

Appendix E-4

City of Loveland

Requirements for Public Improvements - Construction Plans

NOTE: Appendix Forms and Information are for Reference Only. Contact Local Entity Engineer for Original Forms and Current Information.

Project Name: _____

All applications for final subdivision plans must include final construction plans for public improvements. The standards for these plans are set forth in Section 16.20.090 of the Municipal Code, these Standards and as further noted in this appendix.

The two “check list” columns to the left of the construction plan requirements below are provided for the convenience of both staff and the Developer’s Engineer. The columns are organized as follows:

- (1) The first column, “Applicant Validation,” is provided as a check list for the applicant to ensure that all required items are addressed within the construction plan set.
- (2) Upon submittal, city staff will check off items in the second column to ensure that all the required items are included within the construction plan set.

<u>Applicant Validation</u>			<u>Staff Check</u>
<u>N/A</u>	<u>Included</u>	<u>Staff Check</u>	
I.	Title Sheet		
_____	_____	_____	A. Preamble title of "Public Improvements Construction Plans".
_____	_____	_____	B. The legal name of the addition or subdivision (the marketing name may be used on the plans, but must be subordinate to the subdivision name).
_____	_____	_____	C. Signature review blocks for City and other applicable entities, i.e., ditch company, C.D.O.T., County, etc. (See Appendix E-3)
_____	_____	_____	D. Index to all sheets in the plan set.
_____	_____	_____	E. The character type and position of benchmark (including elevation) must reference the “City of Loveland 1995 Level Net Survey.
_____	_____	_____	F. Vicinity map, scale and north arrow. The vicinity map must be updated to show all approved projects in the area. 1” = _____.
_____	_____	_____	G. General Construction Notes, Street Construction Notes, & Water/Sewer and Storm Drainage Notes (see attached Appendix E-1).
_____	_____	_____	H. Stamp and signature of licensed Civil Engineer (on final approved sets of plans) in accordance with current State Statutes and Board Rules.

Applicant Validation

N/A

Included

Staff Check

I. Overall Utility Layout Plan sheet(s)

<u>N/A</u>	<u>Included</u>	<u>Staff Check</u>	
_____	_____	_____	A. Streets
_____	_____	_____	1. R.O.W. and easements.
_____	_____	_____	2. Cross-Pans.
_____	_____	_____	3. Curb and gutter (lines depicting lip and flowline).
_____	_____	_____	4. Walk, (attached or detached).
_____	_____	_____	5. Medians, (line depicting both flowlines), if an outfall gutter then show lip and flowline.
_____	_____	_____	6. Signs (speed, stop, warning) general location.
_____	_____	_____	7. Other roadway signs or devices associated with phasing or dead end streets.
_____	_____	_____	B. Provide 3" P.V.C. schedule 40, 36" deep with pull boxes at intersections that will be signalized now or in the future.
_____	_____	_____	C. Include Phasing of development and construction of all Public Improvements. Minimum development phasing shall be 10 lots; All public improvements within each phase shall stand alone. Phase lines shall be shown by heavy dark lines, all phases shall be identified by number or letter.
_____	_____	_____	D. Water Distribution System Valves, hydrants, bends, airvacs, blowoffs, lowering, crossings, sizes of all mains and services. See Water/Wastewater Development Standards for further requirements.
_____	_____	_____	E. Sanitary Sewer System MH, C.O.'s, services, subdrains (where applicable), crossings and sizes of all mains and services. See Water/Wastewater Development Standards for further requirements.
_____	_____	_____	F. Storm Drain System
_____	_____	_____	1. MH, junction structures
_____	_____	_____	2. Inlets / catch basins
_____	_____	_____	3. Storm sewer pipes
_____	_____	_____	4. Detention Pond Outlet Structures
_____	_____	_____	5. Waterways

<u>Applicant Validation</u>		
<u>N/A</u>	<u>Included</u>	<u>Staff Check</u>

_____	_____	_____
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G. Street Lighting Show all public street lights in conformance with Chapter 15 of these Standards.

II. Grading, Drainage & Sediment/Erosion Control Plan & Report

_____	_____	_____
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A. A Grading, Drainage and Sediment/Erosion Control Report done in accordance with the City of Loveland Storm Drainage Criteria Manual.

_____	_____	_____
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B. Existing and proposed contours in a minimum of two foot intervals.

_____	_____	_____
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1. Show contours extending a minimum of 50' off-site, and tying into existing contours.

_____	_____	_____
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2. Finish grade elevations for streets, lot corners, and finish floor grades or alternately top of foundation of buildings shown for all lots.

_____	_____	_____
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C. This statement: The top of foundation elevations shown are the minimum elevations required for protection from the 100 year storm. The lowest opening elevations shown are at least one foot above the 100 year storm elevation of adjacent streets, channels, ditches, swales, or other drainage facilities. Minimum finished floor elevations above 100-year water surface in streets, channels, ditches, swales, or other drainage facilities, as illustrated by a master grading plan are to be shown.

_____	_____	_____
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D. Plans to have positive drainage to streets (showing drainage arrows across lots) or to an approved discharge facility.

_____	_____	_____
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E. All drainage improvements are to be designed to include all necessary improvement details on the detail sheet.

_____	_____	_____
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F. Cross-check front lot elevations with plan & profile sheets for continuity. Also check for elevations and datum match where streets will meet an adjoining subdivision, especially when the adjoining street is designed but not built.

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G. Show phase lines. If phasing is proposed after the construction plans are signed, the consultant must revise the plans to show the phase lines.

_____	_____	_____
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H. Criteria:

_____	_____	_____
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1. Minimum of 1.5% profile grade on grass and a maximum side slope of 4:1. If special circumstances warrant a steeper cross slope, it will be evaluated on a case-by-case basis.

_____	_____	_____
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2. If rear lot drainage distance is greater than 300' and provides less than 2% profile

grade, a concrete trickle channel or an under drain must be provided.

3. Drainage outlets and ending pans typically should have some type of erosion protection indicated. Example: If rip-rap is to be used, details should include size of rock D-50 and dimensions of placement, length, width, depth.

I. Inlets/catch basins, fire hydrants and utility poles are not to be constructed where they would conflict with handicap ramps, or be a hazard to traffic. Maintain a 2' minimum clearance from flowline.

J. A final drainage report must be accepted by the storm water utility.

K. Include Phasing of construction & development if phasing is desired.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Applicant Validation

<u>N/A</u>	<u>Included</u>	<u>Staff Check</u>
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IV. Street Plan & Profile

A. Minimum local street widths is per Table 4.1 and 4.2 .(unless project is a PUD or a waiver or variance is approved).

B. Profile grades:

1. See Table 4.2 for maximum grades. Minimum grade allowed is 0.5%.

2. Street grades within 100' of an approaching intersection shall be a maximum grade of 4%.

3. Maximum grade through the intersection is 3%.

a. 10' min. length for each segment prior to a grade break. 2% max. algebraic difference between segments for Collectors and Arterials. 4% max. grade break on local streets. This is to provide a smooth ride through the intersection.

b. Provide flow line grades for intersections with cross-pans. Check the grades for correctness. Make sure they drain.

c. Provide the percent grade for all curb returns at intersections.

C. Vertical curve is required when the algebraic difference in grades is >1.0% except flowline grades in sumps.

_____	_____	_____
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<u>Applicant Validation</u>		<u>Staff Check</u>	
<u>N/A</u>	<u>Included</u>		
_____	_____	_____	1. Check actual grades and length for accuracy and correctness.
_____	_____	_____	2. All K-values shall be noted on the profile view; minimum K-values shall be in accordance with design speed. Minimum K=45 for crest vertical curve unless circumstances warrant less than 45 ($K=L/Alg.$ Difference in grades)
_____	_____	_____	3. All proposed streets to match with existing streets and adjacent topography/projects. Show the existing streets profile and topography grade and where the proposed will match it. Existing street and topography grades are to be shown for an adequate distance beyond the proposed improvements to facilitate a smooth transition.
_____	_____	_____	4. Check stationing of plan and profile for errors in design and/or discrepancies between the two. Keep the street names the same. (Don't change names of streets at intersections.)
_____	_____	_____	D. Tapers:
_____	_____	_____	1. When shifting an entire directional stream of traffic the taper length $(L) = WS$ for design speeds of >45mph; and $L=WS^2/60$ for design speeds of <40mph; and for turning bay tapers $L=WS/3$. (L =length of transitional taper section in feet, W =width of lateral lane shift in feet, S =design speed in m.p.h.)
_____	_____	_____	E. Access ramps shall be constructed at all corners of street intersections, including one ramp opposite from corners of tee intersections. It is recommended by the Handicap Advisory Committee that access ramps be installed midblock when blocks exceed 600 feet in length street.
_____	_____	_____	F. Inlets/catch basins, fire hydrants, utility poles and electric appurtenances are not to be constructed where they would conflict with handicap ramps.
_____	_____	_____	G. Provide 3" P.V.C. schedule 40, 36" deep with pull boxes at intersections that will be signalized now or in the future. Includes 90° sweeps.
_____	_____	_____	H. Show all raised medians and include all details for construction. Show interior median treatment and design. (i.e., trees, sprinklers, pavement, rock, splash pan, etc). Trees shall not block signing. See Standard Drawing 4-9.

	<u>Applicant Validation</u>		<u>Staff Check</u>
<u>N/A</u>	<u>Included</u>		

I. Gutter cross pans are not to be designed to cross arterial or major collector streets. Gutter pans widths are as follows:

<u>Width</u>	<u>Intersection Type</u>
6'	Local-Local
8'	Local-Collector
8'	Collector-Collector
10'	Local-Arterial
10'	Arterial-Collector
12'	midblock on local street
30'	midblock on collector street

J. Gutter pans or concrete edge protection may be constructed in place of curb and gutter within industrial zoned areas.

1. Minimum 4' compacted fill to be placed between back edge of concrete edge protection or gutter and top of slope of roadside ditch.

K. Minimum curb radii at intersections will be as follows (measured to flow line):

	Local	Collector	Arterial
Local	15'	20'	30'
Collector	20'	25'	30'
Arterial	30'	30'	35'

Note: As per state highway regulations, a minimum of a 50' flow line radius is required when an arterial street intersects a state highway, unless otherwise approved through traffic engineering.

L. Verify written easements are received for any required easements not dedicated on the final plat. Check the easements for accuracy and check that all roadway improvement (i.e., curb and gutter, walk, etc.) are located within dedicated public ROW or pedestrian easements when applicable.

M. Identify the numeric phasing designation and the physical limits of each construction phase.

1. Type III barricades or 3-rail fence with "End of Road" sign, and any related pre-warning signs at all deadends of roads and sidewalks.

For detail see Part

IV, 4.6.b.

2. Secondary access provided for dead ends of length $\geq 400'$ shall be all weather surface, 20' wide, 6" minimum thickness of Class 5 or 6 ABC or recycled HBP.

3. 50' outside radius all weather turn around at deadend roadways longer than 150'.

of either may result in slopes which overrun the R.O.W. In this case, a construction easement will be required.

<u>Applicant Validation</u>		<u>Staff Check</u>
<u>N/A</u>	<u>Included</u>	
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_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4. Information to be shown on each cross section.
 - a) Curb and gutter, existing and proposed.
 - b) Roadway surface, existing and proposed.
 - c) Sidewalk, existing and proposed.
 - d) Pavement, base and subgrade thickness, existing and proposed.
 - e) Cross grades, existing and proposed.
 - f) R.O.W., existing and proposed.
 - g) Easements, existing and proposed.
 - h) Sideslopes, existing and proposed.

VI. Striping Plan

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- A. SIGNING & STRIPING PLANS ARE REQUIRED on all streets classified minor collector and greater. Major Collector and Arterial street signing and striping plans shall have a minimum scale of 1"=30' and shall be per M.U.T.C.D. and the City Standards.
 1. Bike lanes w/symbols and dimensions (7' min. adjacent to curb and gutter, 5' min. adjacent to travel lanes w/o curb and gutter.)
 2. Travel lanes w/dimensions for all tapers, angle points, turning bays, medians, symbols, etc.
 3. Location of all existing and proposed signs (i.e., no parking/bike lane, stop, speed, warning, etc.)
 4. R.O.W., easements. (All traffic control devices must be located within right-of-way or easements.)
 5. All street improvements (i.e., curb and gutter, walk, asphalt, etc.) w/dimensions.

Applicant Validation

N/A Included Staff Check

_____	_____	_____
_____	_____	_____
_____	_____	_____

6. Layout data/geometrics to all angle points, end points, symbol locations, and sign locations.
7. Add note to signing and striping sheet: "The layout of all signing and striping using 3-M temporary tape at a minimum of 50' spacing shall be approved by the City Street Inspector prior to the installation".
8. Preformed thermo-plastic for arrows, cross walks, bike symbols, etc.

VII. Sanitary Sewer Plan and Profile

_____	_____	_____
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- A. Include Phasing of construction and development if phasing is desired. See Water/Wastewater Development Standards for further requirements.

VIII. Storm Sewer Plan and Profile

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- A. Check to make sure water tight joints are used on all storm drainage pipes underneath roads.
- B. Include Phasing of construction and development if phasing is desired.
- C. The profiles must include the hydraulic grade lines of the storm event that the storm sewer is being designed for.
- D. Check to make sure there is a profile for each storm sewer and culvert being proposed.

IX. Utility Details

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- A. All improvements that have not been standardized are required to be fully designed and shown in the Plans, including the following items:
 1. Curb inlets and outlets (to have grates for sidewalks).
 2. Irrigation boxes.
 3. Drainage structure inlets and outlets.
 4. Bridges.
 5. Drainage pans.
 6. Retaining structures.
- B. All standardized improvements shall be depicted by the appropriate City Standard Detail Drawing.

Applicant Validation

N/A Included Staff Check

C. See Water/Wastewater Development Standards for further requirements.

X. Typical Pavement Cross-Sections & Street Improvement Details

A. Pavement sections are to be designed using a soil investigation report as a basis for design, or by using the City's default values as found in Part IV, Table 4.3.

1. This design will include:

a. Methods of stabilizing the subgrade. The most common method is to scarify to a minimum depth of six inches and re-compact to a uniform minimum of 95% relative density as determined by AASHTO T-99.

b. Thickness of the aggregate base course. Compacted to 95% in accordance with T-180.

c. Thickness of asphalt pavement.

2. "Default pavement design" may be chosen vs. a full pavement design based on a soils report. The default pavement design is based on the following coefficients.

a. Aggregate Base Course (A.B.C.) strength coef. = 0.11 per inch, unless R Value tests are submitted which show R values > 78.

b. Pavement Grading "C" & "G" Hot Bituminous pavement strength coefficient =0.44 per inch.

c. The minimum sums of the coefficients for the default pavement design are listed below:

Pavement Thickness

<u>Street Clarification</u>	<u>WSN</u>	<u>(full depth HBP)</u>
Local	2.22	5.5"
Minor Collector	2.97	7.0"
Major Collector	3.48	8"
2-lane Arterial	4.08	9.5"
4-lane Arterial	4.51	10.5"
6-lane Arterial	4.77	11"

d. Show the min/max lift thickness for Grading "SX" HBP =1.5" and 2.5" respectively.

<u>Applicant Validation</u>		<u>Staff Check</u>	
<u>N/A</u>	<u>Included</u>		
_____	_____	_____	e. Show the min/max lift thickness for Grading “S” HBP =2” and 3” respectively.
_____	_____	_____	f. Show the min/max lift thickness for Grading “SG” HBP =3” and 5” respectively.
_____	_____	_____	g. Minimum allowable pavement thickness shall be as shown in Table 10-1.
_____	_____	_____	B. Soils/Subsurface investigation report to recommend methods of stabilizing the subgrade when ground water is within 3’ of the pavement section. Details of the methods of construction of the roads, in high ground water areas, shall be shown and described in the appropriate typical cross-section.
_____	_____	_____	C. Standard Details
_____	_____	_____	1. Access ramp.
_____	_____	_____	2. Gutter pan.
_____	_____	_____	3. Curb and gutter (vertical or driveover).
_____	_____	_____	4. Sidewalk (detached or attached).
_____	_____	_____	5. Elevated sidewalk crossings at driveway (detached walk only).
_____	_____	_____	6. Monolithic curb and gutter/walk (driveover or vertical).
_____	_____	_____	7. Commercial drive approach (flared or radius).
_____	_____	_____	8. Residential drive approach (flared or radius).
_____	_____	_____	9. Curb chase.
_____	_____	_____	10. Crown transition.
_____	_____	_____	11. Industrial edge protection.
_____	_____	_____	D. Non Standard Details – construction detail (i.e., speed hump, traffic circles, etc.)
_____	_____	_____	E. Street Construction Notes (See appendix I-B)

Applicant Validation

N/A Included Staff Check

2. Show all proposed public tree lawn treatments.

3. Show all existing mature vegetation.

4. Annotate intersection sight distance triangles and horizontal curve stopping sight distance triangles on all proposed streets. Private easements may be needed which restrict installation of certain landscape material.

5. All proposed and existing water, wastewater, storm drainage facilities, including laterals, services, meterpits, hydrants, blowoffs, airvacs, etc. Clearances of 10' to any tree and 5' to any shrub must be maintained for all proposed and existing facilities.