acquisition area must be shown.
- 15) Clear definition of each type of easement if more than one type is to be acquired/conveyed (i.e., street easement, public utilities, etc.).
- 16) Assessor's Parcel Number for parcels affected by the acquisition.
- 17) Street boundaries for streets to be dedicated with appropriate bearings and distances so that legal can be shown for each separate sheet.
- 18) Signed and sealed by a licensed surveyor or a registered engineer with a number of 33965 or less.

c. (2 Copies) A current Grant Deed and Title Report.

d. (2 Copies) Traverse closure tapes.

e. Execution of the documents by the owner. (City will prepare documents)

6. Copies of this plan were sent to the Utilities and Fire Departments on first plan check. Any comments received need to be incorporated into the plans.
7. All Projects not initially processed through the Planning Department shall be submitted to Planning for an environmental determination prior to plan approval.
8. Submit the original mylar(**REQUIRED 4 MIL DOUBLE-MATTED**) for approval.
9. .

IMPROVEMENT PLAN REQUIREMENTS

1. Use standard City mylar sheets (available at Engineering Dept). Final plans shall be prepared with waterproof ink with minimum lettering of 1/8" in height.
2. Show a north arrow on plan pointing to the top of sheet whenever possible.
3. Show file No. _____ on the lower right hand corner of all sheets.
4. Show the improvement plan number of all reference plans both on the plans and in title block under "references".

5. Show horizontal and vertical scale on plan. Horizontal scale shall be a graphic bar-type, 1/4" wide and 4" long to accommodate future plan reduction.
6. Include a vicinity map.
7. Include an index map. The map shall be drawn at an appropriate scale showing the overall layout of the water, sewer, storm drain, fire hydrants and street lighting.
8. Include a "Work to be Done" on plan including standard drawing numbers, legend of symbols, item description, and quantities.
9. Include City bench mark used for basis of plan elevations. (available at Engineering Dept.)
10. Title Block should describe project with Street Names, Tract No., etc.
11. The plans must be wet signed and sealed by a Registered Civil Engineer. The Engineer's Seal should show the expiration date.
12. Show the name, address and phone number of the Engineer and Owner on the plan.
13. Add a signature block:
Reviewed by Director of Utilities: _____ Date: _____
14. Add signature blocks for the following:
 - a. Rincon Del Diablo Municipal Water District
 - b. San Diego County Water Authority
 - c. San Diego County Department of Transportation
 - d. Vallecitos Water District
 - e. CALTRANS
 - f. Valley Center Municipal Water District

IMPROVEMENT PLAN NOTES

Include the notes circled below on the plan:

GENERAL NOTES

1. All work to be done in accordance with the Standard Specifications and Special Provisions of the City of Escondido effective April 25, 2007 by Resolution No. 2007-60 and the Design Standards and Standard Drawings of the City of Escondido effective April 23, 2008 by Resolution No. 2008-65 with any amendments thereto.
2. All contractors working in the public right of way shall obtain a separate Encroachment Permit from the Director of Engineering Services. Inspection of all work is required. Contact the Engineering Field Office at (760) 839-4664 to arrange for Encroachment Permits and inspection. Twenty-four hour advance notice is required for inspection. No work shall be performed in the public right of way on Saturdays, Sundays or legal holidays without the express permission of the City Engineer.
3. It shall be the responsibility of the contractor to locate all substructures, whether shown hereon or not, and protect them from damage. The expense of repair or replacement of said substructures shall be borne by the contractor.

4. Neither the owner nor the engineer of work will enforce safety measures or regulations. The contractor shall be solely responsible therefor.
5. Location and elevation of all existing improvements within the area of work shall be confirmed by field measurement prior to construction of new work. Contractor will make exploratory excavations and locate existing underground facilities sufficiently ahead of construction to permit revisions to plans if revisions are necessary because of actual location of existing facilities.

STREET NOTES

6. All stationing refers to the centerline of the street.
7. All curb data refers to the face of curb.
8. Structural section to be determined after rough grading is completed, according to Figure 3 of the Escondido Design Standards.
9. The address of each lot shall either be painted on the curb or, where curbs are not available, posted in such manner that the address is visible from the street. In both cases, the address shall be placed in a manner and location approved by the City Engineer.

UTILITY NOTES

10. All temporary paving placed by any contractor, subcontractor or utility company shall remain in the public right of way for not more than 30 calendar days on residential streets and 72 hours on arterials, major roads, collectors and local collectors, prior to placement of permanent pavement. All temporary paving placed in the public right of way shall be maintained continuously in accordance with City of Escondido Standard Drawing No. G-3-E.
11. All underground utilities to be installed before construction of curbs, gutters, sidewalks or surfacing of streets.
12. Unless otherwise shown, sewer laterals and water services shall be run normal to the main.
13. All waterlines shall have 36" minimum cover to finished grade.
14. A fee is charged for shutting down or tapping a live waterline. Contact the Engineering Field Inspector at (760) 839-4664 for a determination of the fee amount. Schedule all shutdowns through a Public Works Inspector. This is only applicable to the City of Escondido waterlines.
15. Contractor shall notify utility companies prior to starting work near company facilities and coordinate his work with company representatives. It shall be the responsibility of the developer to contact the utility companies, advise them of the proposed improvements and bear the cost of relocations, if needed. See owner's letter regarding utility coordination dated _____.
16. Thrust blocks are required per Standard Drawings WT-01 as directed by the Engineer.
17. All required waterlines and fire hydrants shall be installed and in service prior to the accumulation of any combustible material on the job site.
18. Paved access to the site shall be maintained for the use of heavy firefighting equipment.

19. Verification of a San Diego County explosive permit and a policy of certificate of public liability insurance shall be filed with the Fire Department prior to any blasting within the City of Escondido.
20. All water and sewer lines including services and laterals shall be provided with a 6-inch wide strip of polyethylene nonmetallic detection tape one foot over the pipe. A blue color shall be used for water and red or green color for sewer. In addition, a #10 bare copper wire shall be installed over all nonmetallic waterlines. A "W" shall be stamped in the curb face at the water service location and an "S" shall be stamped in the curb at the sewer lateral location.
21. All abandoned sewer laterals shall be capped at the property line. All abandoned water services shall be shut off and disconnected at the main.
22. Fire hydrant markers are required per standard drawing M-19. Locations for areas outside of the public right of way shall be determined by the Fire Department.
23. The contractor shall construct sewer lateral cleanouts immediately behind the right of way line on all sewer laterals. The cleanout shall be contained within an enclosure covered with a cast-iron lid marked "sewer" if located in driveways or walkways.

STREET DESIGN

Alignment

1. Show street names, stations, intersection equations and street widths.
2. Show sufficient data on plan so improvements can be staked in the field.
3. Conform with stationing of existing improvement plans.
4. Show alignment data and curve data; station B.C. and E.C.
5. All curb returns shall have a minimum radius of 30 feet. Larger radii may be required as determined by the City Engineer. Show a profile of all curb returns.
6. The minimum horizontal street radii design criteria are as follows:

STREET CLASSIFICATION	MINIMUM RADIUS	MINIMUM TANGENT BETWEEN REVERSING HORIZONTAL CURVES
Alley	100'	None
Residential	435'	90'
Local Collector, Commercial, Industrial, Frontage	610'	100'
Collector	825'	120'
Major and Prime	1400'	150'

7. Streets shall normally intersect at right angles. Local Collector streets shall have at least 50 feet of tangent adjacent to the intersection, measured from the B.C.R. Collectors, Industrial and Commercial Roads should have at least 100 feet. Major Roads and Prime Arterials will

require a special design. An angle of intersection more than 20 degrees from a right angle shall not be used.

8. Residential street intersections should be directly opposite or separated by 200' minimum.
9. Cul-de-sacs shall not exceed 800 feet. Cul-de-sac design shall be in conformance with the Design Standards. Emergency access is required for longer single-access projects.
10. When streets are temporarily dead-ended, use a temporary cul-de-sac per Design Standards. Provide a standard barricade at the end of the street.
11. Provide a knuckle per the Design Standards when a street makes a right-angle turn in accordance with the design standards.
12. All cross-gutters shall be 10 feet minimum width and conform with Standard Drawings.
13. No cross-gutters shall be allowed to cross streets classified as Local Collector or above.
14. Mid-block cross-gutters require approval of the City Engineer.

Profile

1. Vertical curves are required when the grade break exceeds 1.0%.
2. Minimum vertical curve length is 200 feet for streets classified as Collector and above 100 feet for other streets and 40 feet on short cul-de sacs or at "T" intersections. In any event, the absolute minimum vertical curve length shall be $L = 1.2AV^{\frac{3}{2}}$, where L= length of curve in feet, A = the algebraic difference in grade in percent / 100 and V= design speed in miles per hour.
3. All sight distance shall be in accordance with the California Department of Transportation Design Manual. Sight distance may be reduced for sag curves with proper street lighting upon approval of the City Engineer.

STREET CLASSIFICATION	MAX. GRAD	SIGHT DISTANCE	DESIGN SPEED
Residential	15% A.C. 20% P.C.C.	200 feet	30 mph
Local Collector, Commercial, Industrial, Frontage	12%	250 feet	35 mph
Collector	7%	300 feet	40 mph
Major and Prime	7%	430 feet	50 mph

4. Maximum grade of 6% within any intersection to 20' from gutter line extended.
5. The maximum grade for permanent cul-de-sac is 5%. Maximum grade for a temporary cul-de-sac is 8%.
6. The minimum street and alley grade is 0.5% unless waived by the City Engineer.

7. Show existing profiles at centerline and property line.
8. Show proposed profiles at centerline and top of curb.
9. Profiles must follow typical section. A three-line profile shall be shown for all public streets.
10. Extend both existing and proposed centerline profile design a minimum of 200 feet beyond project boundary.
11. The top of curb should be lower than the property line elevation to allow drainage to flow to the street.
12. Show profile grades, length of vertical curves, P.I. elevations and design speed in m.p.h., stationing and elevations every 25 feet on vertical curves.
13. Show B.V.C. and E.V.C. and give stations and elevations.

Cross Section

1. All streets should have a typical section on plans including:
 - a. Use note ____ " A.C. over approved aggregate base. See note _____, general notes".
 - b. Use P.C.C. pavement for grades in excess of 15% up to 20%. (grades in excess of 20% not allowed) Grades in excess of 15% shall not exceed 400 feet.
 - c. Show property line, parkway slope at 2%, 4" P.C.C. sidewalk, type "G" curb and gutter. (usually 6" unless 8" is approved in special situations by the City Engineer)
 - d. Show base extended under curb and gutter.
 - e. Show a 2"x6" redwood header at paving limits next to dirt.
 - f. Section should conform with City Design Standards, Circulation or Specific Alignment Plan and any supplements thereto.
2. When joining an existing section, the proposed section may vary to match:
 - a. Normal cross slope on A.C. pavement shall be 2%. 1% minimum, 5% maximum cross slope; 1% maximum grade-break in cross slope.
 - b. Minimum cross slope shall be 2% where the profile grade is 1% or less.
 - c. Profile at the join must not exceed 1% difference from design profile.
 - d. Longitudinal join to be feathered smooth.
 - e. Saw cut rough edges in a straight line. (1' minimum saw cut)
3. The engineer shall provide cross-sections at ____ foot intervals showing existing and proposed improvements, elevations, all existing and proposed paving, slopes, any pavement removal or overlays and all join locations. All cross-sections shall be drawn at a scale of

1" = 10' horizontal and 1" = 1' vertical. Cross-sections shall be submitted on separate sheets that are signed and sealed by the engineer of work.

4. The developer of one side of the street only shall be required to construct 32 feet of structural section, plus necessary transitional paving. This requirement may be reduced to 28 feet for Residential streets.
5. "Undocumented" structural sections within the City of Escondido will normally need to be removed and replaced. When the engineer wishes to try to save an "undocumented" structural section, the following information shall be provided to the City Engineer:
 - a. Existing and proposed design profiles at the appropriate design speeds.
 - b. Cross-sections of the roadway including any proposed overlays and/or removals.
 - c. Core tests of the existing roadway by a geotechnical engineer.
 - d. "R" Value tests of subgrade by a geotechnical engineer.
6. The maximum cross-fall gradient shall not exceed 3%. In a street with cross-fall, the crown of the street shall be no closer than 8 feet from the face of curb.
7. Superelevation shall normally be avoided. When necessary because of restricted geometrics, maximum superelevation shall be 6%. Special drainage design will be required.
8. Sidewalks shall be installed on both sides of the streets and shall be located contiguous to the curb. Sidewalks are required on all streets, regardless of zoning. Widths shall be as follows excluding the top of curb:
 - a. Standard sidewalk - 5 feet. (no utilities allowed in the sidewalk)
 - b. Commercial zone - 6 feet. (no utilities allowed in the sidewalk)
 - c. C.B.D. zone or commercial areas with conflicts in the sidewalk - 8 feet or full width of the parkway.
9. Sidewalk ramps shall be provided at all intersections where sidewalks are required.

Transitions

1. Show all transitions from existing to proposed improvements
 - a. Show existing field elevations at 25' stations on all longitudinal joins.
 - b. Show existing field elevations at centerline and edge of paving on all transverse joins.
 - c. Show grading and paving of transitional ditches. Show necessary elevations and slopes to show positive drainage.
 - d. Where driveways cross existing roadside ditches, a dip section or an 18" minimum diameter culvert shall be provided.
 - e. Show cut and fill required on adjacent private property.
 - f. Submit a letter of permission to grade from adjoining owner.
 - g. Show guard posts as required along edge of transitional paving.

2. The minimum longitudinal transition shall be 50' for Local Collector Roads and below and 100' for Collector Roads and above.
3. The following formulas shall be used when reducing the number of traffic lanes:

$$\underline{L = WS^2/60 \text{ (40 mph or less) and } L = WS \text{ (45 mph or greater)}}$$

- S = design speed in m.p.h.
- W = width of transition in feet
- L = length of transition in feet

Driveways

1. The minimum driveway width shall be 16 feet for single family and small residential projects and 24 feet for other projects and shall be constructed of 5 1/2" P.C.C. minimum. Wider driveways may be required by the City Engineer.
2. Maximum frontage available for driveway use: residential - 40%; commercial and industrial - 60%.
3. Driveways shall be set back from intersections as to allow for the following length of full-height curb between the street curb return and driveway:

Prime Arterial and Major Road.....	120'
Collector, Commercial and Industrial Road.....	90'
Local Collector and Frontage Road.....	60'
Residential Street.....	30'

4. The minimum clear distance between driveways - 6 feet.
5. The minimum clear distance from property line - 3 feet.
6. The minimum distance from a fire hydrant, utility pole, traffic signal or any other permanent obstruction - 5 feet.
7. The maximum driveway grade in the public right of way is 10%. See Design Standards, Figure 12, for maximum on-site driveway grades.
8. Driveways shall extend from curb face to property line where P.C.C. curb and gutters are used.
9. Alley-type driveways shall be used for all high-use driveways as designated by the City Engineer.
10. Higher use driveways should not cause an interlock in the two-way left turn lane with existing driveways.
11. All unused driveways shall be removed and replaced with full height curb and gutter and standard sidewalk.
12. Show that driveway transitions are driveable with spot elevations.

13. All driveways that are significantly impacted by the proposed improvements shall have separate cross sections shown on the improvement plans.

Street Lights

Ornamental street lights (low pressure sodium vapor) shall be installed per City Standard Drawings as follows:

STREET CLASSIFICATION	WATTAGE	SPACING
Residential and Frontage	135W	200'
Industrial	135 W	200'
Local Collector	135W	200'
Commercial	135W	200'
Collector	180W	200'
Major	180W	180'
Prime	180W	150'

Signs

The following street name and traffic signs shall be installed:

- a. Two street name signs at every residential intersection.
- b. Stop signs at Local Collector intersections and above, or where required by the Traffic Engineer.
- c. "No outlet" sign when the end of the street cannot be seen.

Miscellaneous

1. Shade-in all proposed paving. Show a different symbol for transitional paving.
2. Street trees shall be planted at a minimum spacing of 30'.
3. Show slope lines on plan where no site grading is proposed.
4. Show existing S.D.G.&E., Telco and cable TV facilities, including any conflicts.
5. When applicable, note that all overhead utilities shall be converted underground on each sheet.
6. A signal modification plan is required for any work which affects a traffic signal. (See policy statement for details)
7. When required by the City Engineer, a guard rail shall be constructed at the top of any retaining wall or cut slope, adjacent to and lying below the public street. In addition, a fence at least five feet in height shall be constructed at the top of any retaining wall adjoining the public street.

8. Show any survey monuments to be preserved, tied out, reset or adjusted to grade on the plans. A corner record may need to be filed with the County prior to recording a certificate of completion for the project.
 9. Field check existing improvements including pavement width, curb height, sidewalk width, driveways, drainage facilities, utility poles, manholes, gate valves, etc.
 10. A subdrain system needs to be considered in all roadway designs.
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WATERLINE DESIGN

Mains

1. Waterline design should be based on the Design Standards and the City's Master Plan.
2. Minimum size main is 8" for residential and 12" for commercial and industrial zoning.
3. Distribution lines up to 12" in diameter shall be constructed of polyvinyl chloride (P.V.C.) pipe manufactured per A.W.W.A. C900, class 235 minimum.
4. Lines 14" in diameter and larger shall be constructed of cement lined and coated - welded steel pipe (CML-WSP), 12 gauge minimum or Ductile Iron Conformance with A.W.W.A. Standards. Cathodic protection systems and/or bonded pipe joints need to be addressed with all steel pipe design.
5. All mains, valves and other fittings shall be designed for the proper pressure class, which shall be indicated on the plans.
6. Standard waterline location is 12' south or east of sewer (centerline to centerline). One foot minimum clearance is normally required when crossing other conflicting utilities.
7. Maintain 10 foot minimum horizontal and one foot vertical clearance over all sewer lines per State Dept. of Health Standards.
8. All lines shall be looped whenever possible.
9. Show waterline alignment data including distances and bearings.
10. The following minimum radii shall be used for P.V.C. waterlines:
 - a. 8" main – 200 foot radius
 - b. 12" main - 300 foot radius
11. All mains shall be shown on the profile. Include slopes, elevations and note minimum cover.
12. Waterlines within easements should be avoided whenever possible. When easements are necessary, the minimum width shall be 20 feet.
13. The developer is responsible for extending the waterline across the full property frontage and to all property limits as necessary for future extensions.

14. The minimum cover shall be 3 feet. The ultimate design profile should be considered in determining waterline depth. If ultimate grades are not known, use 5 feet minimum.
15. Show all thrust and anchor blocks on plan in accordance with Standard Drawings.
16. Solve all conflicts with other utilities.
17. Large vertical angles require anchor/thrust blocks or should be steel pipe with sufficient length for soil friction to balance thrust.
18. Wet taps into existing waterlines shall be done by City forces at Contractor's expense and so noted on the plans.
19. Where the existing line is to be closed down to complete improvements, ***the work shall be coordinated with City forces*** and so noted on the plans.

Valves

1. The maximum valve spacing in distribution mains is 1000'.
 - a. Install valves at all tees and crosses. Gate valves may be used, except for pipelines 16" and larger in diameter which require butterfly valves.
 - b. Valves should be placed so that at least half the fire hydrants remain in service if the system is shut down.
2. All high points shall be equipped with combination air release valves (Std. Dwg. No. W-5-E & W-6-E - located behind sidewalk). ***All low points and dead-ends*** shall be equipped with blow-off valves (Std. Dwg. No. W-9-E, located in the street, 4" min. for 8" and larger). Valve placements must assume valves in both the open and closed positions.
3. Note on the plan that all existing valves will be adjusted to grade.

Fire Hydrants

1. Fire Hydrant Requirements:
 - a. Locate on prolongation of B.C., radial or property line.
 - b. Place on the side of the street nearest the water main.
 - c. Locate behind the sidewalk.
 - d. Residential F.H. has two outlets (single family residential areas only) industrial type has three (all other areas) - call out type on plan.

Water Services

1. Show a 1" minimum water service to each lot.
2. Water services shall be at right angles to main, except at cul-de-sacs.
3. No service shall be installed in the driveway.
4. All water meters shall be located behind the sidewalk. Behind the curb, if no sidewalk, within the Public Easement.

SEWER DESIGN

Mains

1. All mains shall conform to the City of Escondido Wastewater Master Plan.
2. The minimum size shall be 8".
3. Material shall be P.V.C. SDR 35, to conform to the "Standard Specifications for Public Works Construction", latest edition. Material for sewer in easements shall be PVC C900 pipe.
4. Minimum cover shall be 3'. Use concrete encasement when less than minimum.
5. Horizontal curves should be avoided. When necessary, the minimum horizontal curve radius shall be 375'.
6. Show all pipe alignment data including curve data, B.C. and E.C. stationing, distances, bearings, pipe slopes, etc. Information should be sufficient to stake sewer from plans.
7. Vertical curves should be avoided. When necessary they shall have a minimum length of 40' or four times the grade break in percent, whichever is greater.
8. The maximum depth of any sewer shall be 15'.
9. Design criteria: For diameters 10" or smaller, maximum depth of flow is 1/2 the diameter. For diameters 12" and larger, maximum depth of flow = 3/4 the diameter.
10. Sewer shall be located at the centerline of the street, except the main shall be offset 6' north or west of the centerline for roadways and alleys at 30 feet or less in width.
11. Maintain 10 feet horizontal clearance from waterlines per State Department of Health Standards.
12. Sewers within easements should be avoided if possible. Where easements are necessary, the minimum width shall be 20 feet. All easements shall be fenced and surfaced and shall be easily accessible by City maintenance equipment.
13. The developer is responsible for extending the sewer across the full property frontage, and to all property limits as necessary for future extensions.
14. Sewers shall normally be placed at least 6' below finished grade. Mains shall be designed to serve the farthest and lowest site at 2% minimum grade. Ultimate street grades need to be considered.
15. Conflicts with other utilities need to be resolved. Clearance from storm drains and other utilities shall be 1'. Clearance shall be 1' under waterlines in conformance with State Department of Health Standards.

16. Minimum slopes - maintain a minimum velocity of 2 f.p.s.:

PIPE SIZE	MINIMUM
8"	0.50%
10"	0.40%
12' and above	0.30%

Manholes

1. Manholes are required at the following locations:
 - a. All changes in slope.
 - b. All changes in direction.
 - c. At all ends of lines.
 - d. At 300 intervals along main. (350 foot maximum for 12" and smaller pipe). If sewer slope exceeds 8%, manhole spacing shall not exceed 180 feet.
2. Manholes shall be 60" in diameter.
3. Existing manholes need to be adjusted to grade.
4. Provide capped stubs as required for future extensions.
5. All manholes and stubs must have elevations called out.
6. Manholes shall not create an adverse flow condition, where a sewer line is opposing the direction of flow in the sewer.
7. A cleanout may be considered at a temporary end of the line less than 200 feet from the last manhole, with no vertical or horizontal alignment changes.

Laterals

1. Sewer Laterals
 - a. Show a separate lateral to each lot on the plan. Include station and invert elevation at property line.
 - b. Single family and up to four residential units - 4" minimum lateral at 2% minimum slope.
 - c. All others - 6" minimum lateral (8" or larger laterals require a manhole connection)
 - d. A cleanout shall be located at the property line.
 - e. Lateral is normally at right angles or radial to the street right of way.
 - f. Sewer laterals may be located in the driveway only in areas of limited frontage.
 - g. Provide clearance from other utilities and trees.

- h. Depth is 5' desirable minimum at property line; 3' is the minimum depth.
- i. Laterals from mains deeper than 10' require deep cut house connections. (SS-02)

Miscellaneous

1. Sewer easements shall be a minimum of 12 feet wide surfaced with 6" D.G. for grades less than 10% and 3" A.C. over 6" D.G. for grades over 10%. Both sides shall be fenced.
 2. Private septic systems and sewer pumps should be avoided. Odor control measures need to be considered with all private sewer pumps.
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DRAINAGE DESIGN

General

1. Public drainage facilities shall be designed for a 50-year frequency storm except that a 100-year frequency storm shall be used for all tributary areas over one square mile.
2. The use of underground storm drain systems, in addition to standard curb and gutter shall be required:
 - a. When flooding or street overflow will cause damage.
 - b. When existing drainage facilities discharge into the proposed development.
 - c. When a 100-year frequency storm cannot be contained within the public right of way.
 - d. When the depth of flow in the street exceeds 5 inches or more than 16 feet of paving is flooded in a 50-year frequency storm.
 - e. When the depth-velocity product of flow in the street (expressed in feet and feet per second) exceeds six.
 - f. To minimize the installation of cross gutters.
3. When the above conditions require an underground storm drain, the combined street and storm drain design shall carry the design flow.
4. The designer should consider the impact of a clogged drainage system and flows from a larger storm than the design storm.
5. Permanent open drainage ditches will not be permitted in the right of way of a public street.
6. Open channels may be considered in lieu of underground systems when the design flow exceeds the capacity of a 48" diameter R.C.P.
7. The developer is responsible to accept all drainage flows tributary to his or her property, providing permanent drainage facilities in accordance with these standards through the limits of development to a point of satisfactory disposal as approved by the City Engineer. (This may include offsite improvements.)

8. Concentrated discharges into unimproved areas shall only be permitted into natural channels with "defined bed and banks".
9. Onsite detention shall be considered on all projects, particularly when downstream drainage problems exist. Detention shall limit maximum discharges to those of pre-development conditions.
10. Natural channels are encouraged in areas where substantial open space can be preserved. Maximum design velocity shall not exceed 6 f.p.s. Arrangements for maintenance of the channel shall be included in the project.
11. Concentrated drainage over 10 c.f.s. shall not be discharged into the public street.
12. The minimum freeboard for open channels shall be based on the following formula:

$$\text{Freeboard} = 1 + 0.025vd^{0.33}$$

where: v = normal velocity in feet per second
 d = normal depth of flow in feet

11. Improved channels must be fenced on both sides. A 12' wide paved access road shall be provided on one side or access ramps shall be provided to the channel bottom. Access ramps shall be located at every street crossing or at 1500 foot intervals, whichever is less. The maximum slope of access ramps shall be 10%.

Hydrology

1. Off site - use a blue line print of the latest 1" = 100' or 200' scale City of Escondido Topographic Maps. Show existing culverts, cross-gutters and drainage courses based on a field review. Indicate direction of flow and clearly delineate each drainage basin showing the area of discharge and the points of concentration.
2. On site - use the Grading Plan. If grading is not proposed, use a 100 scale plan or greater enlargement. Show all proposed and existing drainage facilities and drainage courses. Indicate the direction of flow. Clearly delineate each drainage basin showing the area and discharge and the points of concentration.
3. Use the charts in the City Design Standards (Figures No. 1 and 2) for finding the "time of concentration", "intensity" and "runoff coefficients".

Use the rational formula $Q = CIA$ for watersheds less than 0.5 square mile. For watersheds in excess of 0.5 square mile, the SCS method of analysis shall be used, unless an alternate method is approved by the City Engineer prior to submitting calculations. Refer to Drainage Master Plan dated November, 1995.

Hydraulics

1. The following street calculations shall be provided:
 - a. Depth of gutter flow calculations.
 - b. Inlet calculations.

- c. Show gutter flow Q, inlet Q, and bypass Q on a plan of the street.
 - d. Depth-velocity product calculations.
2. For storm drains and open channels, provide:
- a. Hydraulic loss calculations for: entrance, friction, junction, manholes, bends, angles, reduction and enlargement.
 - b. Analyze existing conditions upstream and downstream from the proposed system.
 - c. Calculate critical and normal depth for open channel flow conditions.
 - d. Show the H.G.L. plotted on a scale drawing of the pipe or channel profile.
 - e. Design for a non-silting velocity of 4 f.p.s. in a 2-year frequency storm.

Inlets

- 1. Curb inlets at a sump condition should be designed for 2 c.f.s. per lineal foot of opening when headwater may rise to the top of curb.
- 2. Curb inlets on a continuous grade for 100% interception should be designed based on the following equation:

$$Q = 0.7 L (a + y)^{3/2}$$

Where: y = depth of flow in approach gutter (feet)
 a = depth of depression of F.L. at inlet (feet)
 L = length of clear inlet opening (feet)

Continuous grade inlets designed for partial interception should be based on Bureau of Public Roads Nomographs. (now known as the Federal Highway Administration)

- 3. Six inches of freeboard shall be provided for street inlets from the hydraulic grade line to the flowline of gutter.
- 4. Grated inlets should be avoided when possible. When necessary, the design should be based on the Bureau of Public Roads Nomographs. (now known as the Federal Highway Administration) Bike grates should be used in streets.
- 5. Inlets shall be provided at superelevated roadway sections, both along the curb and in the median, as necessary to avoid concentrated flows across the roadway.

Storm Drains

- 1. The minimum pipe slope is 0.5%. A flatter slope may be approved based on topography.
- 2. A non-silting velocity of 4 f.p.s. in a 2 year storm shall be maintained.
- 3. Minimum storm drain size shall be 18" in diameter.
- 4. Provide cleanouts at 300 foot maximum spacing, at horizontal angle points exceeding 10 degrees and at vertical breaks in grade. For pipes 48" in diameter and larger, a maximum cleanout spacing of 500 feet may be used.

5. Lugging of pipes less than double the diameter of the pipe to be lugged-in shall not be permitted.
 6. The material for storm drains shall be reinforced concrete pipe or high density corrugated polyethylene pipe.
 7. Show sufficient alignment data on plans so pipe can be staked in the field.
 8. The minimum horizontal radius for any storm drain shall be 22.5'. A maximum deflection of 10 degrees per bend shall be used for horizontal curves.
 9. The pipe invert elevations, slope, length, material and pipe profile shall be shown on the improvement plans.
 10. The strength classification of any pipe shall be shown on the plans. (1350-D minimum for R.C.P.)
 11. Deep inlets and outlets shall be fenced for safety. Headwalls may require special design if they extend more than one foot above the pipe. A protective barrier shall be provided whenever determined necessary for public safety.
 12. Conflicts with other utilities and services need to be resolved. Clearance also needs to be provided under the curb and gutter.
 13. The minimum easement width shall be 20 feet.
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Engineering Department

IMPROVEMENT PLAN

Transmittal ~ Re-Submittal and Final Submittal Requirements

Date: _____ City Plan Checker: _____ Check #: _____

Project #: _____ Project Name: _____

THE FOLLOWING INDICATED ITEMS MUST BE INCLUDED IN EACH RE-SUBMITTAL:

- _____ Transmittal letter from the Engineer or Surveyor of Work listing all the items being submitted.
- _____ Copy of this City Transmittal.
- _____ Six (6) bond sets of the corrected improvement plans, folded to 9" x 12".
- _____ Two (2) sets of bound (not notebook) corrected Drainage Report, sealed & signed by Eng. or Surveyor of Work.
- _____ Two (2) sets of bound (not notebook) corrected Soils Report, sealed & signed by Engineer or Surveyor of Work.
- _____ Two (s) sets of Engineer's corrected Cost Estimate, sealed & signed by Engineer or Surveyor of Work.
- _____ Two (2) sets of corrected Stormwater Pollution Prevention Plan (SWPPP).
- _____ All previous checkprints of plans, correction list, reports, calculations and estimates.
- _____ Concurrent re-submittal: Final/Parcel Map, Grading & Erosion Control Plans.
- _____ Additional Items/Information Required: _____
- _____ Comments: _____

THE FOLLOWING INDICATED ITEMS MUST BE INCLUDED BEFORE CITY APPROVAL:

- _____ Transmittal letter from the Engineer or Surveyor of Work listing all the items being submitted.
- _____ Copy of this City Transmittal.
- _____ All previous checkprints of plans, correction list, reports, calculations and estimates.
- _____ Six (6) bond sets of the corrected improvement plan folded to 9"x12".
- _____ Original mylars of the plans with all required signatures. Mylars must also be sealed & signed by the Engineer of Work.
- _____ Proof of approval of securities and agreements, and verification of payment of balance of fees.
- _____ Once signed by City, need Fifteen (15) bond sets, Sixteen (16) if Rincon Water District of signed improvement plan folded to 9" x 12" & digital copy of plans on CD.
- _____ Comments: _____