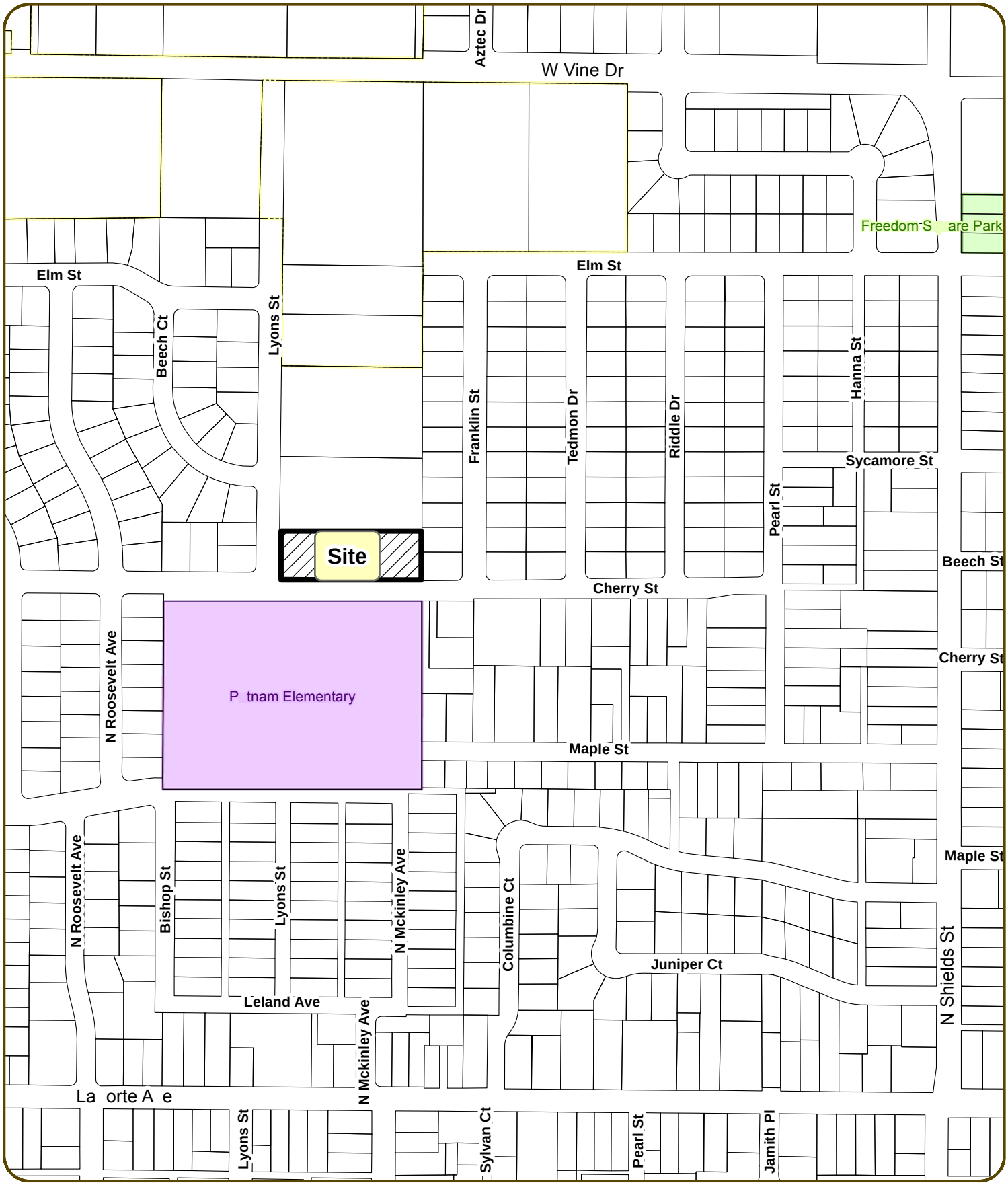
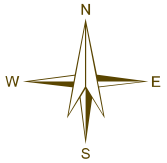


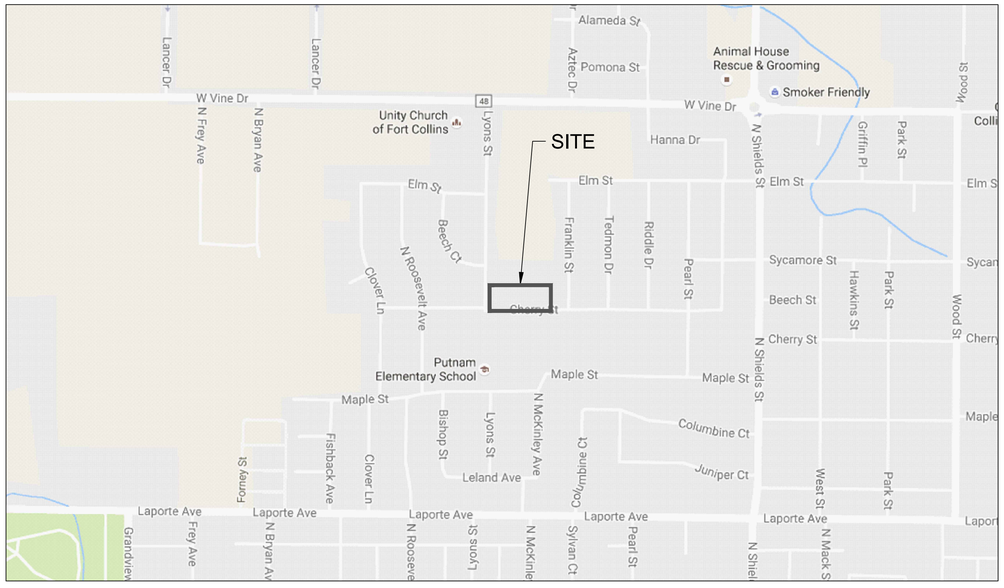
Cherry Street Cottages
Development Plan
Location Map



PROJECT DEVELOPMENT PLANS FOR
CHERRY STREET COTTAGES

BEING A PORTION OF THE NE 1/4 OF SECTION 10, TOWNSHIP 7 N, RANGE 69 W OF THE 6TH P.M.
CITY OF FORT COLLINS, COUNTY OF LARIMER, STATE OF COLORADO

VICINITY MAP



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
C-1.0	COVER SHEET
C-2.0	SITE PLAN
C-3.0	DETAILS
LP001	LANDSCAPE PLAN COVER
LP101	OVERALL LANDSCAPE PLAN
LP501	LANDSCAPE DETAILS

LEGEND:

PROPERTY LINE	PROPOSED WATER SERVICE (WET TAPS)
EXISTING FLOW LINE	PROPOSED SANITARY SERVICE
EXISTING EASEMENT	PROPOSED TELEPHONE
EXISTING GAS LINE	PROPOSED STREET LIGHT
EXISTING WATER LINE	PROPOSED ELECTRICAL
EXISTING SEWER LINE	PROPOSED WATER METER & CURB STOP
EXISTING TELEPHONE	PROPOSED 3/4 WATER TAP
EXISTING ELECTRICAL	PROPOSED 4" SANITARY TAP
LOT SETBACKS	PROPOSED TRANSFORMER
EXISTING FIRE HYDRANT	100-YR FLOODPLAIN
	100-YR FLOODWAY

SITE DATA

SITE ZONING: LMN LOW DENSITY MIXED USE	TRACT #		LOT #						ROW	TOTAL
	A	B	1	2	3	4	5	6		
USE	POND	ALLEY	BLDG	BLDG	BLDG	BLDG	BLDG	BLDG	ROW	
Gross Area (sqft)	6,185	5,468	4,879	4,549	4,550	4,549	4,549	4,550	5,300	44,579
Gross Land Area (Ac)	0.14	0.13	0.11	0.10	0.10	0.10	0.10	0.10	0.12	1.02
LAND USE:										
Single-Family Detached (Sqft)			2,000	2,000	2,000	1,700	1,700	1,700		9,900
DWELLING UNITS										
Dwelling Unit			2	2	2	1	1	1		9
Max Building Height			25'	25'	25'	25'	25'	25'		
LOT COVERAGE										
Sidewalk (Sqft)	240		163	72	73	75	75	99	2,204	3,001
Driveway (Sqft)		3,477	223	222	222	222	222	261	174	5,023
Sidewalk and Driveway (%)	4%	64%	8%	6%	6%	7%	7%	8%		18%
Off-Street Parking (Spaces)			2	2	2	2	2	2		12
Impervious Space (Sqft)	240	3,477	2,286	2,294	2,295	1,997	1,997	2,060	2,378	17,924
Impervious Space (%)	4%	64%	47%	50%	50%	44%	44%	45%	45%	40%
LOT USAGE										
Open Space (Sqft)	5,945	1,991	2,593	2,255	2,255	2,552	2,552	2,490		22,633
Open Space (%)	96%	36%	53%	50%	50%	56%	56%	55%		51%
Active Rec Use (Sqft)	5,945	0	0	0	0	0	0	0		0
Active Rec Use (%)	96%	0%	0%	0%	0%	0%	0%	0%		0%

811 Know what's below. Call before you dig.

NOTES

1. THE PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FINAL PLANS. AMENDMENTS TO THE PLANS MUST BE REVIEWED AND APPROVED BY THE CITY PRIOR TO THE IMPLEMENTATION OF ANY CHANGES TO THE PLANS.

2. REFER TO FINAL UTILITY PLANS FOR EXACT LOCATIONS AND CONSTRUCTION INFORMATION FOR STORM DRAINAGE STRUCTURES, UTILITY MAINS AND SERVICES, PROPOSED TOPOGRAPHY, STREET IMPROVEMENTS.

3. REFER TO THE SUBDIVISION PLAT AND UTILITY PLANS FOR EXACT LOCATIONS, AREAS AND DIMENSIONS OF ALL EASEMENTS, LOTS, TRACTS, STREETS, WALKS AND OTHER SURVEY INFORMATION.

4. ALL ROOFTOP AND GROUND MOUNTED MECHANICAL EQUIPMENT MUST BE SCREENED FROM VIEW FROM ADJACENT PROPERTY AND PUBLIC STREETS. IN CASES WHERE BUILDING PARAPETS DO NOT ACCOMPLISH SUFFICIENT SCREENING, THEN FREE-STANDING SCREEN WALLS MATCHING THE PREDOMINANT COLOR OF THE BUILDING SHALL BE CONSTRUCTED. OTHER MINOR EQUIPMENT SUCH AS CONDUIT, METERS AND PLUMBING VENTS SHALL BE SCREENED OR PAINTED TO MATCH SURROUNDING BUILDING SURFACES.

5. ALL CONSTRUCTION WITH THIS DEVELOPMENT PLAN MUST BE COMPLETED IN ONE PHASE UNLESS A PHASING PLAN IS SHOWN WITH THESE PLANS.

6. N/A

7. ALL SINGLE FAMILY DETACHED HOMES SHALL MEET OR EXCEED THE GARAGE DOOR STANDARDS AS OUTLINED IN 3.5.2(E) OF THE LAND USE CODE.

8. A MINIMUM OF 1 HOUSING MODEL(S) FOR THE SINGLE FAMILY HOMES SHALL BE REQUIRED. THESE HOUSING MODELS SHALL MEET OR EXCEED THE STANDARDS AS OUTLINED IN 3.5.2(C) OF THE LAND USE CODE.

9. ALL EXTERIOR LIGHTING PROVIDED SHALL COMPLY WITH THE FOOT-CANDLE REQUIREMENTS IN SECTION 3.2.4 OF THE LAND USE CODE AND SHALL USE A CONCEALED, FULLY SHIELDED LIGHT SOURCE WITH SHARP CUT-OFF CAPABILITY SO AS TO MINIMIZE UP-LIGHT, SPILL LIGHT, GLARE AND UNNECESSARY DIFFUSION.

10. N/A.

11. FIRE HYDRANTS MUST MEET OR EXCEED POUDRE FIRE AUTHORITY STANDARDS. ALL BUILDINGS MUST PROVIDE AN APPROVED FIRE EXTINGUISHING SYSTEM.

12. N/A.

13. ALL SIDEWALKS AND RAMPS MUST CONFORM TO CITY STANDARDS. ACCESSIBLE RAMPS MUST BE PROVIDED AT ALL STREET AND DRIVE INTERSECTIONS AND AT ALL DESIGNATED ACCESSIBLE PARKING SPACES. ACCESSIBLE PARKING SPACES MUST SLOPE NO MORE THAN 1:48 IN ANY DIRECTION. ALL ACCESSIBLE ROUTES MUST SLOPE NO MORE THAN 1:20 IN DIRECTION OF TRAVEL AND WITH NO MORE THAN 1:48 CROSS SLOPE.

14. COMMON OPEN SPACE AREAS AND LANDSCAPING WITHIN RIGHT OF WAYS, STREET MEDIANS, AND TRAFFIC CIRCLES ADJACENT TO COMMON OPEN SPACE AREAS ARE REQUIRED TO BE MAINTAINED BY A PROPERTY OWNERS' ASSOCIATION. THE PROPERTY OWNERS' ASSOCIATION IS RESPONSIBLE FOR SNOW REMOVAL ON ALL ADJACENT STREET SIDEWALKS AND SIDEWALKS IN COMMON OPEN SPACE AREAS.

15. THE PROPERTY OWNER FOR EACH RESIDENTIAL LOT IS RESPONSIBLE FOR SNOW REMOVAL ON ALL STREET SIDEWALKS ADJACENT TO EACH RESIDENTIAL LOT.

16. PRIVATE CONDITIONS, COVENANTS, AND RESTRICTIONS (CC&R'S), OR ANY OTHER PRIVATE RESTRICTIVE COVENANT IMPOSED ON LANDOWNERS WITHIN THE DEVELOPMENT, MAY NOT BE CREATED OR ENFORCED HAVING THE EFFECT OF PROHIBITING OR LIMITING THE INSTALLATION OF XERISCAPE LANDSCAPING, SOLAR/PHOTO-VOLTAIC COLLECTORS (IF MOUNTED FLUSH UPON ANY ESTABLISHED ROOF LINE), CLOTHES LINES (IF LOCATED IN BACK YARDS), ODOR CONTROLLED COMPOST BINS, OR WHICH HAVE THE EFFECT OF REQUIRING THAT A PORTION OF ANY INDIVIDUAL LOT BE PLANTED IN TURF GRASS.

17. ANY DAMAGED CURB, GUTTER AND SIDEWALK EXISTING PRIOR TO CONSTRUCTION, AS WELL AS STREETS, SIDEWALKS, CURBS AND GUTTERS, DESTROYED, DAMAGED OR REMOVED DUE TO CONSTRUCTION OF THIS PROJECT, SHALL BE REPLACED OR RESTORED TO CITY OF FORT COLLINS STANDARDS AT THE DEVELOPER'S EXPENSE PRIOR TO THE ACCEPTANCE OF COMPLETED IMPROVEMENTS AND/OR PRIOR TO THE ISSUANCE OF THE FIRST CERTIFICATE OF OCCUPANCY.

18. N/A

19. PREMISE IDENTIFICATION: AN ADDRESSING PLAN IS REQUIRED TO BE REVIEWED AND APPROVED BY THE CITY AND POUDRE FIRE AUTHORITY PRIOR TO THE ISSUANCE OF ANY CERTIFICATE OF OCCUPANCY. UNLESS THE PRIVATE DRIVE IS NAMED, MONUMENT SIGNAGE MAY BE REQUIRED TO ALLOW WAY-FINDING. ALL BUILDINGS SHALL HAVE ADDRESS NUMBERS, BUILDING NUMBERS OR APPROVED BUILDING IDENTIFICATION PLACED IN A POSITION THAT IS PLAINLY LEGIBLE, VISIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY, AND POSTED WITH A MINIMUM OF SIX-INCH NUMERALS ON A CONTRASTING BACKGROUND. WHERE ACCESS IS BY MEANS OF A PRIVATE ROAD AND THE BUILDING CANNOT BE VIEWED FROM THE PUBLIC WAY, A MONUMENT, POLE OR OTHER SIGN OR MEANS SHALL BE USED TO IDENTIFY THE STRUCTURE.

STREET TREE NOTES:

1. A PERMIT MUST BE OBTAINED FROM THE CITY FORESTER BEFORE ANY TREES OR SHRUBS AS NOTED ON THIS PLAN ARE PLANTED, PRUNED OR REMOVED IN THE PUBLIC RIGHT-OF-WAY. THIS INCLUDES ZONES BETWEEN THE SIDEWALK AND CURB, MEDIANS AND OTHER CITY PROPERTY. THIS PERMIT SHALL APPROVE THE LOCATION AND SPECIES TO BE PLANTED. FAILURE TO OBTAIN THIS PERMIT IS A VIOLATION OF THE CITY OF FORT COLLINS CODE SUBJECT TO CITATION (SECTION 27-31) AND MAY ALSO RESULT IN REPLACING OR RELOCATING TREES AND A HOLD ON CERTIFICATE OF OCCUPANCY.

2. CONTACT THE CITY FORESTER TO INSPECT ALL STREET TREE PLANTINGS AT THE COMPLETION OF EACH PHASE OF THE DEVELOPMENT. ALL MUST BE INSTALLED AS SHOWN ON THE LANDSCAPE PLAN. APPROVAL OF STREET TREE PLANTING IS REQUIRED BEFORE FINAL APPROVAL OF EACH PHASE.

3. STREET LANDSCAPING, INCLUDING STREET TREES, SHALL BE SELECTED IN ACCORDANCE WITH ALL CITY CODES AND POLICIES. ALL TREE PRUNING AND REMOVAL WORKS SHALL BE PERFORMED BY A CITY OF FORT COLLINS LICENSED ARBORS WHERE REQUIRED BY CODE.STREET TREES SHALL BE SUPPLIED AND PLANTED BY THE DEVELOPER USING A QUALIFIED LANDSCAPE CONTRACTOR.

4. THE DEVELOPER SHALL REPLACE DEAD OR DYING STREET TREES AFTER PLANTING UNTIL FINAL MAINTENANCE INSPECTION AND ACCEPTANCE BY THE CITY OF FORT COLLINS FORESTRY DIVISION. ALL STREET TREES IN THE PROJECT MUST BE ESTABLISHED, WITH AN APPROVED SPECIES AND OF ACCEPTABLE CONDITION PRIOR TO ACCEPTANCE.

5. SUBJECT TO APPROVAL BY THE CITY FORESTER -- STREET TREE LOCATIONS MAY BE ADJUSTED TO ACCOMMODATE DRIVEWAY LOCATIONS, UTILITY SEPARATIONS BETWEEN TREES, STREET SIGNS AND STREET LIGHTS. STREET TREES TO BE CENTERED IN THE MIDDLE OF THE LOT TO THE EXTENT FEASIBLE. QUANTITIES SHOWN ON PLAN MUST BE INSTALLED UNLESS A REDUCTION IS APPROVED BY THE CITY TO MEET SEPARATION STANDARDS.

OWNER'S CERTIFICATION:

THE UNDERSIGNED DOES/DO HEREBY CERTIFY THAT I/WE ARE THE LAWFUL OWNERS OF REAL PROPERTY DESCRIBED ON THIS SITE PLAN AND DO HEREBY CERTIFY THAT I/WE ACCEPT THE CONDITIONS AND RESTRICTIONS SET FORTH IN SAID PLAN.

NOTARY CERTIFICATE:

STATE OF COLORADO

COUNTY OF LARIMER

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS DAY OF

_____, 20___,

by Evan Gilmartin, as Owners of CHERRY STREET COTTAGES.

OWNER: Egilmartin, Inc., a Colorado Corporation

TITLE: Evan Gilmartin, as President

_____
SIGNATURE OF NOTARY PUBLIC

MY COMMISSION EXPIRES: _____

ADDRESS: _____

CITY, STATE, ZIP: _____ SEAL

DIRECTOR OF COMMUNITY DEVELOPMENT AND NEIGHBORHOOD SERVICES

REVIEWED BY: _____ _____ DATE

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
PaulS51@comcast.net
SEC

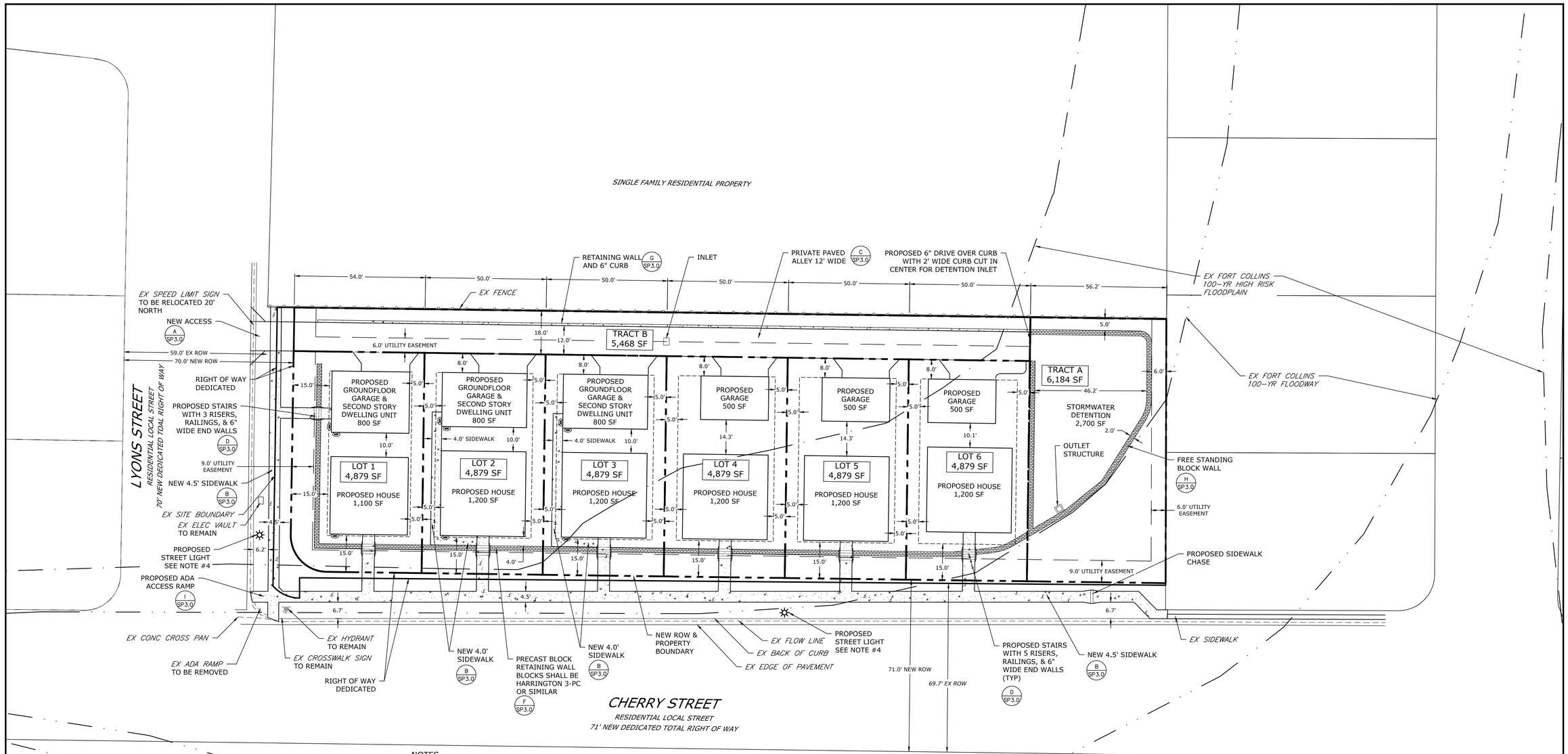
PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE: COVER SHEET

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018
SHEET NUMBER: SP1.0
JOB NUMBER



N

SCALE
GRAPHIC
0' 20 40

LEGEND:

- PROPERTY LINE
- EXISTING FLOW LINE
- EXISTING EASEMENT
- LOT SETBACKS
- 100-YR FLOODPLAIN
- 100-YR FLOODWAY
- EXISTING HYDRANT
- PROPOSED STREET LIGHT
- PROPOSED ADDRESS & DIRECTIONAL SIGN FOR CARRIAGE UNITS: HOUSE NUMBER, STREET & DIRECTIONAL ARROW

NOTES

1. ALL BUILDING SETBACKS SHOWN ARE PER CITY STANDARDS:
   15 FEET– FRONT AND STREET–FACING SIDE
   5 FEET – SIDE LOTS
   8 FEET – REAR
2. BASEMENTS ARE NOT PERMITTED ON LOTS 3,4,5, OR 6 DUE TO THE PRESENCE OF THE FLOODPLAIN.
3. PORTIONS OF THIS PROPERTY ARE LOCATED IN THE FORT COLLINS 100–YEAR FLOODWAY AND HIGH RISK FLOOD FRINGE.
4. STREET LIGHTS SHALL BE "OLD ENGLISH FIXTURE" WITH TYPE 3 DISTRIBUTION 70W 0.2 FOOT CANDLES LOCATED NO CLOSER THAN 2' FROM ROADWAY OR SIDEWALK
5. ALL DEVELOPMENT WITHIN THE FLOODPLAIN MUST COMPLY WITH THE FLOODPLAIN REGULATIONS OF CHAPTER 10 OF CITY OF FORT COLLINS MUNICIPAL CODE.
6. CONSTRUCTION OF RESIDENTIAL STRUCTURES IS NOT ALLOWED IN THE 100 YEAR FLOODWAY.
7. RESIDENTIAL STRUCTURES ARE ALLOWED IN THE 100 YEAR HIGH RISK FLOOD FRINGE PROVIDED THEY MEET ALL ELEVATION REQUIREMENTS OF CHAPTER 10 OF CITY MUNICIPAL CODE.
8. NON–STRUCTURAL DEVELOPMENT (FENCES, DETENTION PONDS, HARD SURFACE PATHS, FILL, DRIVEWAYS, PARKING AREAS, VEGETATION, ETC.) IS ALLOWED WITHIN THE 100 YEAR FLOODWAY, PROVIDED THE DEVELOPMENT WILL NOT CAUSE A RISE IN THE BASE FLOOD ELEVATION OR A CHANGE TO THE FLOODWAY OR FLOOD FRINGE BOUNDARIES. NON–STRUCTURAL DEVELOPMENT IS NOT RESTRICTED IN THE FLOOD FRINGE.
9. THE LOWEST FLOOR (INCLUDING BASEMENT OR CRAWL SPACES) AND HVAC EQUIPMENT WILL BE ELEVATED ABOVE THE REGULATORY FLOOD PROTECTION ELEVATION.
10. FLOODPLAIN USE PERMIT WILL BE SUBMITTED FOR EACH STRUCTURE AND EACH SITE CONSTRUCTION ELEMENT (IE. DETENTION POND) IN THE FLOODPLAIN.
11. A FEMA ELEVATION OR FLOODPLAIN CERTIFICATE WILL BE COMPLETED AND APPROVED BEFORE THE CO IS ISSUED FOR ANY STRUCTURE IN THE FLOODPLAIN.

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
PaulS51@comcast.net

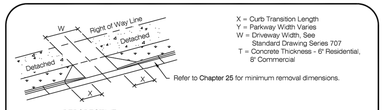
PROJECT
CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE
SITE PLAN

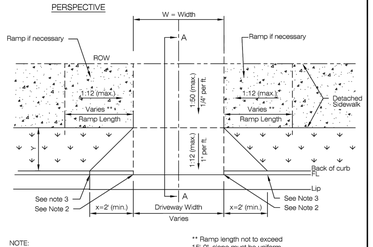
OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: 1"=20'
DATE: 05/24/2018
SHEET NUMBER: SP2.0
JOB NUMBER



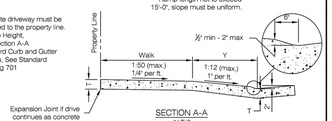
PERSPECTIVE



NOTE:

1. Concrete driveway must be provided to the property line.
2. 0" Curb Height, See Section A-A
3. Standard Curb and Gutter Section, See Standard Drawing 701

** Ramp length not to exceed 15'-0", slope must be uniform.

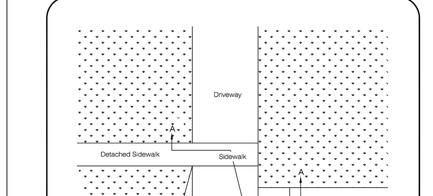


SECTION A-A
N.T.S.

NOT TO SCALE

STANDARD DRIVEWAY APPROACH DETACHED WALK (Type I)			
LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 1	DRAWING
		DATE: 02/17/15	706.1

A SP3.0 DRIVEWAY ACCESS



SECTION A-A

All Sidewalk Thickness Shall Be 6" minimum.

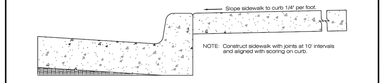
NOTE:

1. Sidewalk grade shall remain consistent across driveway
2. For driveway design requirements, see CONST. DWG. Series 706 & 707
3. This detail applies to Residential & Commercial driveways.

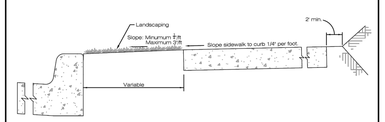
NOT TO SCALE

STANDARD SIDEWALK			
LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 4	DRAWING
		DATE: 02/17/15	1601

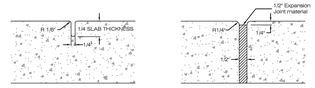
B SP3.0 SIDEWALK



ATTACHED SIDEWALK DETAIL



DETACHED SIDEWALK DETAIL



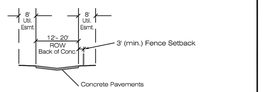
WEAKENED PLANE JOINT

EXPANSION JOINT

SIDEWALK DETAIL			
LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 2	DRAWING
		DATE: 04/01/07	1602

C SP3.0 DRIVEWAY

FORT COLLINS ONLY



ROADWAY WIDTH: 12' to 20'. (20' width required for commercial and industrial areas)

RIGHT OF WAY WIDTH: 12' to 20'. (20' width required for commercial and industrial areas)

PARKING: None. Parking must be provided on private property.

WHERE USED: An alley may be used to provide secondary vehicular access only to the rear of properties served by a street, if allowed by city code.

DESIGN SPEED: 15 MPH

SPEED LIMIT: 15 MPH.

DRIVEWAY CONNECTIONS TO ALLEYS: Driveway connections to alleys must be flared in accordance with Detail 1.

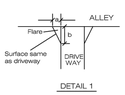
ALLEY CONNECTIONS TO STREETS: Where an alley intersects the right of way for a street 10' x 10' corner cuts shall be dedicated as R.O.W. for visibility as shown in Detail 2 below. These areas may be landscaped no higher than 12". No fences may encroach into this area.

CONTINUITY: Alleys are limited in length to 660 feet.

GARAGE DOOR SET BACK: ★ Option 1: 8' for fences placed with a setback equal to 8' or more. Option 2: 20' feet minimum for fences placed less than 8' from the edge of the alley.

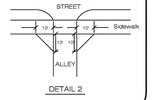
FENCES: Fences may be placed as close as 3' from the right-of-way line on private property when the garage door is set back at least 20' from the right-of-way. Minimum setback is 8' for garage door setback less than 20' from the right-of-way.

★ Building setbacks shall be in accordance with the Land Use Code.



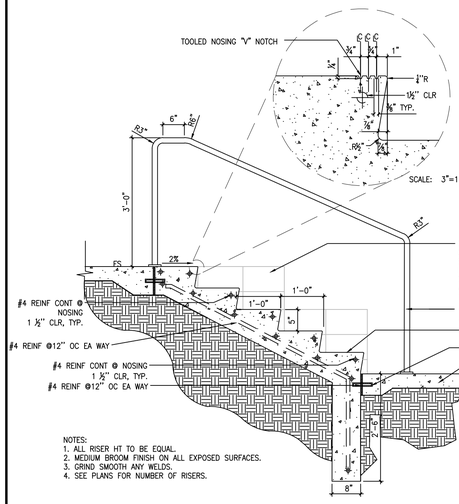
DETAIL 1

Alley Width FT.	Driveway Flare a FT.	Driveway Flare b FT.
20	0	0
18	2'	6'
16	4'	8'
14	5'	8'
12	6'	8'



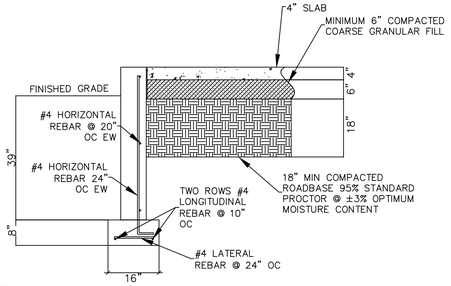
DETAIL 2

ALLEY OPTION (A) (Drainage to Center)			
LARIMER COUNTY URBAN AREA STREET STANDARDS	DESIGN FIGURE	REVISION NO: 1	FIGURE
		DATE: 04/01/07	7-11F

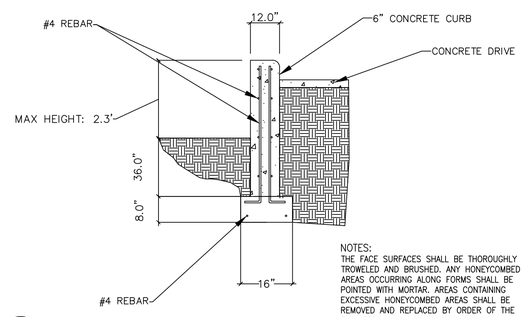


NOTES:
1. ALL RISER HT TO BE EQUAL.
2. MEDIUM BROOM FINISH ON ALL EXPOSED SURFACES.
3. GRIND SMOOTH ANY WELDS.
4. SEE PLANS FOR NUMBER OF RISERS.

D SP3.0 STAIRS

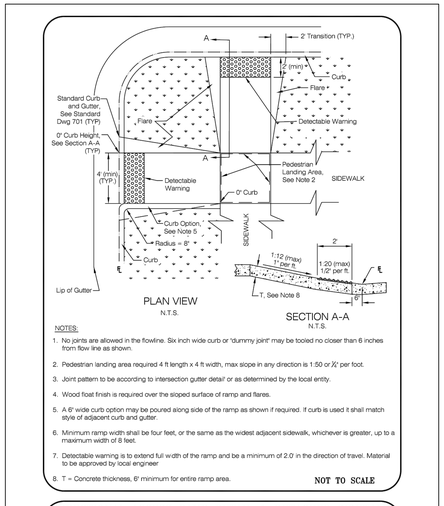


E SP3.0 FOUNDATION DETAIL N.T.S.



NOTES:
THE FACE SURFACES SHALL BE THOROUGHLY TROWELED AND BRUSHED. ANY HONEYCOMBED AREAS OCCURRING ALONG FORMS SHALL BE POINTED WITH MORTAR. AREAS CONTAINING EXCESSIVE HONEYCOMBED AREAS SHALL BE REMOVED AND REPLACED BY ORDER OF THE ENGINEER.

G SP3.0 RETAINING WALL & 6" CURB N.T.S.



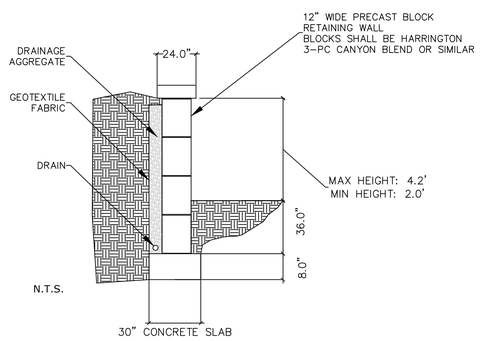
NOTES:

1. No joints are allowed in the flowline. Six inch wide curb or 'dummy joint' may be tooled no closer than 6 inches from flow line as shown.
2. Pedestrian landing area required 4 ft length x 4 ft width, max slope in any direction is 1.50 or ¼" per foot.
3. Joint pattern to be according to intersection gutter detail or as determined by the local entity.
4. Wood float finish is required over the sloped surface of ramp and flares.
5. A 6" wide curb option may be poured along side of the ramp as shown if required. If curb is used it shall match style of adjacent curb and gutter.
6. Minimum ramp width shall be four feet, or the same as the widest adjacent sidewalk, whichever is greater, up to a maximum width of 8 feet.
7. Detectable warning is to extend full width of the ramp and be a minimum of 2.0' in the direction of travel. Material to be approved by local engineer
8. T = Concrete thickness, 6" minimum for entire ramp area.

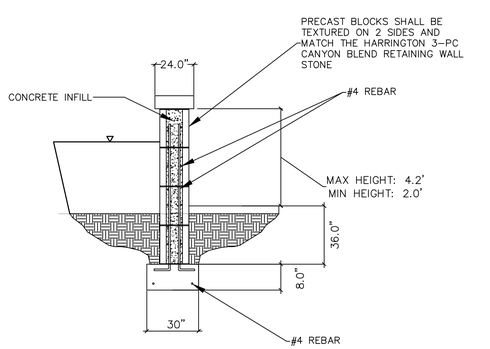
NOT TO SCALE

DIRECTIONAL ACCESS RAMP DETAIL & DETACHED SIDEWALK			
LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 2	DRAWING
		DATE: 02/17/15	1606

I SP3.0 ACCESS RAMP



F SP3.0 RETAINING WALL DETAIL N.T.S.



H SP3.0 DETENTION POND WALL

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

PROJECT
CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE
DETAILS

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

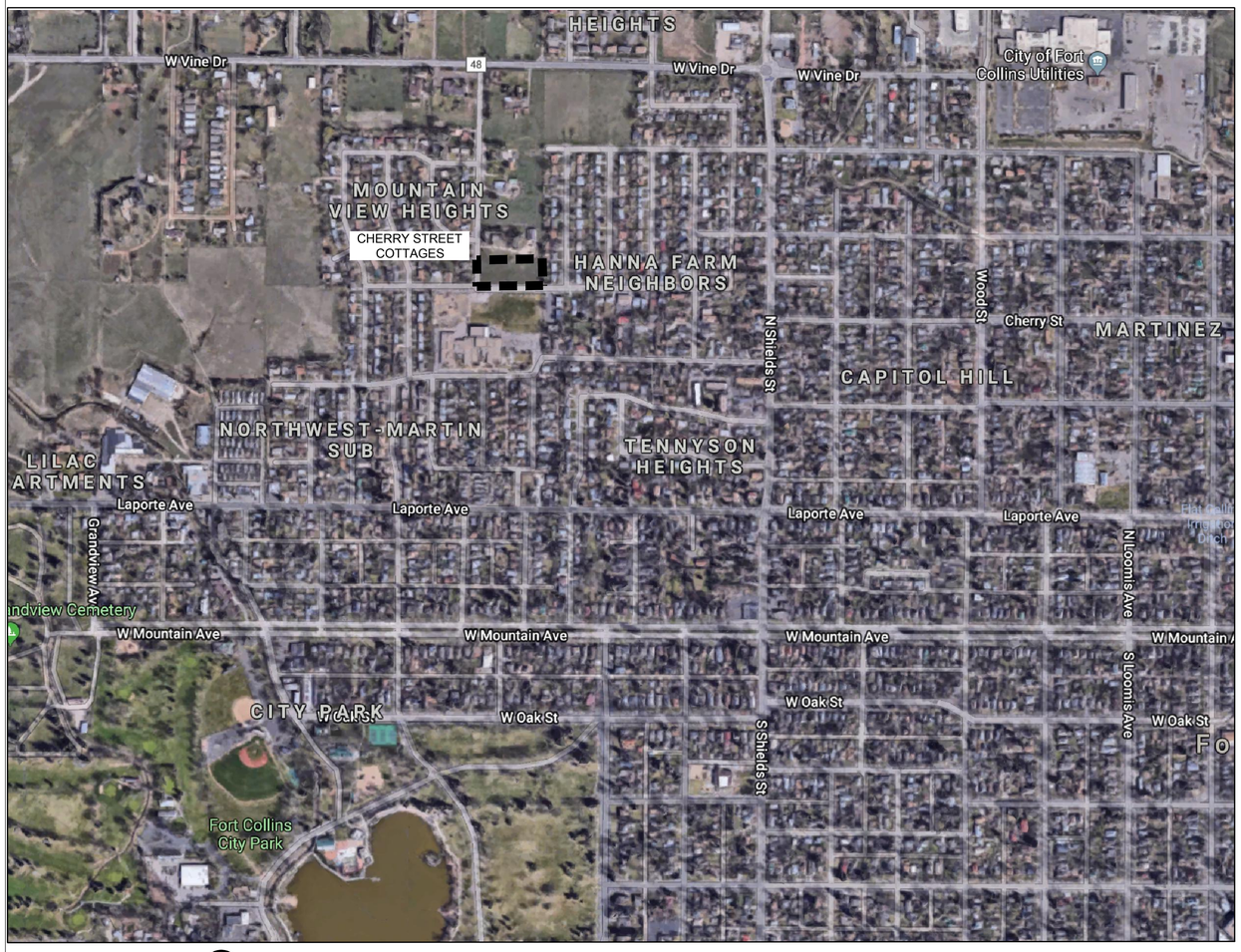
DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018

SHEET NUMBER
SP3.0
JOB NUMBER

PDP - LANDSCAPE SUBMITTAL
CHERRY STREET COTTAGES

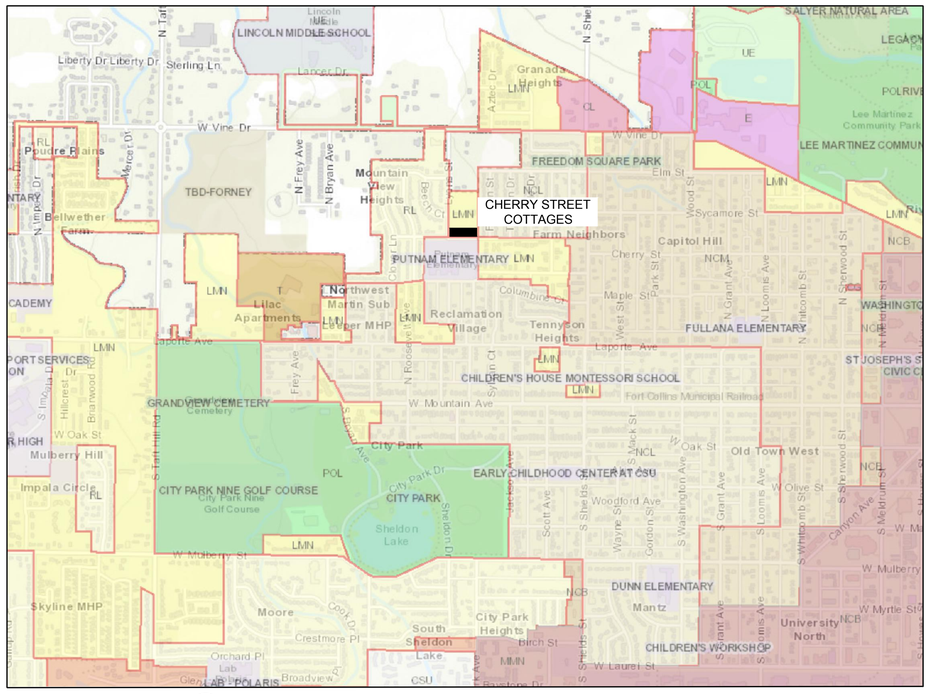
BEING A PORTION OF THE NE 1/4 OF SECTION 10, TOWNSHIP 7 N, RANGE 69 W OF THE 6TH P.M.
CITY OF FORT COLLINS, COUNTY OF LARIMER, STATE OF COLORAD0

SHEET INDEX



CONTEXT MAP

NORTH



ZONING MAP

NORTH

CHERRY STREET COTTAGES
FORT COLLINS, CO

russell + mills

REV.	COMMENT	DATE

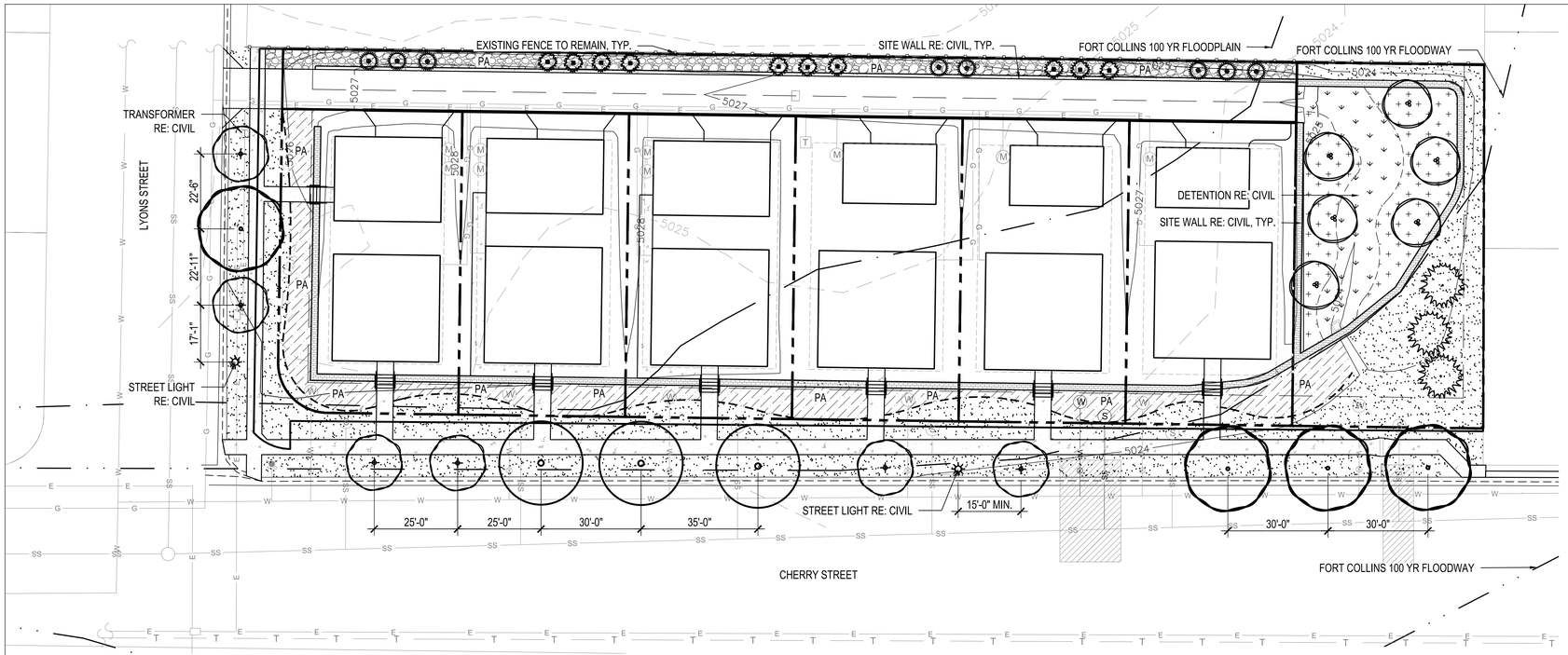
SEAL:

PDP

Date: MAY 2018
Drawn By: DD/JB
Checked By: CR

Sheet Name
LANDSCAPE COVER

Sheet
LP001



A OVERALL LANDSCAPE PLAN

20' 0 10' 20' 40' NORTH

GENERAL LANDSCAPE NOTES:

1. PLANT QUALITY: ALL PLANT MATERIAL SHALL BE A-GRADE OR NO. 1 GRADE – FREE OF ANY DEFECTS, OF NORMAL HEALTH, HEIGHT, LEAF DENSITY AND SPREAD APPROPRIATE TO THE SPECIES AS DEFINED BY THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN) STANDARDS. ALL TREES SHALL BE BALL AND BURLAP OR EQUIVALENT.
2. IRRIGATION: ALL LANDSCAPE AREAS WITHIN THE SITE INCLUDING TURF, SHRUB BEDS AND TREE AREAS SHALL BE IRRIGATED WITH AN AUTOMATIC IRRIGATION SYSTEM. THE IRRIGATION PLAN MUST BE REVIEWED AND APPROVED BY THE CITY OF FORT COLLINS WATER UTILITIES DEPARTMENT PRIOR TO THE ISSUANCE OF A BUILDING PERMIT. ALL TURF AREAS SHALL BE IRRIGATED WITH AN AUTOMATIC POP-UP IRRIGATION SYSTEM. ALL SHRUB BEDS AND TREES, INCLUDING IN NATIVE SEED AREAS, SHALL BE IRRIGATED WITH AN AUTOMATIC DRIP (TRICKLE) IRRIGATION SYSTEM, OR WITH AN ACCEPTABLE ALTERNATIVE APPROVED BY THE CITY WITH THE IRRIGATION PLANS. THE IRRIGATION SYSTEM SHALL BE ADJUSTED TO MEET THE WATER REQUIREMENTS OF THE INDIVIDUAL PLANT MATERIAL.
3. TOPSOIL: TO THE MAXIMUM EXTENT FEASIBLE, TOPSOIL THAT IS REMOVED DURING CONSTRUCTION ACTIVITY SHALL BE CONSERVED FOR LATER USE ON AREAS REQUIRING REVEGETATION AND LANDSCAPING.
4. SOIL AMENDMENTS: SOIL AMENDMENTS SHALL BE PROVIDED AND DOCUMENTED IN ACCORDANCE WITH CITY CODE SECTION 12-132. THE SOIL IN ALL LANDSCAPE AREAS, INCLUDING PARKWAYS AND MEDIANS, SHALL BE THOROUGHLY LOOSENED TO A DEPTH OF NOT LESS THAN EIGHT(8) INCHES AND SOIL AMENDMENT SHALL BE THOROUGHLY INCORPORATED INTO THE SOIL OF ALL LANDSCAPE AREAS TO A DEPTH OF AT LEAST SIX(6) INCHES BY TILLING, DISCING OR OTHER SUITABLE METHOD, AT A RATE OF AT LEAST THREE (3) CUBIC YARDS OF SOIL AMENDMENT PER ONE THOUSAND (1,000) SQUARE FEET OF LANDSCAPE AREA. PRIOR TO THE ISSUANCE OF ANY CERTIFICATE OF OCCUPANCY, A WRITTEN CERTIFICATION MUST BE SUBMITTED TO THE CITY THAT ALL PLANTED AREAS, OR AREAS TO BE PLANTED, HAVE BEEN THOROUGHLY LOOSENED AND THE SOIL AMENDED, CONSISTENT WITH THE REQUIREMENTS SET FORTH IN SECTION 12-132.
5. INSTALLATION AND GUARANTEE: ALL LANDSCAPING SHALL BE INSTALLED ACCORDING TO SOUND HORTICULTURAL PRACTICES IN A MANNER DESIGNED TO ENCOURAGE QUICK ESTABLISHMENT AND HEALTHY GROWTH. ALL LANDSCAPING FOR EACH PHASE MUST BE EITHER INSTALLED OR THE INSTALLATION MUST BE SECURED WITH AN IRREVOCABLE LETTER OF CREDIT, PERFORMANCE BOND, OR ESCROW ACCOUNT FOR 125% OF THE VALUATION OF THE MATERIALS AND LABOR PRIOR TO ISSUANCE OF A CERTIFICATE OF OCCUPANCY FOR ANY BUILDING IN SUCH PHASE.
6. MAINTENANCE: TREES AND VEGETATION, IRRIGATION SYSTEMS, FENCES, WALLS AND OTHER LANDSCAPE ELEMENTS WITH THESE FINAL PLANS SHALL BE CONSIDERED AS ELEMENTS OF THE PROJECT IN THE SAME MANNER AS PARKING, BUILDING MATERIALS AND OTHER SITE DETAILS. THE APPLICANT, LANDOWNER OR SUCCESSORS IN INTEREST SHALL BE JOINTLY AND SEVERALLY RESPONSIBLE FOR THE REGULAR MAINTENANCE OF ALL LANDSCAPING ELEMENTS IN GOOD CONDITION. ALL LANDSCAPING SHALL BE MAINTAINED FREE FROM DISEASE, PESTS, WEEDS AND LITTER, AND ALL LANDSCAPE STRUCTURES SUCH AS FENCES AND WALLS SHALL BE REPAIRED AND REPLACED PERIODICALLY TO MAINTAIN A STRUCTURALLY SOUND CONDITION.
7. REPLACEMENT: ANY LANDSCAPE ELEMENT THAT DIES, OR IS OTHERWISE REMOVED, SHALL BE PROMPTLY REPLACED IN ACCORDANCE WITH THE REQUIREMENTS OF THESE PLANS.
8. THE FOLLOWING SEPARATIONS SHALL BE PROVIDED BETWEEN TREES/SHRUBS AND UTILITIES:
   - 40 FEET BETWEEN CANOPY TREES AND STREET LIGHTS
   - 15 FEET BETWEEN ORNAMENTAL TREES AND STREETLIGHTS
   - 10 FEET BETWEEN TREES AND PUBLIC WATER, SANITARY AND STORM SEWER MAIN LINES
   - 6 FEET BETWEEN TREES AND PUBLIC WATER, SANITARY AND STORM SEWER SERVICE LINES.
   - 4 FEET BETWEEN SHRUBS AND PUBLIC WATER AND SANITARY AND STORM SEWER LINES
   - 4 FEET BETWEEN TREES AND GAS LINES
9. ALL STREET TREES SHALL BE PLACED A MINIMUM EIGHT (8) FEET AWAY FROM THE EDGES OF DRIVEWAYS AND ALLEYS PER LUC 3.2.1(D)(2)(a).
10. PLACEMENT OF ALL LANDSCAPING SHALL BE IN ACCORDANCE WITH THE SIGHT DISTANCE CRITERIA AS SPECIFIED BY THE CITY OF FORT COLLINS. NO STRUCTURES OR LANDSCAPE ELEMENTS GREATER THAN 24" SHALL BE ALLOWED WITHIN THE SIGHT DISTANCE TRIANGLE OR EASEMENTS WITH THE EXCEPTION OF DECIDUOUS TREES PROVIDED THAT THE LOWEST BRANCH IS AT LEAST 6' FROM GRADE. ANY FENCES WITHIN THE SIGHT DISTANCE TRIANGLE OR EASEMENT MUST BE NOT MORE THAN 42" IN HEIGHT AND OF AN OPEN DESIGN.
11. THE FINAL LANDSCAPE PLAN SHALL BE COORDINATED WITH ALL OTHER FINAL PLAN ELEMENTS SO THAT THE PROPOSED GRADING, STORM DRAINAGE, AND OTHER DEVELOPMENT IMPROVEMENTS DO NOT CONFLICT WITH NOR PRECLUDE INSTALLATION AND MAINTENANCE OF LANDSCAPE ELEMENTS ON THIS PLAN.
12. MINOR CHANGES IN SPECIES AND PLANT LOCATIONS MAY BE MADE DURING CONSTRUCTION -- AS REQUIRED BY SITE CONDITIONS OR PLANT AVAILABILITY. OVERALL QUANTITY, QUALITY, AND DESIGN CONCEPT MUST BE CONSISTENT WITH THE APPROVED PLANS. IN THE EVENT OF CONFLICT WITH THE QUANTITIES INCLUDED IN THE PLANT LIST, SPECIES AND QUANTITIES ILLUSTRATED SHALL BE PROVIDED. ALL CHANGES OF PLANT SPECIES AND LOCATION MUST HAVE WRITTEN APPROVAL BY THE CITY PRIOR TO INSTALLATION.
13. ALL PLANTING BEDS SHALL BE MULCHED TO A MINIMUM DEPTH OF THREE INCHES.

STREET TREE NOTES:

1. A PERMIT MUST BE OBTAINED FROM THE CITY FORESTER BEFORE ANY TREES OR SHRUBS AS NOTED ON THIS PLAN ARE PLANTED, PRUNED OR REMOVED IN THE PUBLIC RIGHT-OF-WAY. THIS INCLUDES ZONES BETWEEN THE SIDEWALK AND CURB, MEDIANS AND OTHER CITY PROPERTY. THIS PERMIT SHALL APPROVE THE LOCATION AND SPECIES TO BE PLANTED. FAILURE TO OBTAIN THIS PERMIT IS A VIOLATION OF THE CITY OF FORT COLLINS CODE SUBJECT TO CITATION (SECTION 27-31) AND MAY ALSO RESULT IN REPLACING OR RELOCATING TREES AND A HOLD ON CERTIFICATE OF OCCUPANCY.
2. CONTACT THE CITY FORESTER TO INSPECT ALL STREET TREE PLANTINGS AT THE COMPLETION OF EACH PHASE OF THE DEVELOPMENT. ALL MUST BE INSTALLED AS SHOWN ON THE LANDSCAPE PLAN. APPROVAL OF STREET TREE PLANTING IS REQUIRED BEFORE FINAL APPROVAL OF EACH PHASE.
3. STREET LANDSCAPING, INCLUDING STREET TREES, SHALL BE SELECTED IN ACCORDANCE WITH ALL CITY CODES AND POLICIES. ALL TREE PRUNING AND REMOVAL WORKS SHALL BE PERFORMED BY A CITY OF FORT COLLINS LICENSED ARBORS WHERE REQUIRED BY CODE.STREET TREES SHALL BE SUPPLIED AND PLANTED BY THE DEVELOPER USING A QUALIFIED LANDSCAPE CONTRACTOR.
4. THE DEVELOPER SHALL REPLACE DEAD OR DYING STREET TREES AFTER PLANTING UNTIL FINAL MAINTENANCE INSPECTION AND ACCEPTANCE BY THE CITY OF FORT COLLINS FORESTRY DIVISION. ALL STREET TREES IN THE PROJECT MUST BE ESTABLISHED, WITH AN APPROVED SPECIES AND OF ACCEPTABLE CONDITION PRIOR TO ACCEPTANCE.
5. SUBJECT TO APPROVAL BY THE CITY FORESTER -- STREET TREE LOCATIONS MAY BE ADJUSTED TO ACCOMMODATE DRIVEWAY LOCATIONS, UTILITY SEPARATIONS BETWEEN TREES, STREET SIGNS AND STREET LIGHTS. STREET TREES TO BE CENTERED IN THE MIDDLE OF THE LOT TO THE EXTENT FEASIBLE. QUANTITIES SHOWN ON PLAN MUST BE INSTALLED UNLESS A REDUCTION IS APPROVED BY THE CITY TO MEET SEPARATION STANDARDS.

NATIVE SEED MIX NOTES:

1. PREPARE SOIL AS NECESSARY AND APPROPRIATE FOR NATIVE SEED MIX SPECIES THROUGH AERATION AND ADDITION OF AMENDMENTS, THEN SEED IN TWO DIRECTIONS TO DISTRIBUTE SEED EVENLY OVER ENTIRE AREA.
2. IF CHANGES ARE TO BE MADE TO SEED MIX BASED ON SITE CONDITIONS THEN APPROVAL MUST BE PROVIDED BY CITY ENVIRONMENTAL PLANNER.
3. APPROPRIATE NATIVE SEEDING EQUIPMENT WILL BE USED (STANDARD TURF SEEDING EQUIPMENT OR AGRICULTURE EQUIPMENT SHALL NOT BE USED).
4. DRILL SEED APPLICATION RECOMMENDED PER SPECIFIED APPLICATION RATE TO NO MORE THAN 1/2 INCH DEPTH. FOR BROADCAST SEEDING INSTEAD OF DRILL SEEDING METHOD DOUBLE SPECIFIED APPLICATION RATE. REFER TO NATIVE SEED MIX TABLE FOR SPECIES, PERCENTAGES AND APPLICATION RATES.
5. TREAT NATIVE SEED MIX AREA PRIOR TO INSTALLATION OF SEED WITH APPROPRIATE HERBICIDE TO PROACTIVELY MITIGATE HERBACEOUS WEED SPECIES GROWTH DURING ESTABLISHMENT PERIOD THEN AFTER APPROPRIATE TIME PERIOD APPLY NATIVE SEED AS CALLED FOR ON APPROVED PLANS.
6. AFTER SEEDING THE AREA SHALL BE COVERED WITH CRIMPED STRAW OR OTHER APPROPRIATE METHODS AND PROVIDED TEMPORARY IRRIGATION UNTIL SEED IS ESTABLISHED.
7. CONTRACTOR SHALL MONITOR SEEDED AREA FOR PROPER IRRIGATION, EROSION CONTROL, GERMINATION AND RESEEDING AS NEEDED TO ESTABLISH COVER.
8. THE APPROVED SEED MIX AREA IS INTENDED TO BE MAINTAINED IN A NATURAL LIKE LANDSCAPE AESTHETIC. IF AND WHEN MOWING OCCURS IN NATIVE GRASS SEED MIX AREAS DO NOT MOW LOWER THAN 6 TO 8 INCHES IN HEIGHT TO AVOID INHIBITING NATIVE PLANT GROWTH.
9. NATIVE SEED AREA WILL BE CONSIDERED ESTABLISHED WHEN SEVENTY PERCENT TOTAL COVER IS REACHED WITH NO LARGER THAN ONE FOOT SQUARE BARE SPOTS AND/OR UNTIL DEEMED ESTABLISHED BY CITY PLANNING SERVICES

WATER BUDGET CHART*

HYDROZONE	AREA(S.F.)	WATER NEED (GAL./S.F.)	ANNUAL WATER USE (GAL.)
HIGH	0 S.F.	18 GAL./SF	0 GAL.
MODERATE	11,366 S.F.	10 GAL./SF	113,660 GAL.
LOW	5,165 S.F.	3 GAL./SF	15,495 GAL.

TOTAL WATER USE = 129,155 GAL.
TOTAL LANDSCAPE AREA = 16,531 S.F.
GALLONS PER S.F. = 6.87 GAL./S.F.

*BREAKDOWN OF AREAS:
MODERATE = TURF + HALF OF SHRUB BEDS
LOW = DETENTION AREA + HALF OF SHRUB BED

LANDSCAPE LEGEND:

ORGANIC WOOD MULCH
TYPE: GORILLA HAIR

STEEL EDGER

COBBLE MULCH
COLOR: RIVER ROCK
SIZE RANGE: 3-6"

IRRIGATED SOD
(ENVIROTURF)

DETENTION BASIN SEED MIX PER CITY
(Drill rate: 14.54 lbs/ac, Broadcast rate: 29.08 lbs/ac)
*REFER TO CITY OF FORT COLLINS ENVIRONMENTAL PLANNING FOR MORE INFORMATION

COMMON NAME	SCIENTIFIC NAME	PLS/AC
PLAINS COREOPSIS	COREOPSIS TINCTORIA	0.17
WHITE PRAIRIE CLOVER	DALEA CANDIDA	0.65
PURPLE PRAIRIE CLOVER	DALEA PURPUREA	0.81
INDIAN BLANKETFLOWER	GAILLARDIA ARISTATA	1.85
MEXICAN HAT	RATIBIDA COLUMNIFERA	0.2
INDIAN RICEGRASS	ACHNATHERUM HYMENOIDES	1.13
SIDEOATS GRAMA	BOUTELOUA CURTIPENDULA	1.15
BUFFALOGRASS	BOUTELOUA DACTYLOIDES	3.27
BLUE GRAMA	BOUTELOUA GRACILIS	0.25
INLAND SALTGRASS	DISTICHLIS STRICTA	0.35
BOTTLEBRUSH SQUIRRELTAIL	ELYMUS ELYMOIDES	0.95
STREAMBANK WHEATGRASS	ELYMUS LANCEOLATUS SSP.	1.36
PRAIRIE JUNEGRASS	KOELERIA MACRANTHA	0.08
WESTERN WHEATGRASS	PASCOPYRUM SMITHII	1.61
LITTLE BLUESTEM	SCHIZACHYRIUM SCOPARIUM	0.7

UPLAND SEED MIX PER CITY
(Drill rate: 13.58 lbs/ac, Broadcast: 27.16 lbs/ac)
*REFER TO CITY OF FORT COLLINS ENVIRONMENTAL PLANNING FOR MORE INFORMATION

COMMON NAME	SCIENTIFIC NAME	PLS/AC
PLAINS COREOPSIS	COREOPSIS TINCTORIA	0.17
PURPLE PRAIRIE CLOVER	DALEA PURPUREA	0.81
INDIAN BLANKETFLOWER	GAILLARDIA ARISTATA	1.85
ROCKY MTN. PENSTEMON	PENSTEMON STRICTUS	0.35
MEXICAN HAT	RATIBIDA COLUMNIFERA	0.2
INDIAN RICEGRASS	ACHNATHERUM HYMENOIDES	1.13
SIDEOATS GRAMA	BOUTELOUA CURTIPENDULA	1.15
BUFFALOGRASS	BOUTELOUA DACTYLOIDES	3.27
BLUE GRAMA	BOUTELOUA GRACILIS	0.25
BOTTLEBRUSH SQUIRRELTAIL	ELYMUS ELYMOIDES	0.95
PRAIRIE JUNEGRASS	KOELERIA MACRANTHA	0.08
GREEN NEEDLEGRASS	NASSELLA VIRIDULA	1.01
SWITCHGRASS	PANICUM VIRGATUM	0.71
WESTERN WHEAT	PASCOPYRUM SMITHII	1.61
SAND DROPSEED	SPOOBOLUS CRYPTANDRUS	0.04

LANDSCAPE SCHEDULE

QTY	SYMBOL	BOTANIC NAME	COMMON NAME	SIZE
DECIDUOUS TREES				
3		QUERCUS ROBUR X MACROCARPA 'CLEMONS'	HERITAGE OAK	2" CAL./B&B
4		ULMUS DAVIDIANA VAR. JAPONICA 'DISCOVERY'	DISCOVERY ELM	2" CAL./B&B
ORNAMENTAL TREES				
6		BETULA OCCIDENTALIS	WESTERN RIVER BIRCH	1.5" CAL.
6		PYRUS USSURIENSIS 'BAILFROST'	MOUNTAIN FROST PEAR	1.5" CAL.
EVERGREEN TREES				
10		JUNIPERUS VIRGINIANA 'TAYLOR'	TAYLOR JUNIPER	6' HT.
3		PINUS EDULIS	PINYON PINE	6' HT.
8		JUNIPERUS SCOPULORUM 'MEDORA'	MEDORA JUNIPER	6' HT.

40 TOTAL TREES - 33% MAXIMUM (13 TREES)

A PERMIT MUST BE OBTAINED FROM THE CITY FORESTER BEFORE ANY TREES OR SHRUBS AS NOTED ON THIS PLAN ARE PLANTED, PRUNED OR REMOVED IN THE PUBLIC RIGHT-OF-WAY. THIS INCLUDES ZONES BETWEEN THE SIDEWALK AND CURB, MEDIANS AND OTHER CITY PROPERTY. THIS PERMIT SHALL APPROVE THE LOCATION AND SPECIES TO BE PLANTED. FAILURE TO OBTAIN THIS PERMIT IS A VIOLATION OF THE CITY OF FORT COLLINS CODE SUBJECT TO CITATION (SECTION 27-31) AND MAY ALSO RESULT IN REPLACING OR RELOCATING TREES AND A HOLD ON CERTIFICATE OF OCCUPANCY.

CHERRY STREET COTTAGES
FORT COLLINS, CO

russell+mills

REV.	COMMENT	DATE

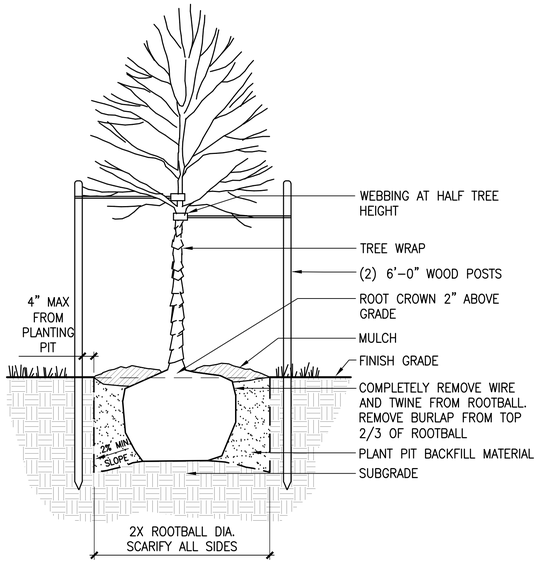
SEAL:

PDP

Date: MAY 2018
Drawn By: DD/JB
Checked By: CR

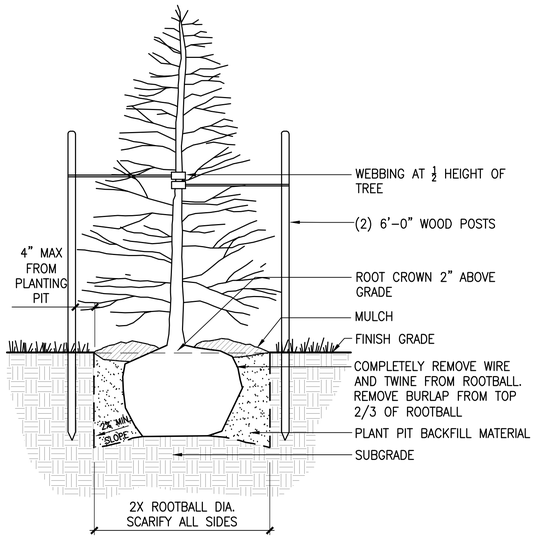
Sheet Name
OVERALL LANDSCAPE PLAN

Sheet
LP101



A DECIDUOUS TREE PLANTING

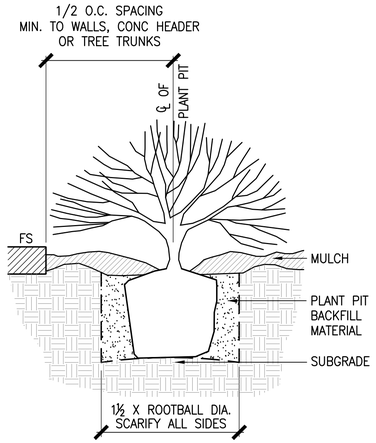
SCALE: NTS



B EVERGREEN TREE PLANTING

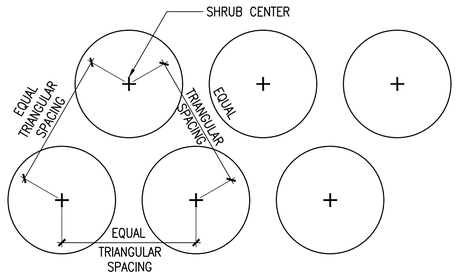
SCALE: NTS

DT-PLNT-TREE-EVER



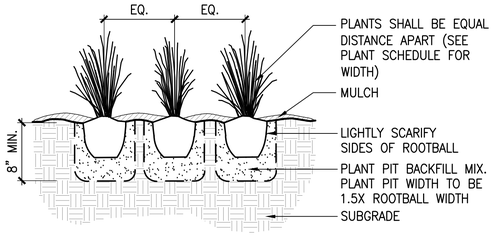
C SHRUB PLANTING

SCALE: NTS



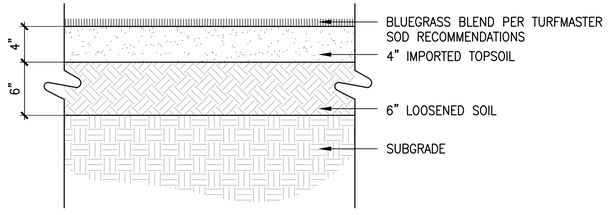
D TRIANGULAR SHRUB SPACING

SCALE: NTS



E PERENNIAL/GRASS PLANTING

SCALE: NTS



NOTE:
1. TURF BLEND AND TOPSOIL TYPE TO MEET CITY OF FORT COLLINS STANDRADS.

F SOD

SCALE: 1 1/2" = 1'-0"

CHERRY STREET COTTAGES
FORT COLLINS, CO

russell+mills

REV.	COMMENT	DATE

SEAL:

PDP

Date: MAY 2018

Drawn By: DD/JB

Checked By: CR

Sheet Name

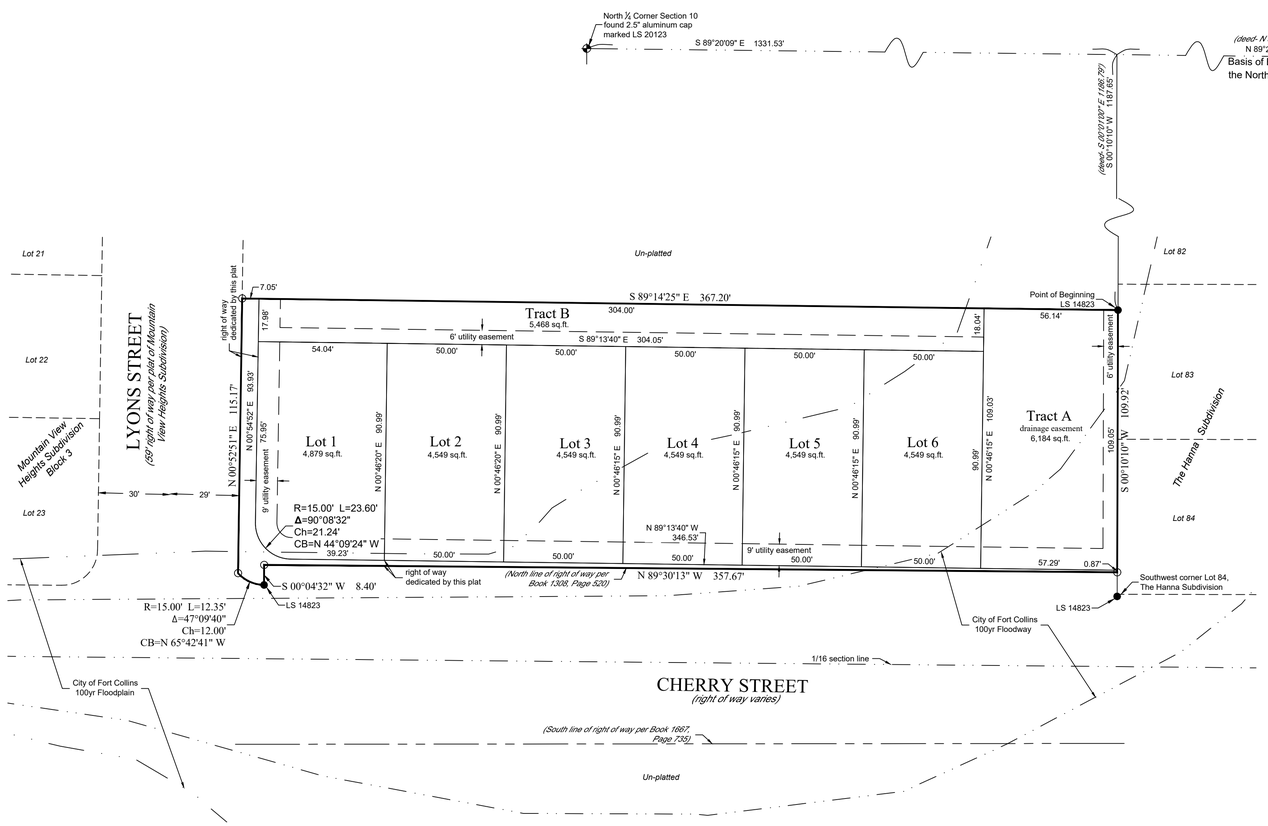
LANDSCAPE DETAILS

Sheet

LP501

CHERRY STREET COTTAGES

BEING A PORTION OF THE NORTHEAST ONE-QUARTER OF SECTION 10, TOWNSHIP 7 NORTH, RANGE 69 WEST OF THE 6TH P.M., CITY OF FORT COLLINS, COUNTY OF LARIMER, STATE OF COLORADO



Vicinity Map
(NTS)

Legend

- ● found 0.5" iron rod with 1.0" plastic cap marked as described
- ○ set 0.5" iron rod with 1.0" plastic cap marked PLS 32444

NOTES:

1. This survey is based on a title commitment provided by North American Title Company of Colorado File No.33400-17-14651, Effective Date: January 24, 2017 at 7:30 A.M.
2. Property Address: Fort Collins, CO 80521
3. Bearings are based on the North line of the Northeast ¼, Section 10 to have an assumed bearing of N 89°20'09" W monumented as shown hereon.
4. Units are shown in U.S. Survey Feet
5. Legal Description based on Warranty Deed recorded at Reception No. 93069283 at the Larimer County, Colorado Clerk and Recorder.
6. There shall be no private conditions, covenants, or restrictions that prohibit or limit the installation of resource conserving equipment or landscaping that are allowed by Sections 12-120 – 12-122 of the City Code.
7. Tracts A and B shall be owned and maintained by the Home Owners Association.
8. The new dedicated right of way shall be owned by the city of Fort Collins, but shall be maintained by the Home Owners Association.
9. The purpose of Tract A is a dedicated Drainage Easement for the Detention Pond within the floodplain boundary with no structural improvements within the floodway area.
10. The purpose of Tract B is a dedicated alley/access driveway to each of the six (6) residential lots.

NOTICE: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event, may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

F:\Projects\2016\16079\dwg\16079.dwg March 26, 2018 - 8:16am

STATEMENT OF OWNERSHIP AND SUBDIVISION:

Know all persons by these presents, that the undersigned owner of the following described land:

A tract of land situate in the Northeast ¼ of Section 10, Township 7 North, Range 69 West of the Sixth P.M., City of Fort Collins, County of Larimer, State of Colorado, which, considering the North line of said Northeast ¼ as bearing N 89°20'09" W, and that all bearings contained herein relative thereto, is contained within the boundary lines which BEGIN at a point which bears N 89°20'09" W 1331.87 feet, and again S 00°10'10" W 1187.65 feet from the Northeast Corner of said Section 10, and run thence S 00°10'10" W 109.92 feet to the North right of way line of Cherry Street; thence N 89°30'13" W 357.67 feet; thence S 00°04'32" W 8.40 feet; thence along the arc of a 15.00 foot radius non-tangent curve to the right a distance of 12.35 feet; the long chord of which bears N 65°42'41" W 12.00 feet; thence N 00°52'51" E 115.17 feet; thence S 89°14'25" E 367.20 feet to the Point of Beginning.

(which above described tract contains 0.937 acres, more or less)

for themselves and their successors in interest Egilmartin, Inc., a Colorado corporation have caused the above described land to be surveyed and subdivided into lots, tracts and streets as shown on this Plat to be known as CHERRY STREET COTTAGES, subject to all easements and rights-of-way now of record or existing or indicated on this Plat. The rights and obligations of this Plat shall run with the land.

CERTIFICATE OF DEDICATION:

The Owner does hereby dedicate and convey to the City of Fort Collins, Colorado (hereafter "City"), for public use, forever, a permanent right-of-way for street purposes and the "Easements" as laid out and designated on this Plat; provided, however, that (1) acceptance by the City of this dedication of Easements does not impose upon the City a duty to maintain the Easements so dedicated, and (2) acceptance by the City of this dedication of streets does not impose upon the City a duty to maintain streets so dedicated until such time as the provisions of the Maintenance Guarantee have been fully satisfied. The streets dedicated on this Plat are the fee property of the City as provided in Section 31-23-107 C.R.S. The City's rights under the Easements include the right to install, operate, access, maintain, repair, reconstruct, remove and replace within the Easements public improvements consistent with the intended purpose of the Easements; the right to install, maintain and use gates in any fences that cross the Easements; the right to mark the location of the Easements with suitable markers; and the right to permit other public utilities to exercise these same rights. Owner reserves the right to use the Easements for purposes that do not interfere with the full enjoyment of the rights hereby granted. The City is responsible for maintenance of its own improvements and for repairing any damage caused by its activities in the Easements, but by acceptance of this dedication, the City does not accept the duty of maintenance of the Easements, or of improvements in the Easements that are not owned by the City. Owner will maintain the surface of the Easements in a sanitary condition in compliance with any applicable weed, nuisance or other legal requirements.

Except as expressly permitted in an approved plan of development or other written agreement with the City, Owner will not install on the Easements, or permit the installation on the Easements, of any building, structure, improvement, fence, retaining wall, sidewalk, tree or other landscaping (other than usual and customary grasses and other ground cover). In the event such obstacles are installed in the Easements, the City has the right to require the Owner to remove such obstacles from the Easements. If Owner does not remove such obstacles, the City may remove such obstacles without any liability or obligation for repair and replacement thereof, and charge the Owner the City's costs for such removal. If the City chooses not to remove the obstacles, the City will not be liable for any damage to the obstacles or any other property to which they are attached.

The rights granted to the City by this Plat inure to the benefit of the City's agents, licensees, permittees and assigns.

Owner: Egilmartin, Inc., a Colorado Corporation

By: _____
Evan Gilmartin, as President

The foregoing instrument was acknowledged before me this _____ day of

_____, 20__ by Evan Gilmartin, as President of Egilmartin, Inc.

State of Colorado)
)SS
County of Larimer)

WITNESS my hand and official seal.

_____
Notary Public
My commission expires:_____

Lienholder: Drennen Investments

By: _____
Representative

The foregoing instrument was acknowledged before me this _____ day of

_____, 20 , by _____ the representative of Drennen Investments a lien holder of CHERRY STREET COTTAGES.

State of Colorado)
)SS
County of Larimer)

WITNESS my hand and official seal.

_____
Notary Public
My commission expires:_____

Lienholder: James Schmid

By: _____
James Schmid

The foregoing instrument was acknowledged before me this _____ day of

_____, 20 , by James Schmid, a lien holder of CHERRY STREET COTTAGES.

State of Colorado)
)SS
County of Larimer)

WITNESS my hand and official seal.

_____
Notary Public
My commission expires:_____

NOTICE

ALL RESPONSIBILITIES AND COSTS OF OPERATION, MAINTENANCE AND RECONSTRUCTION OF THE PRIVATE STREETS AND/OR DRIVES LOCATED ON THE PRIVATE PROPERTY THAT IS THE SUBJECT OF THIS PLAT SHALL BE BORNE BY THE OWNERS OF SAID PROPERTY, EITHER INDIVIDUALLY, OR COLLECTIVELY, THROUGH A PROPERTY OWNERS' ASSOCIATION, IF APPLICABLE. THE CITY OF FORT COLLINS SHALL HAVE NO OBLIGATION OF OPERATION, MAINTENANCE OR RECONSTRUCTION OF SUCH PRIVATE STREETS AND/OR DRIVES NOR SHALL THE CITY HAVE ANY OBLIGATION TO ACCEPT SUCH STREETS AND/OR DRIVES AS PUBLIC STREETS OR DRIVES.

MAINTENANCE GUARANTEE:

The Owner hereby warrants and guarantees to the City, for a period of two (2) years from the date of completion and first acceptance by the City of the improvements warranted hereunder, the full and complete maintenance and repair of the improvements to be constructed in connection with the Development which is the subject of this Plat. This warranty and guarantee is made in accordance with the City Land Use Code and/or the Transitional Land Use Regulations, as applicable. This guarantee applies to the streets and all other appurtenant structures and amenities lying within the rights-of-way, Easements and other public properties, including, without limitation, all curbing, sidewalks, bike paths, drainage pipes, culverts, catch basins, drainage ditches and landscaping. Any maintenance and/or repair required on utilities shall be coordinated with the owning utility company or department.

The Owner shall maintain said improvements in a manner that will assure compliance on a consistent basis with all construction standards, safety requirements and environmental protection requirements of the City. The Owner shall also correct and repair, or cause to be corrected and repaired, all damages to said improvements resulting from development-related or building-related activities. In the event the Owner fails to correct any damages within thirty (30) days after written notice thereof, then said damages may be corrected by the City and all costs and charges billed to and paid by the Owner. The City shall also have any other remedies available to it as authorized by law. Any damages which occurred prior to the end of said two (2) year period and which are unrepaired at the termination of said period shall remain the responsibility of the Owner.

REPAIR GUARANTEE:

In consideration of the approval of this final Plat and other valuable consideration, the Owner does hereby agree to hold the City harmless for a five (5) year period, commencing upon the date of completion and first acceptance by the City of the improvements to be constructed in connection with the development which is the subject of this Plat, from any and all claims, damages, or demands arising on account of the design and construction of public improvements of the property shown herein; and the Owner furthermore commits to make necessary repairs to said public improvements, to include, without limitation, the roads, streets, fills, embankments, ditches, cross pans, sub-drains, culverts, walls and bridges within the right-of-way, Easements and other public properties, resulting from failures caused by design and/or construction defects. This agreement to hold the City harmless includes defects in materials and workmanship, as well as defects caused by or consisting of settling trenches, fills or excavations.

Further, the Owner warrants that he/she owns fee simple title to the property shown hereon and agrees that the City shall not be liable to the Owner or his/her successors in interest during the warranty period, for any claim of damages resulting from negligence in exercising engineering techniques and due caution in the construction of cross drains, drives, structures or buildings, the changing of courses of streams and rivers, flooding from natural creeks and rivers, and any other matter whatsoever on private property. Any and all monetary liability occurring under this paragraph shall be the liability of the Owner. I further warrant that I have the right to convey said land according to this Plat.

Notice Of Other Documents:

All persons take notice that the Owner has executed certain documents pertaining to this Development which create certain rights and obligations of the Development, the Owner and/or subsequent Owners of all or portions of the Development site, many of which obligations constitute promises and covenants that, along with the obligations under this Plat, run with the land. The said documents may also be amended from time to time and may include, without limitation, the Development Agreement, Site And Landscape Covenants, Final Site Plan, Final Landscape Plan, and Architectural Elevations, which documents are on file in the office of the clerk of the City and should be closely examined by all persons interested in purchasing any portion of the Development site.

ATTORNEY'S CERTIFICATION:

I hereby certify that this Subdivision Plat has been duly executed as required pursuant to Section 2.2.3(C)(3)(a) through (e) inclusive of the Land Use Code of the City of Fort Collins and that all persons signing this Subdivision Plat on behalf of a corporation or other entity are duly authorized signatories under the laws of the State of Colorado. This Certification is based upon the records of the Clerk and Recorder of Larimer County, Colorado as of the date of execution of the Plat and other information discovered by me through reasonable inquiry and is limited as authorized by Section 2.2.3(C)(3)(f) of the Land Use Code.

Attorney:_____

Address:_____

Registration No.:_____

APPROVED AS TO FORM, CITY ENGINEER:

By the City Engineer of the City of Fort Collins, Colorado this _____ day of_____, A.D.,_____.

_____
City Engineer

PLANNING APPROVAL:
By the Director of Community Development and Neighborhood Services the City of Fort Collins, Colorado this _____ day of _____ A.D., _____.

Director of Community Development and Neighborhood Services

SURVEYOR'S STATEMENT:
I, M. Bryan Short, a Colorado Registered Professional Land Surveyor, do hereby state that this Subdivision Plat was prepared from an actual survey under my personal supervision, that the monumentation as indicated hereon were found or set as shown, and that the forgoing Plat is an accurate representation thereof, all this to the best of my knowledge, information and belief.

_____
M. Bryan Short
Colorado Registered Professional Land Surveyor # 32444

REVISIONS
Date _____ By_____ Description _____
Date _____ By_____ Description _____
Date _____ By_____ Description _____

Field Date	1.5.2018	ST	MDG
Party Chief	ADS	PM	CLT
Scale	1"= 30'	PLS	MBS

CLIENT Sorensen Engineering & Construction, LLC
1901 Bear Court, Fort Collins, 80525
Phone: (970) 590-1579

PLS Group
6843 North Franklin Avenue, Loveland, Colorado 80538
Phone: 970.669.2100 Fax: 970.669.3652

TITLE **Preliminary Plat of**
Cherry Street Cottages
Section 10, Township 7 North, Range 69 West, 6th P.M., Larimer County, Colorado

PROJECT NO.	SHEET NO.	NO. OF SHEETS
16079.002	1	1

UTILITY PLANS FOR CHERRY STREET COTTAGES

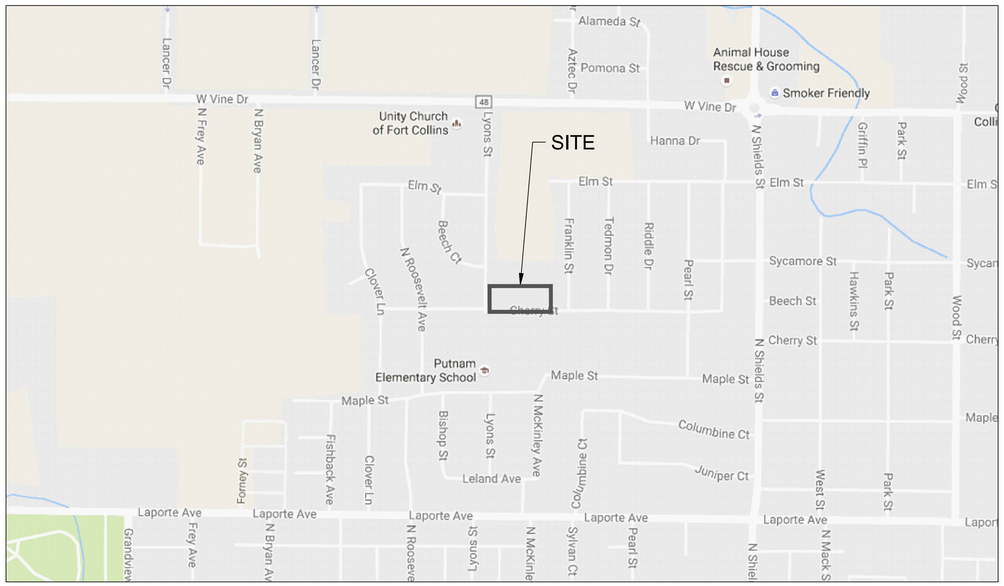
LEGAL DESCRIPTION:

BEING A PORTION OF THE NE 1/4 OF SECTION 10, TOWNSHIP 7 N, RANGE 69 W OF THE 6TH P.M.

CITY OF FORT COLLINS, COUNTY OF LARIMER, STATE OF COLORADO

MAY, 2018

VICINITY MAP



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
C1.0	UTILITY COVER SHEET
C1.1	UTILITY NOTES
C2.0	UTILITY PLAN
C3.0	GRADING PLAN
C4.0	DRAINAGE & EROSION PLAN
C5.0	DETAILS
C5.1	DETAILS
C5.2	DETAILS
C5.3	DETAILS

LEGEND:

PROPERTY LINE	PROPOSED WATER SERVICE (WET TAPS)
EXISTING FLOW LINE	PROPOSED SANITARY SERVICE
EXISTING EASEMENT	PROPOSED TELEPHONE
EXISTING GAS LINE	PROPOSED STREET LIGHT
EXISTING WATER LINE	PROPOSED ELECTRICAL
EXISTING SEWER LINE	PROPOSED WATER METER & CURB STOP
EXISTING TELEPHONE	PROPOSED 3/4 WATER TAP
EXISTING ELECTRICAL	PROPOSED 4" SANITARY TAP
EXISTING FIRE HYDRANT	PROPOSED TRANSFORMER 9ES @ 150 AMP SERVICE

CONTACT DIRECTORY

PROPERTY OWNER
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO 970-308-3927

CIVIL ENGINEER
SORENSEN ENGINEERING & CONSTRUCTION, LLC
1901 BEAR COURT
FORT COLLINS 80525
970.590.1579

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE CITY OF FORT COLLINS AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY; AND THAT I AM FULLY RESPONSIBLE FOR THE ACCURACY OF ALL DESIGN, REVISIONS, AND RECORD CONDITIONS THAT I HAVE NOTED ON THESE PLANS

NAME: _____ DATE

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date

CHECKED BY: _____ Water & Wastewater Utility _____ Date

CHECKED BY: _____ Stormwater Utility _____ Date

CHECKED BY: _____ Parks & Recreation _____ Date

CHECKED BY: _____ Traffic Engineer _____ Date

THESE PLANS HAVE BEEN REVIEWED BY THE LOCAL ENTITY FOR CONCEPT ONLY. THE REVIEW DOES NOT IMPLY RESPONSIBILITY BY THE REVIEWING DEPARTMENT, THE LOCAL ENTITY ENGINEER, OR THE LOCAL ENTITY FOR ACCURACY AND CORRECTNESS OF THE CALCULATIONS. FURTHERMORE,THE REVIEW DOES NOT IMPLY THAT QUANTITIES OF ITEMS ON THE PLANS ARE THE FINAL QUANTITIES REQUIRED. THE REVIEW SHALL NOT BE CONSTRUED FOR ANY REASON AS ACCEPTANCE OF FINANCIAL RESPONSIBILITY BY THE LOCAL ENTITY FOR ADDITIONAL QUANTITIES OF ITEMS SHOWN THAT MAY BE REQUIRED DURING THE CONSTRUCTION PHASE.

811 Know what's below. Call before you dig.

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
PaulS51@comcast.net

PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE: UTILITY COVER SHEET

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018

SHEET NUMBER: C1.0
JOB NUMBER

UTILITY NOTES

1. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION OF PUBLIC IMPROVEMENTS SHALL MEET OR EXCEED THE STANDARDS AND SPECIFICATIONS SET FORTH IN THE LARIMER COUNTY URBAN AREA STREET STANDARDS AND APPLICABLE STATE AND FEDERAL REGULATIONS. WHERE THERE IS CONFLICT BETWEEN THESE PLANS AND THE SPECIFICATIONS, OR ANY APPLICABLE STANDARDS, THE MOST RESTRICTIVE STANDARD SHALL APPLY. ALL WORK SHALL BE INSPECTED AND APPROVED BY THE LOCAL ENTITY.
2. ALL REFERENCES TO ANY PUBLISHED STANDARDS SHALL REFER TO THE LATEST REVISION OF SAID STANDARD, UNLESS SPECIFICALLY STATED OTHERWISE.
3. THESE PUBLIC IMPROVEMENT CONSTRUCTION PLANS SHALL BE VALID FOR A PERIOD OF THREE YEARS FROM THE DATE OF APPROVAL BY THE LOCAL ENTITY ENGINEER. USE OF THESE PLANS AFTER THE EXPIRATION DATE WILL REQUIRE A NEW REVIEW AND APPROVAL PROCESS BY THE LOCAL ENTITY PRIOR TO COMMENCEMENT OF ANY WORK SHOWN IN THESE PLANS.
4. THE ENGINEER WHO HAS PREPARED THESE PLANS, BY EXECUTION AND/OR SEAL HEREOF, DOES HEREBY AFFIRM RESPONSIBILITY TO THE LOCAL ENTITY, AS BENEFICIARY OF SAID ENGINEER'S WORK, FOR ANY ERRORS AND OMISSIONS CONTAINED IN THESE PLANS, AND APPROVAL OF THESE PLANS BY THE LOCAL ENTITY ENGINEER SHALL NOT RELIEVE THE ENGINEER WHO HAS PREPARED THESE PLANS OF ALL SUCH RESPONSIBILITY. FURTHER, TO THE EXTENT PERMITTED BY LAW, THE ENGINEER HEREBY AGREES TO HOLD HARMLESS AND INDEMNIFY THE LOCAL ENTITY, AND ITS OFFICERS AND EMPLOYEES, FROM AND AGAINST ALL LIABILITIES, CLAIMS, AND DEMANDS WHICH MAY ARISE FROM ANY ERRORS AND OMISSIONS CONTAINED IN THESE PLANS.
5. ALL SANITARY SEWER, STORM SEWER, AND WATER LINE CONSTRUCTION, AS WELL AS POWER AND OTHER "DRY"UTILITY INSTALLATIONS, SHALL CONFORM TO THE LOCAL ENTITY STANDARDS AND SPECIFICATIONS CURRENT AT THE DATE OF APPROVAL OF THE PLANS BY THE LOCAL ENTITY ENGINEER.
6. THE TYPE, SIZE, LOCATION AND NUMBER OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THE DRAWINGS. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE ROUTE OF THE WORK BEFORE COMMENCING NEW CONSTRUCTION. THE DEVELOPER SHALL BE RESPONSIBLE FOR UNKNOWN UNDERGROUND UTILITIES.
7. THE ENGINEER SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT 1– 800–922–1987, AT LEAST 2 WORKING DAYS PRIOR TO BEGINNING EXCAVATION OR GRADING, TO HAVE ALL REGISTERED UTILITY LOCATIONS MARKED. OTHER UNREGISTERED UTILITY ENTITIES (I.E. DITCH / IRRIGATION COMPANY) ARE TO BE LOCATED BY CONTACTING THE RESPECTIVE REPRESENTATIVE. UTILITY SERVICE LATERALS ARE ALSO TO BE LOCATED PRIOR TO BEGINNING EXCAVATION OR GRADING. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO RELOCATE ALL EXISTING UTILITIES THAT CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS.
8. THE DEVELOPER SHALL BE RESPONSIBLE FOR PROTECTING ALL UTILITIES DURING CONSTRUCTION AND FOR COORDINATING WITH THE APPROPRIATE UTILITY COMPANY FOR ANY UTILITY CROSSINGS REQUIRED.
9. IF A CONFLICT EXISTS BETWEEN EXISTING AND PROPOSED UTILITIES AND/OR A DESIGN MODIFICATION IS REQUIRED, THE DEVELOPER SHALL COORDINATE WITH THE ENGINEER TO MODIFY THE DESIGN. DESIGN MODIFICATION(S) MUST BE APPROVED BY THE LOCAL ENTITY PRIOR TO BEGINNING CONSTRUCTION.
10. THE DEVELOPER SHALL COORDINATE AND COOPERATE WITH THE LOCAL ENTITY, AND ALL UTILITY COMPANIES INVOLVED, TO ASSURE THAT THE WORK IS ACCOMPLISHED IN A TIMELY FASHION AND WITH A MINIMUM DISRUPTION OF SERVICE. THE DEVELOPER SHALL BE RESPONSIBLE FOR CONTACTING, IN ADVANCE, ALL PARTIES AFFECTED BY ANY DISRUPTION OF ANY UTILITY SERVICE AS WELL AS THE UTILITY COMPANIES.
11. NO WORK MAY COMMENCE WITHIN ANY PUBLIC STORM WATER, SANITARY SEWER OR POTABLE WATER SYSTEM UNTIL THE DEVELOPER NOTIFIES THE UTILITY PROVIDER. NOTIFICATION SHALL BE A MINIMUM OF 2 WORKING DAYS PRIOR TO COMMENCEMENT OF ANY WORK. AT THE DISCRETION OF THE WATER UTILITY PROVIDER, A PRE–CONSTRUCTION MEETING MAY BE REQUIRED PRIOR TO COMMENCEMENT OF ANY WORK.
12. THE DEVELOPER SHALL SEQUENCE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO MINIMIZE POTENTIAL UTILITY CONFLICTS. IN GENERAL, STORM SEWER AND SANITARY SEWER SHOULD BE CONSTRUCTED PRIOR TO INSTALLATION OF THE WATER LINES AND DRY UTILITIES.
13. THE MINIMUM COVER OVER WATER LINES IS 4.5 FEET AND THE MAXIMUM COVER IS 5.5 FEET UNLESS OTHERWISE NOTED IN THE PLANS AND APPROVED BY THE WATER UTILITY.
14. A STATE CONSTRUCTION DEWATERING WASTEWATER DISCHARGE PERMIT IS REQUIRED IF DEWATERING IS REQUIRED IN ORDER TO INSTALL UTILITIES OR WATER IS DISCHARGED INTO A STORM SEWER, CHANNEL, IRRIGATION DITCH OR ANY WATERS OF THE UNITED STATES.
15. THE DEVELOPER SHALL COMPLY WITH ALL TERMS AND CONDITIONS OF THE COLORADO PERMIT FOR STORM WATER DISCHARGE (CONTACT COLORADO DEPARTMENT OF HEALTH, WATER QUALITY CONTROL DIVISION, (303) 692–3590), THE STORM WATER MANAGEMENT PLAN, AND THE EROSION CONTROL PLAN.
16. THE LOCAL ENTITY SHALL NOT BE RESPONSIBLE FOR THE MAINTENANCE OF STORM DRAINAGE FACILITIES LOCATED ON PRIVATE PROPERTY. MAINTENANCE OF ONSITE DRAINAGE FACILITIES SHALL BE THE RESPONSIBILITY OF THE PROPERTY OWNER(S).
17. PRIOR TO FINAL INSPECTION AND ACCEPTANCE BY THE LOCAL ENTITY, CERTIFICATION OF THE DRAINAGE FACILITIES, BY A REGISTERED ENGINEER, MUST BE SUBMITTED TO AND APPROVED BY THE STORMWATER UTILITY DEPARTMENT. CERTIFICATION SHALL BE SUBMITTED TO THE STORMWATER UTILITY DEPARTMENT AT LEAST TWO WEEKS PRIOR TO THE RELEASE OF A CERTIFICATE OF OCCUPANCY FOR SINGLE FAMILY UNITS. FOR COMMERCIAL PROPERTIES, CERTIFICATION SHALL BE SUBMITTED TO THE STORMWATER UTILITY DEPARTMENT AT LEAST TWO WEEKS PRIOR TO THE RELEASE OF ANY BUILDING PERMITS IN EXCESS OF THOSE ALLOWED PRIOR TO CERTIFICATION PER THE DEVELOPMENT AGREEMENT.
18. THE LOCAL ENTITY SHALL NOT BE RESPONSIBLE FOR ANY DAMAGES OR INJURIES SUSTAINED IN THIS DEVELOPMENT AS A RESULT OF GROUNDWATER SEEPAGE, WHETHER RESULTING FROM GROUNDWATER FLOODING, STRUCTURAL DAMAGE OR OTHER DAMAGE UNLESS SUCH DAMAGE OR INJURIES ARE SUSTAINED AS A RESULT OF THE LOCAL ENTITY FAILURE TO PROPERLY MAINTAIN ITS WATER, WASTEWATER, AND/OR STORM DRAINAGE FACILITIES IN THE DEVELOPMENT.
19. ALL RECOMMENDATIONS OF THE FINAL DRAINAGE AND EROSION CONTROL STUDY DRAINAGE AND EROSION CONTROL REPORT BY SORENSEN ENGINEERING AND CONSTRUCTION SHALL BE FOLLOWED AND IMPLEMENTED.
20. TEMPORARY EROSION CONTROL DURING CONSTRUCTION SHALL BE PROVIDED AS SHOWN ON THE EROSION CONTROL PLAN. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED IN GOOD REPAIR BY THE DEVELOPER, UNTIL SUCH TIME AS THE ENTIRE DISTURBED AREAS IS STABILIZED WITH HARD SURFACE OR LANDSCAPING.
21. THE DEVELOPER SHALL BE RESPONSIBLE FOR INSURING THAT NO MUD OR DEBRIS SHALL BE TRACKED ONTO THE EXISTING PUBLIC STREET SYSTEM. MUD AND DEBRIS MUST BE REMOVED WITHIN 24 HOURS BY AN APPROPRIATE MECHANICAL METHOD (I.E. MACHINE BROOM SWEEP, LIGHT DUTY FRONT–END LOADER, ETC.) OR AS APPROVED BY THE LOCAL ENTITY STREET INSPECTOR.
22. NO WORK MAY COMMENCE WITHIN ANY IMPROVED OR UNIMPROVED PUBLIC RIGHT–OF–WAY UNTIL A RIGHT–OF–WAY PERMIT OR DEVELOPMENT CONSTRUCTION PERMIT IS OBTAINED, IF APPLICABLE.
23. THE DEVELOPER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FOR ALL APPLICABLE AGENCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION. THE DEVELOPER SHALL NOTIFY THE LOCAL ENTITY ENGINEERING INSPECTOR (FORT COLLINS – 221–6605) AND THE LOCAL ENTITY EROSION CONTROL INSPECTOR (FORT COLLINS -221–6700) AT LEAST 2 WORKING DAYS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITY, OR CONSTRUCTION ON ANY AND ALL PUBLIC IMPROVEMENTS. IF THE LOCAL ENTITY ENGINEER IS NOT AVAILABLE AFTER PROPER NOTICE OF CONSTRUCTION ACTIVITY HAS BEEN PROVIDED, THE DEVELOPER MAY COMMENCE WORK IN THE ENGINEER ABSENCE. HOWEVER, THE LOCAL ENTITY RESERVES THE RIGHT NOT TO ACCEPT THE IMPROVEMENT IF SUBSEQUENT TESTING REVEALS AN IMPROPER INSTALLATION.

24. THE DEVELOPER SHALL BE RESPONSIBLE FOR OBTAINING SOILS TESTS WITHIN THE PUBLIC RIGHTOF–WAY AFTER RIGHT OF WAY GRADING AND ALL UTILITY TRENCH WORK IS COMPLETE AND PRIOR TO THE PLACEMENT OF CURB, GUTTER, SIDEWALK AND PAVEMENT. IF THE FINAL SOILS/PAVEMENT DESIGN REPORT DOES NOT CORRESPOND WITH THE RESULTS OF THE ORIGINAL GEOTECHNICAL REPORT, THE DEVELOPER SHALL BE RESPONSIBLE FOR A RE–DESIGN OF THE SUBJECT PAVEMENT SECTION OR, THE DEVELOPER MAY USE THE LOCAL ENTITY'S DEFAULT PAVEMENT THICKNESS SECTION(S). REGARDLESS OF THE OPTION USED, ALL FINAL SOILS/PAVEMENT DESIGN REPORTS SHALL BE PREPARED BY A LICENSED PROFESSIONAL ENGINEER. THE FINAL REPORT SHALL BE SUBMITTED TO THE INSPECTOR A MINIMUM OF 10 WORKING DAYS PRIOR TO PLACEMENT OF BASE AND ASPHALT. PLACEMENT OF CURB, GUTTER, SIDEWALK, BASE AND ASPHALT SHALL NOT OCCUR UNTIL THE LOCAL ENTITY ENGINEER APPROVES THE FINAL REPORT.
25. THE CONTRACTOR SHALL HIRE A LICENSED ENGINEER OR LAND SURVEYOR TO SURVEY THE CONSTRUCTED ELEVATIONS OF THE STREET SUBGRADE AND THE GUTTER FLOWLINE AT ALL INTERSECTIONS, INLETS, AND OTHER LOCATIONS REQUESTED BY THE LOCAL ENTITY INSPECTOR. THE ENGINEER OR SURVEYOR MUST CERTIFY IN A LETTER TO THE LOCAL ENTITY THAT THESE ELEVATIONS CONFORM TO THE APPROVED PLANS AND SPECIFICATIONS. ANY DEVIATIONS SHALL BE NOTED IN THE LETTER AND THEN RESOLVED WITH THE LOCAL ENTITY BEFORE INSTALLATION OF BASE COURSE OR ASPHALT WILL BE ALLOWED ON THE STREETS. N/A
26. ALL UTILITY INSTALLATIONS WITHIN OR ACROSS THE ROADBED OF NEW RESIDENTIAL ROADS MUST BE COMPLETED PRIOR TO THE FINAL STAGES OF ROAD CONSTRUCTION. FOR THE PURPOSES OF THESE STANDARDS, ANY WORK EXCEPT C/G ABOVE THE SUBGRADE IS CONSIDERED FINAL STAGE WORK. ALL SERVICE LINES MUST BE STUBBED TO THE PROPERTY LINES AND MARKED SO AS TO REDUCE THE EXCAVATION NECESSARY FOR BUILDING CONNECTIONS.
27. N/A
28. N/A
29. PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION, THE CONTRACTOR SHALL CONTACT THE LOCAL ENTITY FORESTER TO SCHEDULE A SITE INSPECTION FOR ANY TREE REMOVAL REQUIRING A PERMIT.
30. THE DEVELOPER SHALL BE RESPONSIBLE FOR ALL ASPECTS OF SAFETY INCLUDING, BUT NOT LIMITED TO, EXCAVATION, TRENCHING, SHORING, TRAFFIC CONTROL, AND SECURITY. REFER TO OSHA PUBLICATION 2226, EXCAVATING AND TRENCHING.
31. THE DEVELOPER SHALL SUBMIT A CONSTRUCTION TRAFFIC CONTROL PLAN, IN ACCORDANCE WITH MUTCD, TO THE APPROPRIATE RIGHT–OF–WAY AUTHORITY. (LOCAL ENTITY, COUNTY OR STATE), FOR APPROVAL, PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN, OR AFFECTING, THE RIGHT–OF–WAY. THE DEVELOPER SHALL BE RESPONSIBLE FOR PROVIDING ANY AND ALL TRAFFIC CONTROL DEVICES AS MAY BE REQUIRED BY THE CONSTRUCTION ACTIVITIES.
32. PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION THAT WILL AFFECT TRAFFIC SIGNS OF ANY TYPE, THE CONTRACTOR SHALL CONTACT LOCAL ENTITY TRAFFIC OPERATIONS DEPARTMENT, WHO WILL TEMPORARILY REMOVE OR RELOCATE THE SIGN AT NO COST TO THE CONTRACTOR; HOWEVER, IF THE CONTRACTOR MOVES THE TRAFFIC SIGN THEN THE CONTRACTOR WILL BE CHARGED FOR THE LABOR, MATERIALS AND EQUIPMENT TO REINSTALL THE SIGN AS NEEDED.
33. THE DEVELOPER IS RESPONSIBLE FOR ALL COSTS FOR THE INITIAL INSTALLATION OF TRAFFIC SIGNING AND STRIPING FOR THE DEVELOPMENT RELATED TO THE DEVELOPMENT'S LOCAL STREET OPERATIONS. IN ADDITION, THE DEVELOPER IS RESPONSIBLE FOR ALL COSTS FOR TRAFFIC SIGNING AND STRIPING RELATED TO DIRECTING TRAFFIC ACCESS TO AND FROM THE DEVELOPMENT.
34. THERE SHALL BE NO SITE CONSTRUCTION ACTIVITIES ON SATURDAYS, UNLESS SPECIFICALLY APPROVED BY THE LOCAL ENTITY ENGINEER, AND NO SITE CONSTRUCTION ACTIVITIES ON SUNDAYS OR HOLIDAYS, UNLESS THERE IS PRIOR WRITTEN APPROVAL BY THE LOCAL ENTITY.
35. THE DEVELOPER IS RESPONSIBLE FOR PROVIDING ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETION OF THE INTENDED IMPROVEMENTS, SHOWN ON THESE DRAWINGS, OR DESIGNATED TO BE PROVIDED, INSTALLED, OR CONSTRUCTED, UNLESS SPECIFICALLY NOTED OTHERWISE.
36. DIMENSIONS FOR LAYOUT AND CONSTRUCTION ARE NOT TO BE SCALED FROM ANY DRAWING. IF PERTINENT DIMENSIONS ARE NOT SHOWN, CONTACT THE DESIGNER FOR CLARIFICATION, AND ANNOTATE THE DIMENSION ON THE AS–BUILT RECORD DRAWINGS.
37. THE DEVELOPER SHALL HAVE, ONSITE AT ALL TIMES, ONE (1) SIGNED COPY OF THE APPROVED PLANS, ONE (1) COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS, AND A COPY OF ANY PERMITS AND EXTENSION AGREEMENTS NEEDED FOR THE JOB.
38. IF, DURING THE CONSTRUCTION PROCESS, CONDITIONS ARE ENCOUNTERED WHICH COULD INDICATE A SITUATION THAT IS NOT IDENTIFIED IN THE PLANS OR SPECIFICATIONS, THE DEVELOPER SHALL CONTACT THE DESIGNER AND THE LOCAL ENTITY ENGINEER IMMEDIATELY.
39. THE DEVELOPER SHALL BE RESPONSIBLE FOR RECORDING AS–BUILT INFORMATION ON A SET OF RECORD DRAWINGS KEPT ON THE CONSTRUCTION SITE, AND AVAILABLE TO THE LOCAL ENTITY'S INSPECTOR AT ALL TIMES. UPON COMPLETION OF THE WORK, THE CONTRACTOR(S) SHALL SUBMIT RECORD DRAWINGS TO THE LOCAL ENTITY ENGINEER.
40. PROJECT DATUM: NAVD88

    BENCHMARK# 31–97, ELEVATION: 5023.65 (NGVD29=5020.48)

    SOUTHWEST CORNER OF LAPORTE AVE. AND SHIELDS ST., ON A CONCRETE TRAFFIC SIGNAL BASE

    BENCHMARK# 37–97, ELEVATION 5027.21 (NGVD29=5024.04)

    ON TOP OF A CONCRETE TRAFFIC SIGNAL BASE AT THE EAST ENTRANCE TO LINCOLN JR. HIGH SCHOOL., ON THE SOUTH SIDE OF VINE DR.

41. ALL STATIONING IS BASED ON CENTERLINE OF ROADWAYS UNLESS OTHERWISE NOTED.
42. DAMAGED CURB, GUTTER AND SIDEWALK EXISTING PRIOR TO CONSTRUCTION, AS WELL AS EXISTING FENCES, TREES, STREETS, SIDEWALKS, CURBS AND GUTTERS, LANDSCAPING, STRUCTURES, AND IMPROVEMENTS DESTROYED, DAMAGED OR REMOVED DUE TO CONSTRUCTION OF THIS PROJECT, SHALL BE REPLACED OR RESTORED IN LIKE KIND AT THE DEVELOPER'S EXPENSE, UNLESS OTHERWISE INDICATED ON THESE PLANS, PRIOR TO THE ACCEPTANCE OF COMPLETED IMPROVEMENTS AND/OR PRIOR TO THE ISSUANCE OF THE FIRST CERTIFICATE OF OCCUPANCY.
43. WHEN AN EXISTING ASPHALT STREET MUST BE CUT, THE STREET MUST BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN ITS ORIGINAL CONDITION. THE EXISTING STREET CONDITION SHALL BE DOCUMENTED BY THE LOCAL ENTITY CONSTRUCTION INSPECTOR BEFORE ANY CUTS ARE MADE. PATCHING SHALL BE DONE IN ACCORDANCE WITH THE LOCAL ENTITY STREET REPAIR STANDARDS. THE FINISHED PATCH SHALL BLEND IN SMOOTHLY INTO THE EXISTING SURFACE. ALL LARGE PATCHES SHALL BE PAVED WITH AN ASPHALT LAY–DOWN MACHINE. IN STREETS WHERE MORE THAN ONE CUT IS MADE, AN OVERLAY OF THE ENTIRE STREET WIDTH, INCLUDING THE PATCHED AREA, MAY BE REQUIRED. THE DETERMINATION OF NEED FOR A COMPLETE OVERLAY SHALL BE MADE BY THE LOCAL ENTITY ENGINEER AND/OR THE LOCAL ENTITY INSPECTOR AT THE TIME THE CUTS ARE MADE.
44. UPON COMPLETION OF CONSTRUCTION, THE SITE SHALL BE CLEANED AND RESTORED TO A CONDITION EQUAL TO, OR BETTER THAN, THAT WHICH EXISTED BEFORE CONSTRUCTION, OR TO THE GRADES AND CONDITION AS REQUIRED BY THESE PLANS.
45. STANDARD HANDICAP RAMPS ARE TO BE CONSTRUCTED AT ALL CURB RETURNS AND AT ALL "T"INTERSECTIONS.
46. AFTER ACCEPTANCE BY THE LOCAL ENTITY, PUBLIC IMPROVEMENTS DEPICTED IN THESE PLANS SHALL BE GUARANTEED TO BE FREE FROM MATERIAL AND WORKMANSHIP DEFECTS FOR A MINIMUM PERIOD OF TWO YEARS FROM THE DATE OF ACCEPTANCE. LARIMER COUNTY URBAN AREA STREET STANDARDS -REPEALED AND REENACTED APRIL 1, 2007 ADOPTED BY LARIMER COUNTY, CITY OF LOVELAND, CITY OF FORT COLLINS PAGE E–1–FC/LAR–5
47. THE LOCAL ENTITY SHALL NOT BE RESPONSIBLE FOR THE MAINTENANCE OF ROADWAY AND APPURTENANT IMPROVEMENTS, INCLUDING STORM DRAINAGE STRUCTURES AND PIPES, FOR THE PRIVATE STREETS.

48. NO VARIANCES ASSOCIATED WITH PROJECT.
49. A FEMA ELEVATION CERTIFICATE WILL BE REQUIRED BEFORE A CERTIFICATE OF OCCUPANCY IS ISSUED FOR EACH BUILDING WITHIN THE FLOODPLAIN.
50. FLOODPLAIN USE PERMITS APPLICATIONS WILL BE SUBMITTED WHEN THE BUILDING PERMITS ARE APPLIED FOR.
51. STORAGE OF EQUIPMENT AND MATERIALS IS NOT ALLOWED IN THE FLOODWAY.
52. A NO–RISE CERTIFICATE WILL BE REQUIRED PRIOR TO BEGINNING ANY WORK WITH IN THE FLOODWAY

.

LIGHTING NOTES

1. ALL STREET LIGHT FIXTURES TO BE: "OLDE ENGLISH FIXTURE" WITH TYPE 3 DISTRIBUTION, 70W, 0.2FT CANDLES

2. SITE LIGHT SOURCES SHALL BE FULLY SHIELDED AND DOWN–DIRECTIONAL TO MINIMIZE UP–LIGHT, LIGHT SPILLAGE AND GLARE.

CONSTRUCTION NOTES:

A. STANDARD GRADING AND EROSION AND SEDIMENT CONTROL CONSTRUCTION PLAN NOTES

1. THE EROSION CONTROL INSPECTOR MUST BE NOTIFIED AT LEAST TWENTY–FOUR (24) HOURS PRIOR TO ANY CONSTRUCTION ON THIS SITE.
2. THERE SHALL BE NO EARTH–DISTURBING ACTIVITY OUTSIDE THE LIMITS DESIGNATED ON THE ACCEPTED PLANS.
3. ALL REQUIRED PERIMETER SILT AND CONSTRUCTION FENCING SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY (STOCKPILING, STRIPPING, GRADING, ETC). ALL OTHER REQUIRED EROSION CONTROL MEASURES SHALL BE INSTALLED AT THE APPROPRIATE TIME IN THE CONSTRUCTION SEQUENCE AS INDICATED IN THE APPROVED PROJECT SCHEDULE, CONSTRUCTION PLANS, AND EROSION CONTROL REPORT.
4. AT ALL TIMES DURING CONSTRUCTION, THE DEVELOPER SHALL BE RESPONSIBLE FOR PREVENTING AND CONTROLLING ON–SITE EROSION INCLUDING KEEPING THE PROPERTY SUFFICIENTLY WATERED SO AS TO MINIMIZE WIND BLOWN SEDIMENT. THE DEVELOPER SHALL ALSO BE RESPONSIBLE FOR INSTALLING AND MAINTAINING ALL EROSION CONTROL FACILITIES SHOWN HEREIN.
5. PRE–DISTURBANCE VEGETATION SHALL BE PROTECTED AND RETAINED WHEREVER POSSIBLE. REMOVAL OR DISTURBANCE OF EXISTING VEGETATION SHALL BE LIMITED TO THE AREA(S) REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATIONS, AND FOR THE SHORTEST PRACTICAL PERIOD OF TIME.
6. ALL SOILS EXPOSED DURING LAND DISTURBING ACTIVITY (STRIPPING, GRADING, UTILITY INSTALLATIONS, STOCKPILING, FILLING, ETC.) SHALL BE KEPT IN A ROUGHENED CONDITION BY RIPPING OR DISKING ALONG LAND CONTOURS UNTIL MULCH, VEGETATION, OR OTHER PERMANENT EROSION CONTROL BMPS ARE INSTALLED. NO SOILS IN AREAS OUTSIDE PROJECT STREET RIGHTS–OF–WAY SHALL REMAIN EXPOSED BY LAND DISTURBING ACTIVITY FOR MORE THAN THIRTY (30) DAYS BEFORE REQUIRED TEMPORARY OR PERMANENT EROSION CONTROL (E.G. SEED/MULCH, LANDSCAPING, ETC.) IS INSTALLED, UNLESS OTHERWISE APPROVED BY THE LOCAL ENTITY.
7. IN ORDER TO MINIMIZE EROSION POTENTIAL, ALL TEMPORARY (STRUCTURAL) EROSION CONTROL MEASURES SHALL:
    a. BE INSPECTED AT A MINIMUM OF ONCE EVERY TWO (2) WEEKS AND AFTER EACH SIGNIFICANT STORM EVENT AND REPAIRED OR RECONSTRUCTED AS NECESSARY IN ORDER TO ENSURE THE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
    b. REMAIN IN PLACE UNTIL SUCH TIME AS ALL THE SURROUNDING DISTURBED AREAS ARE SUFFICIENTLY STABILIZED AS DETERMINED BY THE EROSION CONTROL INSPECTOR.
    c. BE REMOVED AFTER THE SITE HAS BEEN SUFFICIENTLY STABILIZED AS DETERMINED BY THE EROSION CONTROL INSPECTOR.
8. WHEN TEMPORARY EROSION CONTROL MEASURES ARE REMOVED, THE DEVELOPER SHALL BE RESPONSIBLE FOR THE CLEAN UP AND REMOVAL OF ALL SEDIMENT AND DEBRIS FROM ALL DRAINAGE INFRASTRUCTURE AND OTHER PUBLIC FACILITIES.
9. THE CONTRACTOR SHALL CLEAN UP ANY INADVERTENT DEPOSITED MATERIAL IMMEDIATELY AND MAKE SURE STREETS ARE FREE OF ALL MATERIALS BY THE END OF EACH WORKING DAY.
10. ALL RETAINED SEDIMENTS, PARTICULARLY THOSE ON PAVED ROADWAY SURFACES, SHALL BE REMOVED AND DISPOSED OF IN A MANNER AND LOCATION SO AS NOT TO CAUSE THEIR RELEASE INTO ANY WATERS OF THE UNITED STATES.
11. NO SOIL STOCKPILE SHALL EXCEED TEN (10) FEET IN HEIGHT. ALL SOIL STOCKPILES SHALL BE PROTECTED FROM SEDIMENT TRANSPORT BY SURFACE ROUGHENING, WATERING, AND PERIMETER SILT FENCING. ANY SOIL STOCKPILE REMAINING AFTER THIRTY (30) DAYS SHALL BE SEEDED AND MULCHED.
12. THE STORMWATER VOLUME CAPACITY OF DETENTION PONDS WILL BE RESTORED AND STORM SEWER LINES WILL BE CLEANED UPON COMPLETION OF THE PROJECT AND BEFORE TURNING THE MAINTENANCE OVER TO THE LOCAL ENTITY OR HOMEOWNERS ASSOCIATION (HOA).
13. CITY ORDINANCE AND COLORADO DISCHARGE PERMIT SYSTEM (CDPS) REQUIREMENTS MAKE IT UNLAWFUL TO DISCHARGE OR ALLOW THE DISCHARGE OF ANY POLLUTANT OR CONTAMINATED WATER FROM CONSTRUCTION SITES. POLLUTANTS INCLUDE, BUT ARE NOT LIMITED TO DISCARDED BUILDING MATERIALS, CONCRETE TRUCK WASHOUT, CHEMICALS, OIL AND GAS PRODUCTS, LITTER, AND SANITARY WASTE. THE DEVELOPER SHALL AT ALL TIMES TAKE WHATEVER MEASURES ARE NECESSARY TO ASSURE THE PROPER CONTAINMENT AND DISPOSAL OF POLLUTANTS ON THE SITE IN ACCORDANCE WITH ANY AND ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.
14. A DESIGNATED AREA SHALL BE PROVIDED ON SITE FOR CONCRETE TRUCK CHUTE WASHOUT. THE AREA SHALL BE CONSTRUCTED SO AS TO CONTAIN WASHOUT MATERIAL AND LOCATED AT LEAST FIFTY (50) FEET AWAY FROM ANY WATERWAY DURING CONSTRUCTION. UPON COMPLETION OF CONSTRUCTION ACTIVITIES THE CONCRETE WASHOUT MATERIAL WILL BE REMOVED AND PROPERLY DISPOSED OF PRIOR TO THE AREA BEING RESTORED.
15. TO ENSURE THAT SEDIMENT DOES NOT MOVE OFF OF INDIVIDUAL LOTS ONE OR MORE OF THE FOLLOWING SEDIMENT/EROSION CONTROL BMPS SHALL BE INSTALLED AND MAINTAINED UNTIL THE LOTS ARE SUFFICIENTLY STABILIZED.
    a. BELOW ALL GUTTER DOWNSPOUTS.
    b. OUT TO DRAINAGE SWALES.
    c. ALONG LOT PERIMETER.
    d. OTHER LOCATIONS, IF NEEDED.
16. CONDITIONS IN THE FIELD MAY WARRANT EROSION CONTROL MEASURES IN ADDITION TO WHAT IS SHOWN ON THESE PLANS. THE DEVELOPER SHALL IMPLEMENT WHATEVER MEASURES ARE DETERMINED NECESSARY, AS DIRECTED BY THE COUNTY.
17. A VEHICLE TRACKING CONTROL PAD SHALL BE INSTALLED WHEN NEEDED FOR CONSTRUCTION EQUIPMENT, INCLUDING BUT NOT LIMITED TO PERSONAL VEHICLES EXITING EXISTING ROADWAYS. NO EARTHEN MATERIALS, I.E. STONE, DIRT, ETC. SHALL BE PLACED IN THE CURB & GUTTER OR ROADWAY AS A RAMP TO ACCESS TEMPORARY STOCKPILES, STAGING AREAS, CONSTRUCTION MATERIALS, CONCRETE WASHOUT AREAS, AND/OR BUILDING SITES.

B. STREET IMPROVEMENTS NOTES

1. ALL STREET CONSTRUCTION IS SUBJECT TO THE GENERAL NOTES ON THE COVER SHEET OF THESE PLANS AS WELL AS THE STREET IMPROVEMENTS NOTES LISTED HERE.
2. A PAVING SECTION DESIGN, SIGNED AND STAMPED BY A COLORADO LICENSED ENGINEER, MUST BE SUBMITTED TO THE LOCAL ENTITY ENGINEER FOR APPROVAL, PRIOR TO ANY STREET CONSTRUCTION ACTIVITY, (FULL DEPTH ASPHALT SECTIONS ARE NOT PERMITTED AT A DEPTH GREATER THAN 8 INCHES OF ASPHALT). THE JOB MIX SHALL BE SUBMITTED FOR APPROVAL PRIOR TO PLACEMENT OF ANY ASPHALT.
3. WHERE PROPOSED PAVING ADJOINS EXISTING ASPHALT, THE EXISTING ASPHALT SHALL BE SAW CUT, A MINIMUM DISTANCE OF 12 INCHES FROM THE EXISTING EDGE, TO CREATE A CLEAN CONSTRUCTION JOINT. THE DEVELOPER SHALL BE REQUIRED TO REMOVE EXISTING PAVEMENT TO A DISTANCE WHERE A CLEAN CONSTRUCTION JOINT CAN BE MADE. WHEEL CUTS SHALL NOT BE ALLOWED UNLESS APPROVED BY THE LOCAL ENTITY ENGINEER IN LOVELAND.
4. STREET SUBGRADES SHALL BE SCARIFIED THE TOP 12 INCHES AND RE–COMPACTED PRIOR TO SUBBASE INSTALLATION. NO BASE MATERIAL SHALL BE LAID UNTIL THE SUBGRADE HAS BEEN INSPECTED AND APPROVED BY THE LOCAL ENTITY ENGINEER.
5. FT. COLLINS ONLY. VALVE BOXES AND MANHOLES ARE TO BE BROUGHT UP TO GRADE AT THE TIME OF PAVEMENT PLACEMENT OR OVERLAY. VALVE BOX ADJUSTING RINGS ARE NOT ALLOWED.
6. WHEN AN EXISTING ASPHALT STREET MUST BE CUT, THE STREET MUST BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN ITS ORIGINAL CONDITION. THE EXISTING STREET CONDITION SHALL BE DOCUMENTED BY THE INSPECTOR BEFORE ANY CUTS ARE MADE. CUTTING AND PATCHING SHALL BE DONE IN CONFORMANCE WITH CHAPTER 25, RECONSTRUCTION AND REPAIR. THE FINISHED PATCH SHALL BLEND SMOOTHLY INTO THE EXISTING SURFACE. THE DETERMINATION OF NEED FOR A COMPLETE OVERLAY SHALL BE MADE BY THE LOCAL ENTITY ENGINEER. ALL OVERLAY WORK SHALL BE COORDINATED WITH ADJACENT LANDOWNERS SUCH THAT FUTURE PROJECTS DO NOT CUT THE NEW ASPHALT OVERLAY WORK.
7. ALL TRAFFIC CONTROL DEVICES SHALL BE IN CONFORMANCE WITH THESE PLANS OR AS OTHERWISE SPECIFIED IN M.U.T.C.D. (INCLUDING COLORADO SUPPLEMENT) AND AS PER THE RIGHT–OF–WAY WORK PERMIT TRAFFIC CONTROL PLAN.
8. N/A.
9. PRIOR TO PLACEMENT OF H.B.P. OR CONCRETE WITHIN THE STREET AND AFTER MOISTURE/DENSITY TESTS HAVE BEEN TAKEN ON THE SUBGRADE MATERIAL (WHEN A FULL DEPTH SECTION IS PROPOSED) OR ON THE SUBGRADE AND BASE MATERIAL (WHEN A COMPOSITE SECTION IS PROPOSED), A MECHANICAL "PROOF ROLL" WILL BE REQUIRED. THE ENTIRE SUBGRADE AND/OR BASE MATERIAL SHALL BE ROLLED WITH A HEAVILY LOADED VEHICLE HAVING A TOTAL GVW OF NOT LESS THAN 50,000 LBS. AND A SINGLE AXLE WEIGHT OF AT LEAST 18,000 LBS. WITH PNEUMATIC TIRES INFLATED TO NOT LESS THAT 90 P.S.I.G. "PROOF ROLL" VEHICLES SHALL NOT TRAVEL AT SPEEDS GREATER THAN 3 M.P.H. ANY PORTION OF THE SUBGRADE OR BASE MATERIAL WHICH EXHIBITS EXCESSIVE PUMPING OR DEFORMATION, AS DETERMINED BY THE LOCAL ENTITY ENGINEER, SHALL BE REWORKED, REPLACED OR OTHERWISE MODIFIED TO FORM A SMOOTH, NON–YIELDING SURFACE. THE LOCAL ENTITY ENGINEER SHALL BE NOTIFIED AT LEAST 24 HOURS PRIOR TO THE "PROOF ROLL." ALL "PROOF ROLLS" SHALL BE PREFORMED IN THE PRESENCE OF AN INSPECTOR.

C. TRAFFIC SIGNING AND PAVEMENT MARKING CONSTRUCTION NOTES

1. ALL SIGNAGE AND MARKING IS SUBJECT TO THE GENERAL NOTES ON THE COVER SHEET OF THESE PLANS, AS WELL AS THE TRAFFIC SIGNING AND MARKING CONSTRUCTION NOTES LISTED HERE.
2. ALL SYMBOLS, INCLUDING ARROWS, ONLYS, CROSSWALKS, STOP BARS, ETC. SHALL BE PRE–FORMED THERMO–PLASTIC.
3. ALL SIGNAGE SHALL BE PER LOCAL ENTITY STANDARDS AND THESE PLANS OR AS OTHERWISE SPECIFIED IN MUTCD.
4. ALL LANE LINES FOR ASPHALT PAVEMENT SHALL RECEIVE TWO COATS OF LATEX PAINT WITH GLASS BEADS.
5. ALL LANE LINES FOR CONCRETE PAVEMENT SHOULD BE EPOXY PAINT.
6. PRIOR TO PERMANENT INSTALLATION OF TRAFFIC STRIPING AND SYMBOLS, THE DEVELOPER SHALL PLACE TEMPORARY TABS OR TAPE DEPICTING ALIGNMENT AND PLACEMENT OF THE SAME. THEIR PLACEMENT SHALL BE APPROVED BY THE LOCAL ENTITY ENGINEER PRIOR TO PERMANENT INSTALLATION OF STRIPING AND SYMBOLS.
7. PRE–FORMED THERMO–PLASTIC APPLICATIONS SHALL BE AS SPECIFIED IN THESE PLANS AND/OR THESE STANDARDS.
8. EPOXY APPLICATIONS SHALL BE APPLIED AS SPECIFIED IN CDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
9. ALL SURFACES SHALL BE THOROUGHLY CLEANED PRIOR TO INSTALLATION OF STRIPING OR MARKINGS.
10. ALL SIGN POSTS SHALL UTILIZE BREAK–AWAY ASSEMBLIES AND FASTENERS PER THE STANDARDS.
11. A FIELD INSPECTION OF LOCATION AND INSTALLATION OF ALL SIGNS SHALL BE PERFORMED BY THE LOCAL ENTITY ENGINEER. ALL DISCREPANCIES IDENTIFIED DURING THE FIELD INSPECTION MUST BE CORRECTED BEFORE THE 2–YEAR WARRANTY PERIOD WILL BEGIN.
12. THE DEVELOPER INSTALLING SIGNS SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES.
13. SPECIAL CARE SHALL BE TAKEN IN SIGN LOCATION TO ENSURE AN UNOBSTRUCTED VIEW OF EACH SIGN.
14. SIGNAGE AND STRIPING HAS BEEN DETERMINED BY INFORMATION AVAILABLE AT THE TIME OF REVIEW. PRIOR TO INITIATION OF THE WARRANTY PERIOD, THE LOCAL ENTITY ENGINEER RESERVES THE RIGHT TO REQUIRE ADDITIONAL SIGNAGE AND/OR STRIPING IF THE LOCAL ENTITY ENGINEER DETERMINES THAT AN UNFORESEEN CONDITION WARRANTS SUCH SIGNAGE ACCORDING TO THE MUTCD OR THE CDOT M AND S STANDARDS. ALL SIGNAGE AND STRIPING SHALL FALL UNDER THE REQUIREMENTS OF THE 2–YEAR WARRANTY PERIOD FOR NEW CONSTRUCTION (EXCEPT FAIR WEAR ON TRAFFIC MARKINGS).
15. SLEEVES FOR SIGN POSTS SHALL BE REQUIRED FOR USE IN ISLANDS/MEDIANS. REFER TO CHAPTER 14, TRAFFIC CONTROL DEVICES, FOR ADDITIONAL DETAIL.

D. STORM DRAINAGE NOTES

1. THE CITY OF FORT COLLINS SHALL NOT BE RESPONSIBLE FOR THE MAINTENANCE OF STORM DRAINAGE FACILITIES LOCATED ON PRIVATE PROPERTY. MAINTENANCE OF ONSITE DRAINAGE FACILITIES SHALL BE THE RESPONSIBILITY OF THE PROPERTY OWNER(S).
2. ALL RECOMMENDATIONS OF THE FINAL DRAINAGE AND EROSION CONTROL STUDY SORENSEN ENGINEERING AND CONSTRUCTION SHALL BE FOLLOWED AND IMPLEMENTED.
3. PRIOR TO FINAL INSPECTION AND ACCEPTANCE BY THE CITY OF FORT COLLINS, CERTIFICATION OF THE DRAINAGE FACILITIES, BY A REGISTERED ENGINEER, MUST BY SUBMITTED TO AND APPROVED BY THE STORMWATER UTILITY DEPARTMENT. CERTIFICATION SHALL BE SUBMITTED TO THE STORMWATER UTILITY DEPARTMENT AT LEAST TWO WEEKS PRIOR TO THE RELEASE OF A CERTIFICATE OF OCCUPANCY FOR SINGLE FAMILY UNITS. FOR COMMERCIAL PROPERTIES, CERTIFICATION SHALL BY SUBMITTED TO THE STORMWATER UTILITY DEPARTMENT AT LEAST TWO WEEKS PRIOR TO THE RELEASE OF ANY BUILDING PERMITS IN EXCESS OF THOSE ALLOWED PRIOR TO CERTIFICATION PER THE DEVELOPMENT AGREEMENT.

E. WATERLINE NOTE

1. THE MINIMUM COVER OVER WATER LINES IS 4.5 FEET AND THE MAXIMUM COVER IS 5.5 FEET UNLESS OTHERWISE NOTED IN THE PLANS AND APPROVED BY THE WATER UTILITY.

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: ________________ City Engineer ________ Date

CHECKED BY: ________________ Water & Wastewater Utility ________ Date

CHECKED BY: ________________ Stormwater Utility ________ Date

CHECKED BY: ________________ Parks & Recreation ________ Date

CHECKED BY: ________________ Traffic Engineer ________ Date

SEAL

SEC
SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
PaulS51@comcast.net

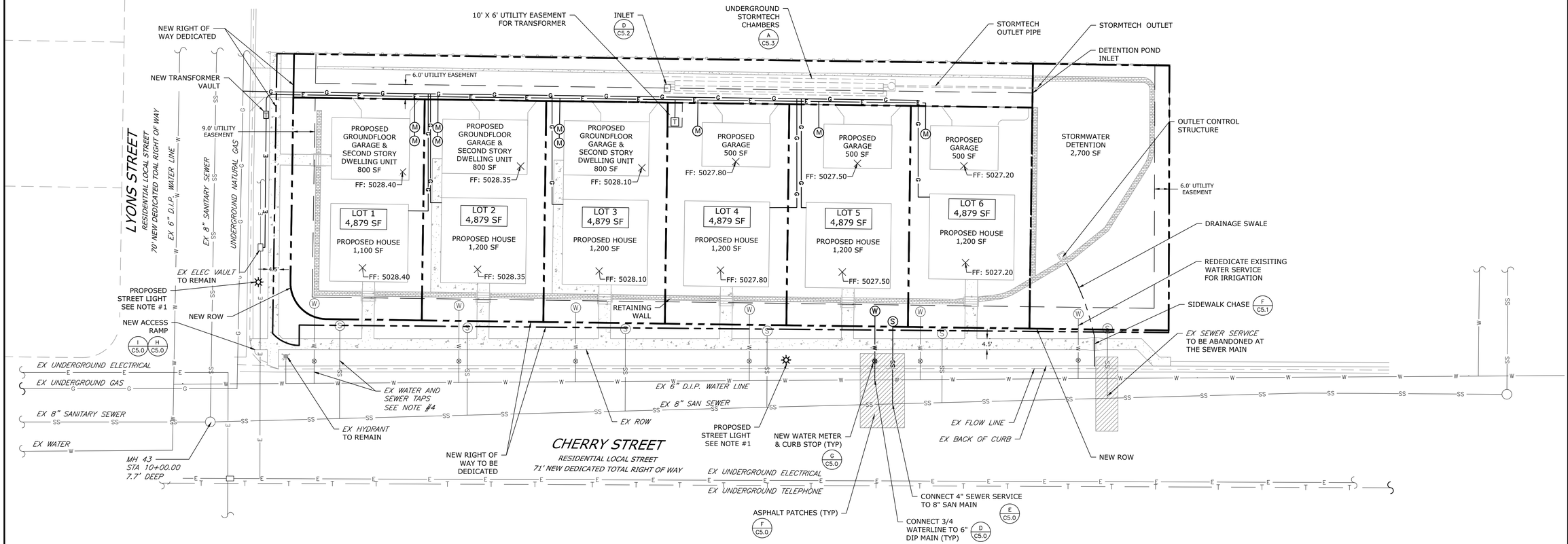
PROJECT
CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE
UTILTY NOTES

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018
SHEET NUMBER
C1.1
JOB NUMBER



LEGEND:

PROPERTY LINE	PROPOSED WATER SERVICE (WET TAPS)
EXISTING FLOW LINE	PROPOSED SANITARY SERVICE
EXISTING EASEMENT	PROPOSED TELEPHONE
EXISTING GAS LINE	PROPOSED STREET LIGHT
EXISTING WATER LINE	PROPOSED ELECTRICAL
EXISTING SEWER LINE	PROPOSED WATER METER & CURB STOP
EXISTING TELEPHONE	PROPOSED 3/4 WATER TAP
EXISTING ELECTRICAL	PROPOSED 4" SANITARY TAP
EXISTING FIRE HYDRANT	PROPOSED TRANSFORMER 9ES @ 150 AMP SERVICE
	INDIVIDUAL STAND ALONE ELECTRIC SERVICE METERS

N

SCALE GRAPHIC
0' 20 40

Know what's below. Call before you dig. 811

Lot Number	Structure	BFE	RFPE	FF	HVAC
3	Home	5024.5	5026.0	5028.1	5028.1
4	Home	5024.3	5025.8	5027.8	5027.8
5	Home	5024.2	5025.7	5027.5	5027.5
6	Home	5023.3	5024.8	5027.2	5027.2
	Garage	5023.8	5025.3	5027.2	n/a

THE TOP OF FOUNDATION ELEVATIONS SHOWN ARE THE MINIMUM ELEVATIONS REQUIRED FOR PROTECTION FROM THE 100-YEAR STORM.

NOTES

1. STREETLIGHTS SHALL BE "OLD ENGLISH FIXTURE" WITH TYPE 3 DISTRIBUTION 70W 0.2 FOOT CANDLES LOCATED NO CLOSER THAN 2' FROM ROADWAY OR SIDEWALK
2. FLOODPLAIN USE PERMIT WILL BE SUBMITTED FOR EACH STRUCTURE AND EACH SITE CONSTRUCTION ELEMENT (IE. DETENTION POND) IN THE FLOODPLAIN.
3. NEW WATER SERVICES SHALL BE WET TAPS.
4. LOTS 1, 2, 3, 4, AND 6 HAVE EXISTING SEWER AND WATER TAPS.

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date
CHECKED BY: _____ Water & Wastewater Utility _____ Date
CHECKED BY: _____ Stormwater Utility _____ Date
CHECKED BY: _____ Parks & Recreation _____ Date
CHECKED BY: _____ Traffic Engineer _____ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

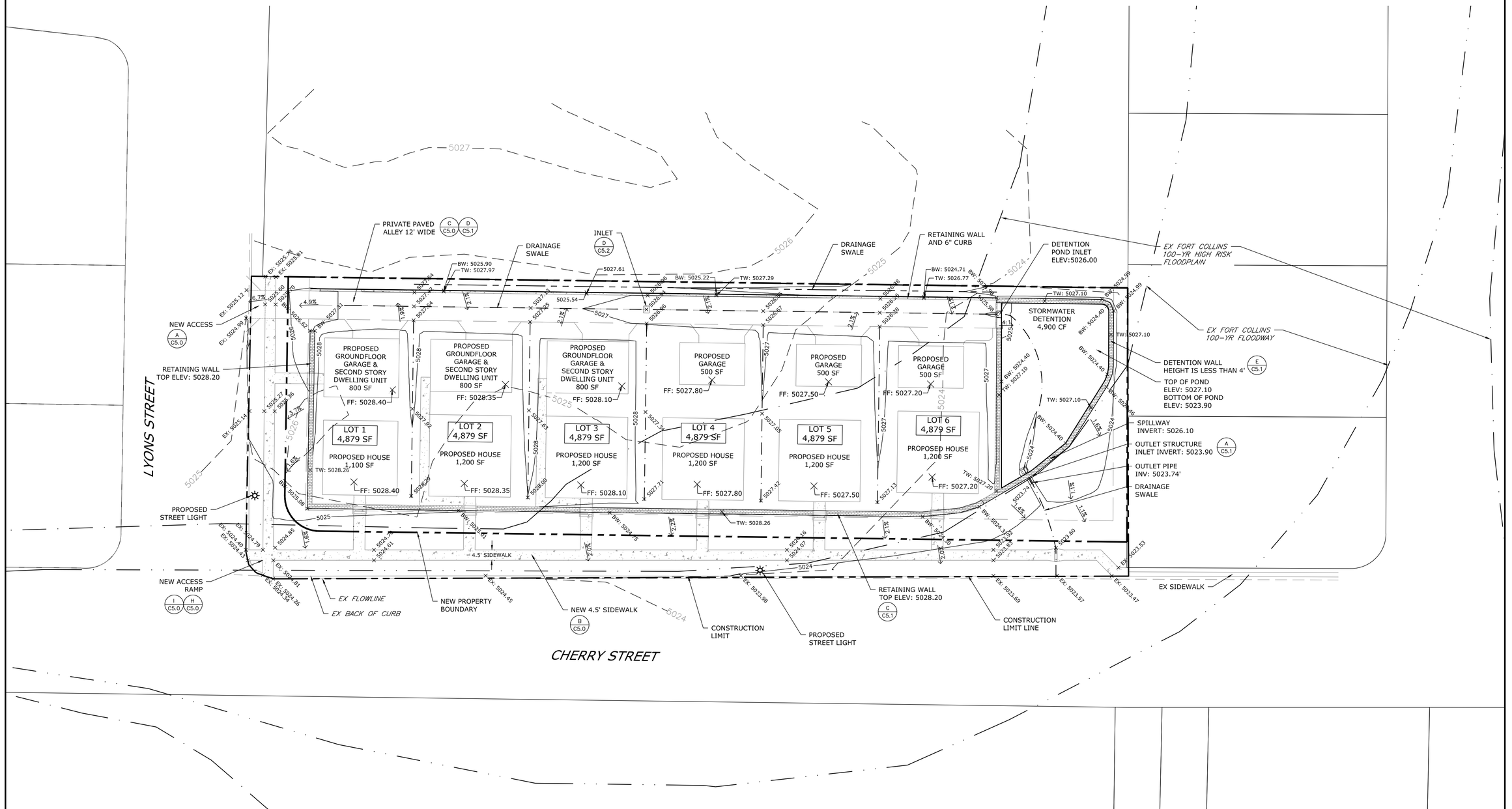
SHEET TITLE: UTILITY PLAN

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: 1"-20'
DATE: 05/24/2018

SHEET NUMBER: C2.0
JOB NUMBER



N

SCALE GRAPHIC
0' 20 40

LEGEND:
- PROPERTY LINE
- PROPOSED SWALE
- EXISTING CONTOUR

NOTES

1. FLOODPLAIN USE PERMIT WILL BE SUBMITTED FOR EACH STRUCTURE AND EACH SITE CONSTRUCTION ELEMENT (IE. DETENTION POND) IN THE FLOODPLAIN.

Lot Number	Structure	BFE	RFPE	FF	HVAC
3	Home	5024.5	5026.0	5028.1	5028.1
4	Home	5024.3	5025.8	5027.8	5027.8
5	Home	5024.2	5025.7	5027.5	5027.5
6	Home	5023.3	5024.8	5027.2	5027.2
	Garage	5023.8	5025.3	5027.2	n/a

THE TOP OF FOUNDATION ELEVATIONS SHOWN ARE THE MINIMUM ELEVATIONS REQUIRED FOR PROTECTION FROM THE 100-YEAR STORM.

Know what's below. Call before you dig. 811

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date
CHECKED BY: _____ Water & Wastewater Utility _____ Date
CHECKED BY: _____ Stormwater Utility _____ Date
CHECKED BY: _____ Parks & Recreation _____ Date
CHECKED BY: _____ Traffic Engineer _____ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

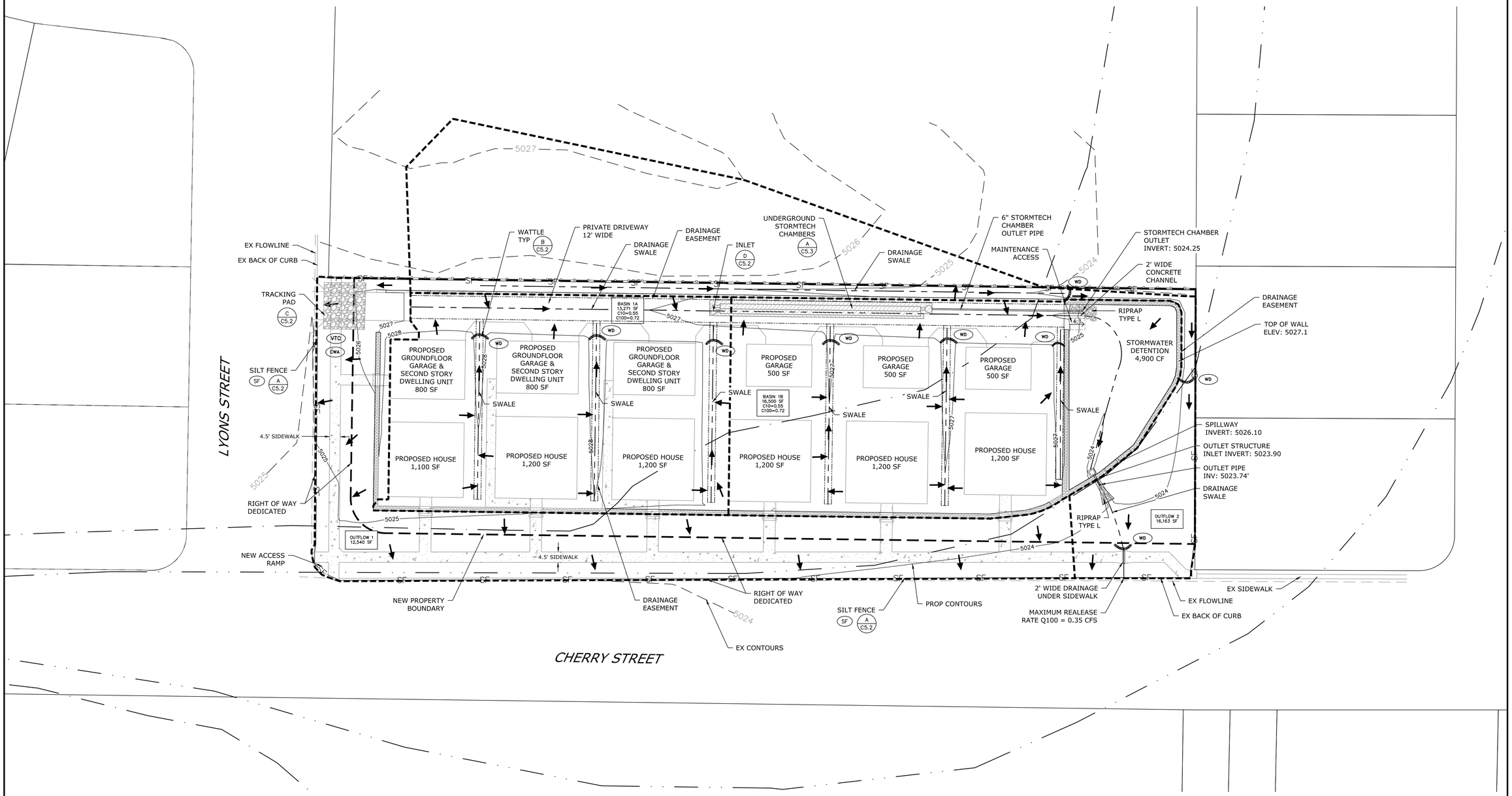
PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE: GRADING PLAN

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: 1"-20'
DATE: 05/24/2018
SHEET NUMBER: C3.0
JOB NUMBER:



N

SCALE
GRAPHIC
0' 20 40

Know what's below. Call before you dig. 811

LEGEND:

- PROPERTY LINE
- EXISTING FLOW LINE
- EXISTING EASEMENT
- 100-YR FLOODPLAIN
- 100-YR FLOODWAY
- DRAINAGE EASEMENT
- FLOW ARROW
- PROPOSED DRAINAGE BASIN
- PROPOSED SWALE
- SILT FENCE (SF)
- VEHICLE TRACKING PAD (VTC)
- CONCRETE WASHOUT AREA (CWA)
- WATTLE (WD)

NOTES

1. THE CITY STORMWATER DEPARTMENT EROSION CONTROL INSPECTOR MUST BE NOTIFIED AT LEAST 24 HOURS PRIOR TO ANY CONSTRUCTION ON THIS SITE.
2. ALL REQUIRED BMPS SHALL BE INSTALLED **PRIOR** TO ANY LAND DISTURBING ACTIVITY (STOCKPILING, STRIPPING, GRADING, ETC.). ALL OF THEIR REQUIRED EROSION CONTROL MEASURES SHALL BE INSTALLED AT THE APPROPRIATE TIME IN THE CONSTRUCTION SEQUENCE AS INDICATED IN THE APPROVED PROJECT SCHEDULE, CONSTRUCTION PLANS, AND EROSION CONTROL REPORT.
3. PRE-DISTURBANCE VEGETATION SHALL BE PROTECTED AND RETAINED WHEREVER POSSIBLE. REMOVAL OR DISTURBANCE OF EXISTING VEGETATION SHALL BE LIMITED TO THE AREA REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATIONS, AND FOR THE SHORTEST PRACTICAL PERIOD OF TIME.
4. ALL SOILS EXPOSED DURING LAND DISTURBING ACTIVITY (STRIPPING, GRADING, UTILITY INSTALLATIONS, STOCKPILING, FILLING, ETC.) SHALL BE KEPT IN A ROUGHENED CONDITION BY RIPPING OR DISKING ALONG LAND CONTOURS UNTIL MULCH, VEGETATION, OR OTHER PERMANENT EROSION CONTROL IS INSTALLED. NO SOILS IN AREAS OUTSIDE PROJECT STREET RIGHTS OF WAY SHALL REMAIN EXPOSED BY LAND DISTURBING ACTIVITY FOR MORE THAN THIRTY (30) DAYS BEFORE REQUIRED TEMPORARY OR PERMANENT EROSION CONTROL (E.G. SEED/MULCH, LANDSCAPING, ETC.) IS INSTALLED, UNLESS OTHERWISE APPROVED BY THE STORMWATER DEPARTMENT.
5. THE PROPERTY MUST BE WATERED AND MAINTAINED **AT ALL TIMES** DURING CONSTRUCTION ACTIVITIES SO AS TO PREVENT WIND-CAUSED EROSION. ALL LAND DISTURBING ACTIVITIES SHALL BE IMMEDIATELY DISCONTINUED WHEN FUGITIVE DUST IMPACTS ADJACENT PROPERTIES, AS DETERMINED BY THE CITY ENGINEERING DEPARTMENT.
6. ALL TEMPORARY (STRUCTURAL) EROSION CONTROL MEASURES MUST BE INSPECTED AND REPAIRED OR RECONSTRUCTED AS NECESSARY AFTER EACH RUNOFF EVENT AND EVERY 14 DAYS IN ORDER TO ASSURE CONTINUES PERFORMANCE OF THEIR INTENDED FUNCTION. ALL RETAINED SEDIMENTS, PARTICULARLY THOSE ON PAVED ROADWAY SURFACES, SHALL BE REMOVED AND DISPOSED OF IN A MANNER AND LOCATION SO AS NOT TO CAUSE THEIR RELEASE INTO ANY DRAINAGEWAY.
7. NO SOIL STOCKPILE SHALL EXCEED TEN (10) FEET IN HEIGHT. ALL SOIL STOCKPILES SHALL BE PROTECTED FROM SEDIMENT TRANSPORT BY SURFACE ROUGHENING, WATERING, AND PERIMETER SILT FENCING. ANY SOIL STOCKPILE REMAINING AFTER 30 DAYS SHALL BE SEEDED AND MULCHED.
8. CITY ORDINANCE PROHIBITS THE TRACKING, DROPPING, OR DEPOSITION OF SOILS OR ANY OTHER MATERIAL ONTO CITY STREETS BY OR FROM ANY VEHICLE. ANY INADVERTENT DEPOSITED MATERIAL SHALL BE CLEANED IMMEDIATELY BY THE CONTRACTOR.
9. ALL REQUIRED PERIMETER SILT FENCING SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY (STOCKPILING, STRIPPING, GRADING, ETC.)
10. "GOOD-HOUSEKEEPING" PRACTICES SHALL BE UNDERTAKEN TO PREVENT POLLUTANT DISCHARGE, INCLUDING SWEEPING AS NEEDED, PICKING UP LOOSE TRASH AND DEBRIS ON A DAILY BASIS, AND OVERALL SITE MANAGEMENT.
11. FLOODPLAIN USE PERMIT WILL BE SUBMITTED FOR EACH STRUCTURE AND EACH SITE CONSTRUCTION ELEMENT (IE. DETENTION POND) IN THE FLOODPLAIN.

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date

CHECKED BY: _____ Water & Wastewater Utility _____ Date

CHECKED BY: _____ Stormwater Utility _____ Date

CHECKED BY: _____ Parks & Recreation _____ Date

CHECKED BY: _____ Traffic Engineer _____ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

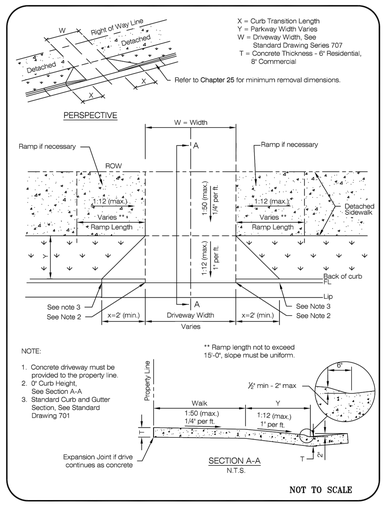
SHEET TITLE: DRAINAGE & EROSION PLAN

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: 1"=20'
DATE: 05/24/2018

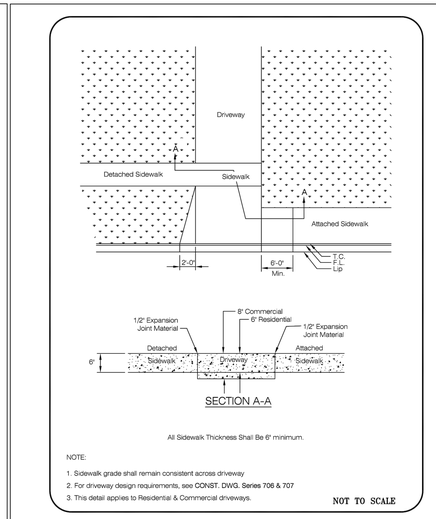
SHEET NUMBER: C4.0
JOB NUMBER



STANDARD DRIVEWAY APPROACH DETACHED WALK (Type 1)

LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 1	DRAWING
		DATE: 02/17/15	706.1

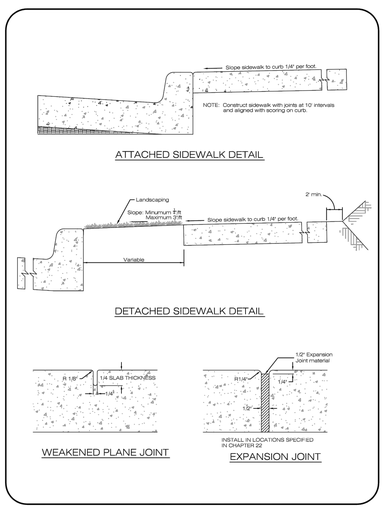
A C5.0 DRIVEWAY ACCESS



STANDARD SIDEWALK

LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 4	DRAWING
		DATE: 02/17/15	1601

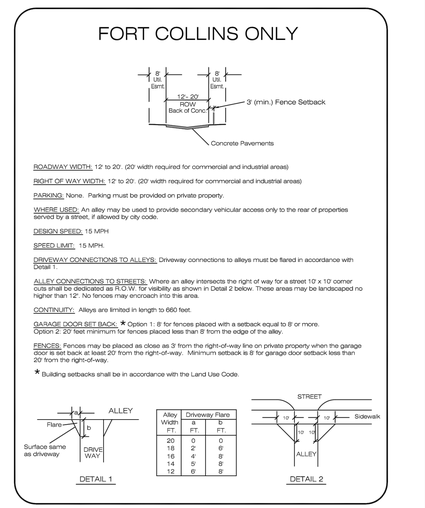
B C5.0 SIDEWALK



SIDEWALK DETAIL

LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 2	DRAWING
		DATE: 04/01/07	1602

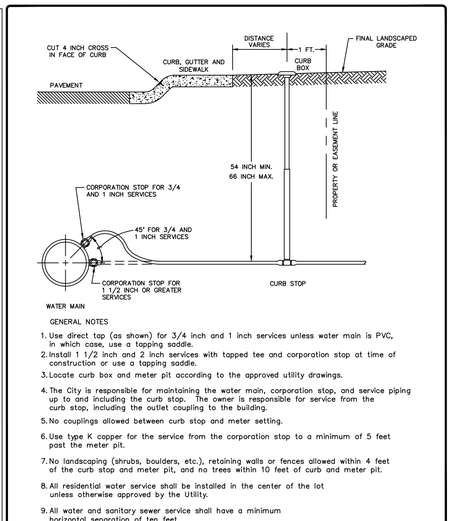
C C5.0 DRIVEWAY



ALLEY OPTION (A) (Drainage to Center)

LARIMER COUNTY URBAN AREA STREET STANDARDS	DESIGN FIGURE	REVISION NO: 1	FIGURE
		DATE: 04/01/07	7-11F

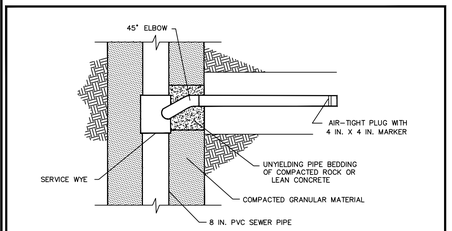
D C5.0 WATER SERVICE CONNECTION



GENERAL NOTES

1. Use direct tap (as shown) for 3/4 inch and 1 inch services unless water main is PVC, in which case, use a tapping saddle.
2. Install 1 1/2 inch and 2 inch services with tapped tee and corporation stop at time of construction or use a tapping saddle.
3. Locate curb box and meter pit according to the approved utility drawings.
4. The City is responsible for maintaining the water main, corporation stop, and service piping up to and including the curb stop. The owner is responsible for service from the curb stop, including the outlet coupling to the building.
5. No couplings allowed between curb stop and meter setting.
6. Use type K copper for the service from the corporation stop to a minimum of 5 feet past the meter pit.
7. No landscaping (shrubs, boulders, etc.), retaining walls or fences allowed within 4 feet of the curb stop and meter pit, and no trees within 10 feet of curb and meter pit.
8. All residential water service shall be installed in the center of the lot unless otherwise approved by the Utility.
9. All water and sanitary sewer service shall have a minimum horizontal separation of ten feet.

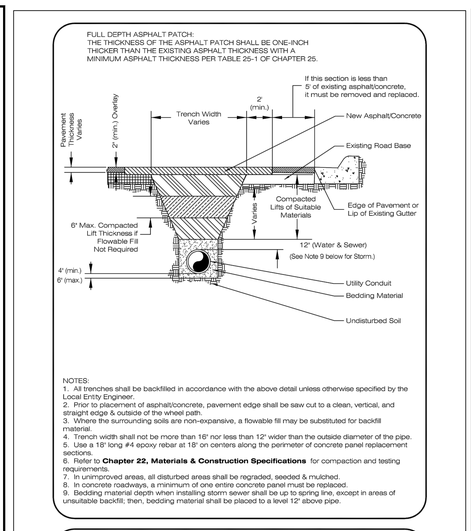
City of Fort Collins — CITY OF FORT COLLINS UTILITIES – WATER FIELD OPERATIONS P.O. BOX 580 FORT COLLINS, CO. 80550 (970) 221-6700 — TYPE OF DRAWING: TYPICAL WATER SERVICE — REVISED DATE: 4/12/11 — DETAIL 11



SERVICE WYE DETAIL

City of Fort Collins	SEWER CONSTRUCTION DETAILS	APPROVED:	DETAIL
		DATE REVISED: 4/11/11	WW-9
		DRAWN BY: NBJ	

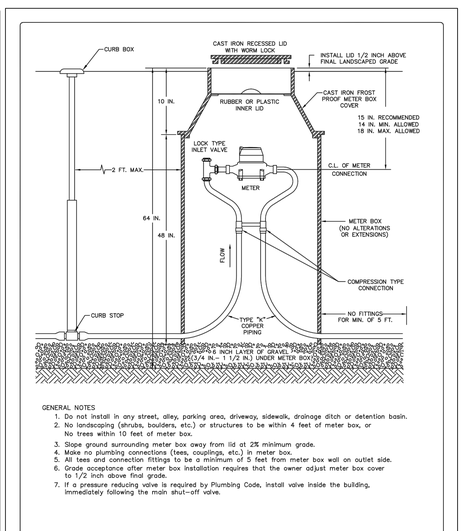
E C5.0 SANITARY SERVICE CONNECTION



TRENCH DETAIL

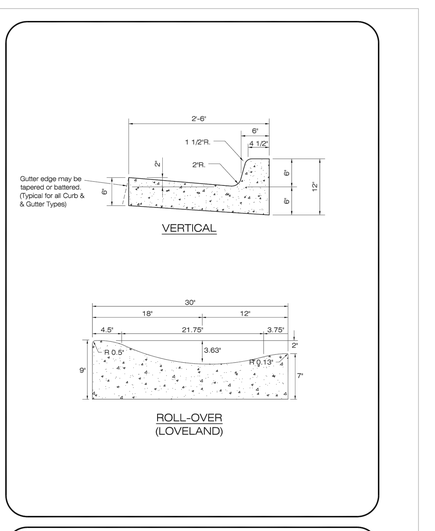
LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 1	DRAWING
		DATE: 04/01/07	2201

F C5.0 PIPE TRENCH DETAIL



City of Fort Collins — CITY OF FORT COLLINS UTILITIES – WATER FIELD OPERATIONS P.O. BOX 580, FORT COLLINS, CO. 80522 (970) 221-6700 — TYPE OF DRAWING: STANDARD EXTERIOR SETTING FOR 3/4 IN. AND 1 IN. WATER METERS — REVISED DATE: 6/22/10 — DETAIL 15

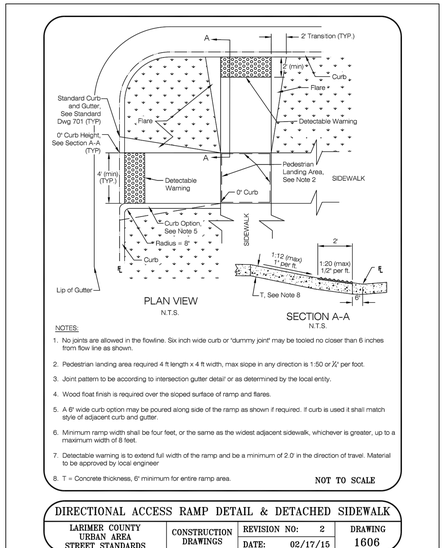
G C5.0 WATER METER



CURB AND GUTTER

LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 1	DRAWING
		DATE: 03/01/02	701

H C5.0 CURB AND GUTTER



NOTES:

1. No joints are allowed in the flowline. Six inch wide curb or 'dummy joint' may be tooled no closer than 6 inches from flow line as shown.
2. Pedestrian landing area required 4 ft length x 4 ft width, max slope in any direction is 1:50 or ¼" per foot.
3. Joint pattern to be according to intersection gutter detail or as determined by the local entity.
4. Wood float finish is required over the sloped surface of ramp and flares.
5. A 6' wide curb option may be poured along side of the ramp as shown if required. If curb is used it shall match style of adjacent curb and gutter.
6. Minimum ramp width shall be four feet, or the same as the widest adjacent sidewalk, whichever is greater, up to a maximum width of 8 feet.
7. Detectable warning is to extend full width of the ramp and be a minimum of 2.0' in the direction of travel. Material to be approved by local engineer
8. T = Concrete thickness, 6" minimum for entire ramp area.

NOT TO SCALE

DIRECTIONAL ACCESS RAMP DETAIL & DETACHED SIDEWALK

LARIMER COUNTY URBAN AREA STREET STANDARDS	CONSTRUCTION DRAWINGS	REVISION NO: 2	DRAWING
		DATE: 02/17/15	1606

I C5.0 ACCESS RAMP

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date

CHECKED BY: _____ Water & Wastewater Utility _____ Date

CHECKED BY: _____ Stormwater Utility _____ Date

CHECKED BY: _____ Parks & Recreation _____ Date

CHECKED BY: _____ Traffic Engineer _____ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

PROJECT: CHERRY STREET COTTAGES FORT COLLINS, CO

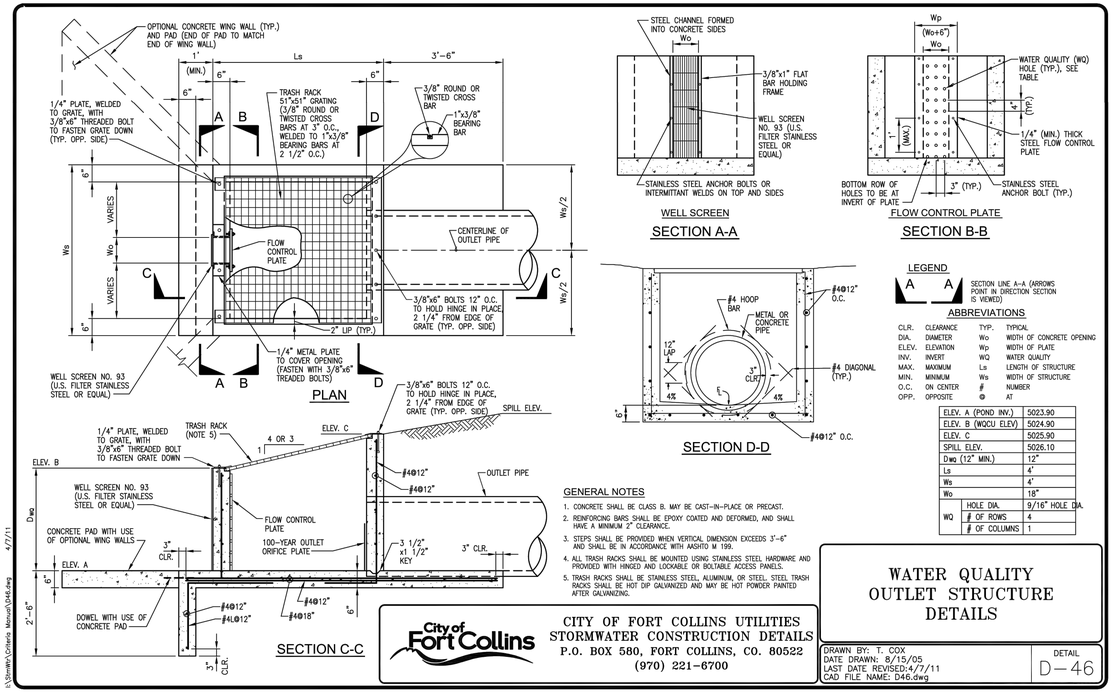
SHEET TITLE: DETAILS

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

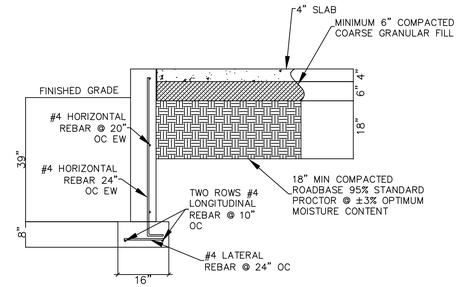
REVISIONS

DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018

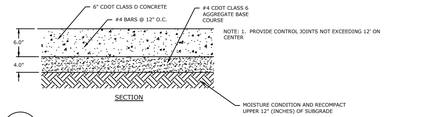
SHEET NUMBER: C5.0
JOB NUMBER



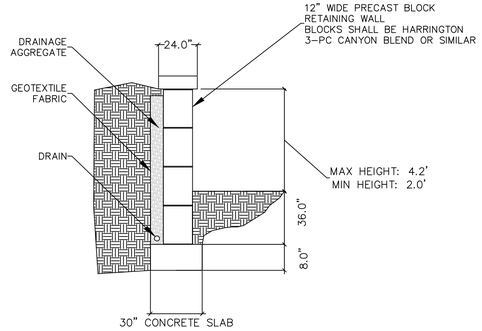
A C5.1 OUTLET STRUCTURE



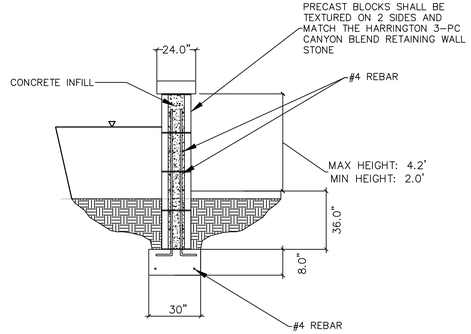
B C5.1 FOUNDATION DETAIL
N.T.S.



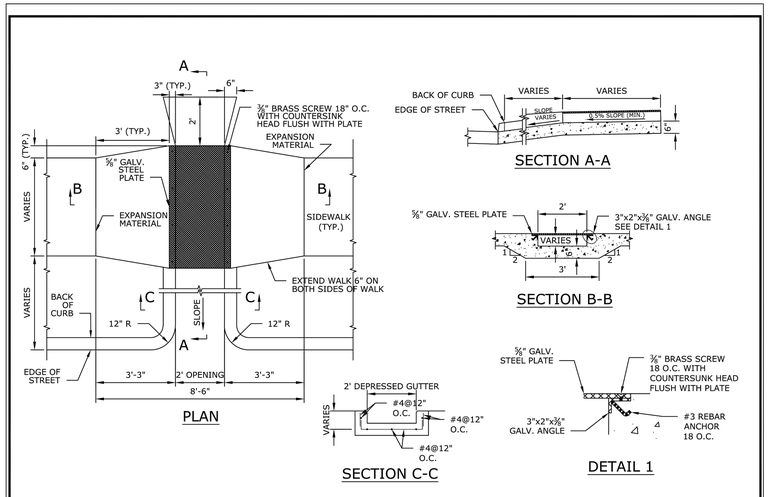
D C5.1 STANDARD CONCRETE SECTION
N.T.S.



C C5.1 RETAINING WALL DETAIL
N.T.S.



E C5.1 POND DETENTION WALL DETAIL
N.T.S.



METAL SIDEWALK CULVERT FOR VERT. CURB & GUTTER AND DETACHED SIDEWALK – OUTFALL TO CURB

City of Fort Collins
CITY OF FORT COLLINS UTILITIES
FORT COLLINS, CO.
(970) 221-6700

STORMWATER CONSTRUCTION DETAILS

APPROVED:
DATE: 7/30/2013
DRAWN BY: D. MOGEN

DETAIL D-10B

F C5.1 SIDEWALK CHASE

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date
CHECKED BY: _____ Water & Wastewater Utility _____ Date
CHECKED BY: _____ Stormwater Utility _____ Date
CHECKED BY: _____ Parks & Recreation _____ Date
CHECKED BY: _____ Traffic Engineer _____ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

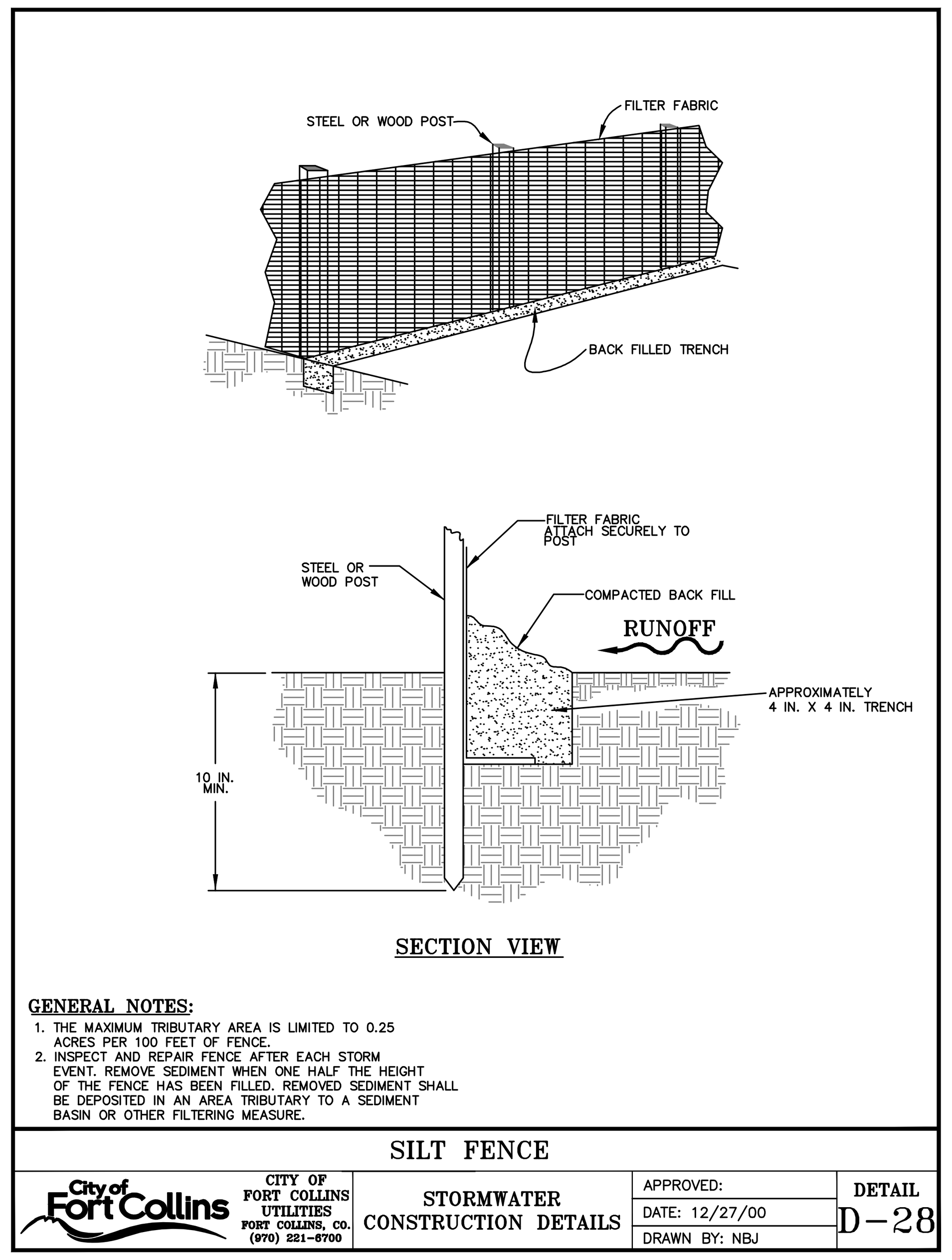
PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE: DETAILS

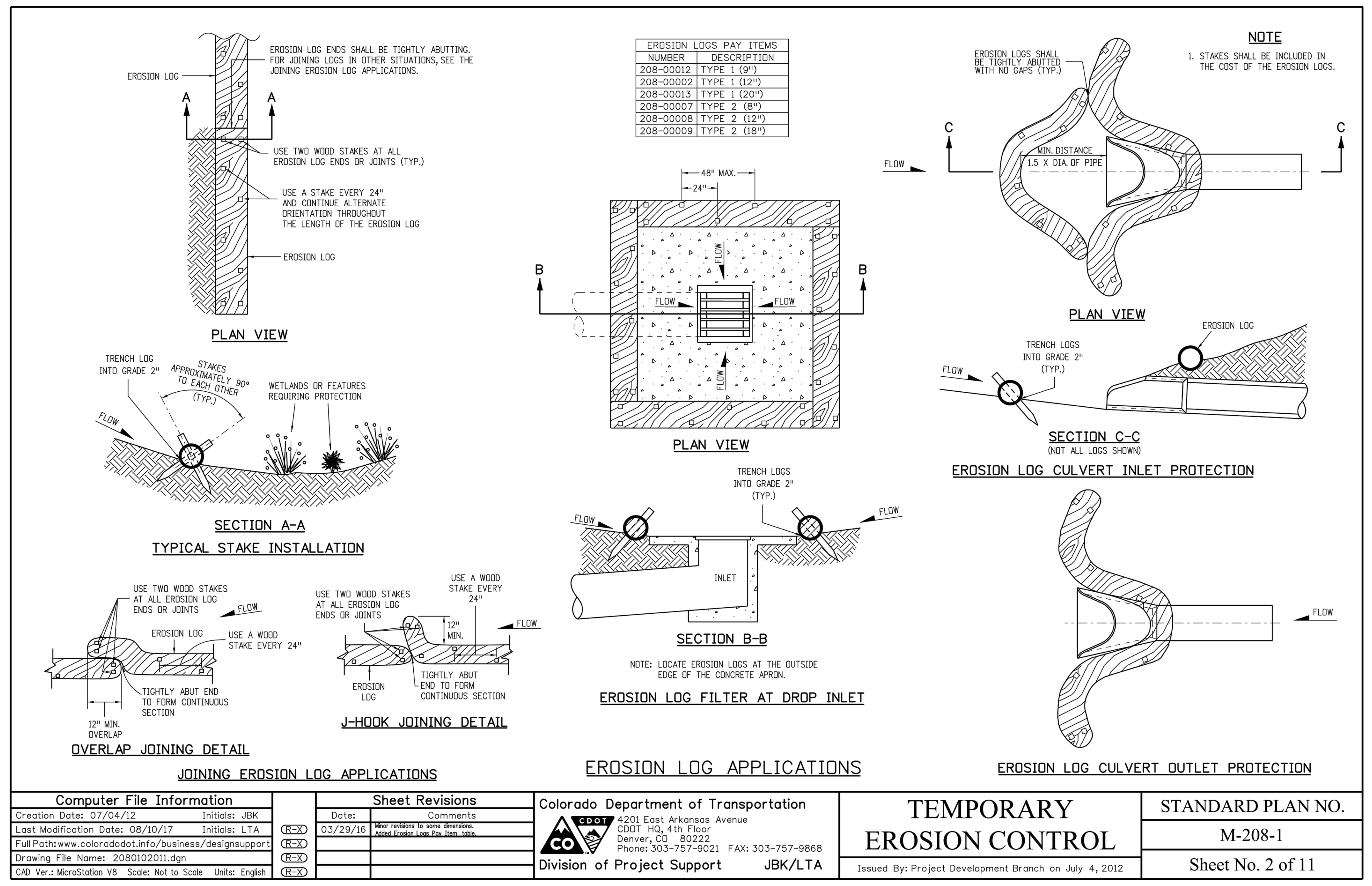
OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

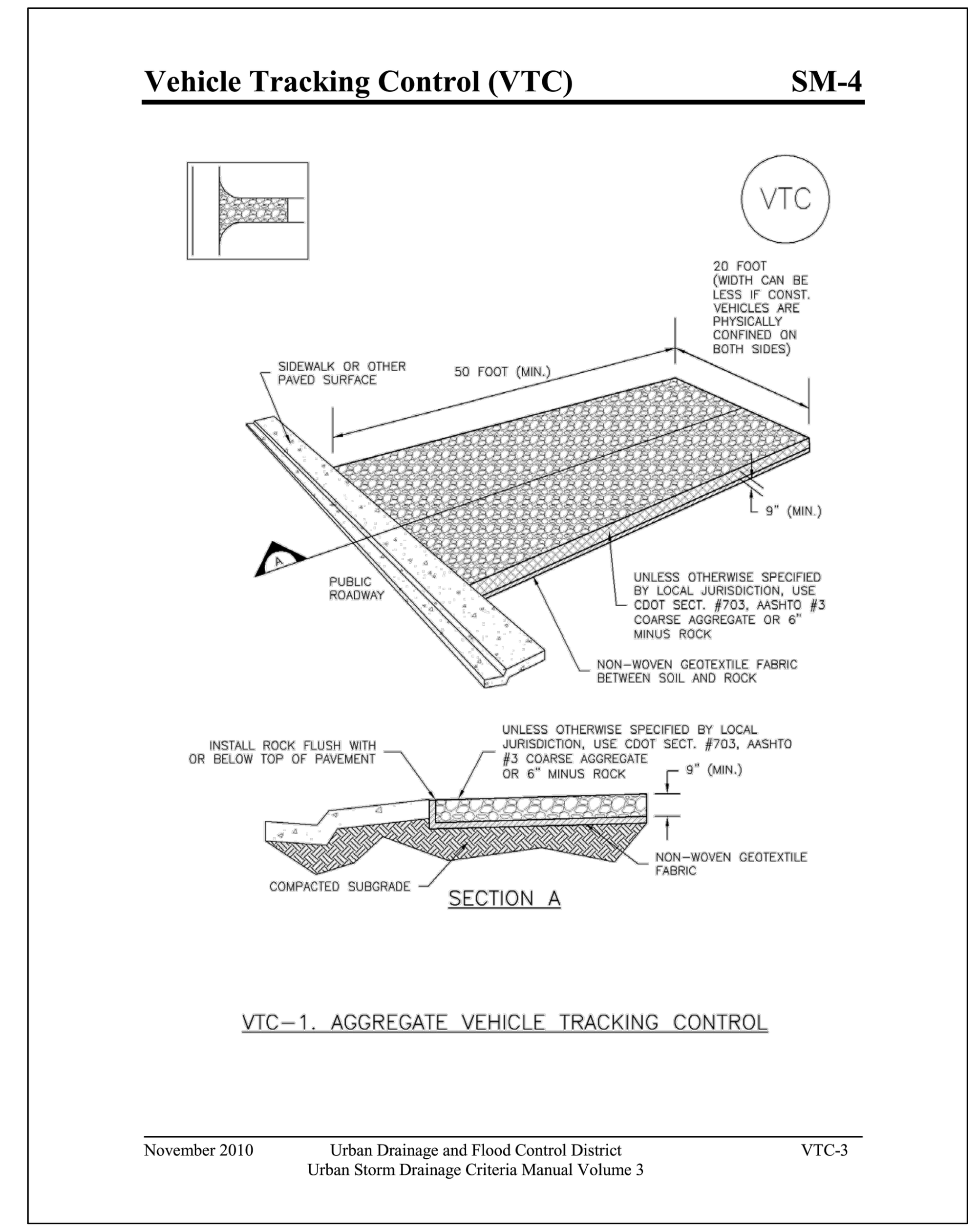
DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018
SHEET NUMBER: C5.1
JOB NUMBER


STEEL OR WOOD POST
FILTER FABRIC
BACK FILLED TRENCH
FILTER FABRIC ATTACH SECURELY TO POST
STEEL OR WOOD POST
COMPACTED BACK FILL
RUNOFF
APPROXIMATELY 4 IN. X 4 IN. TRENCH
10 IN. MIN.
SECTION VIEW
GENERAL NOTES:
1. THE MAXIMUM TRIBUTARY AREA IS LIMITED TO 0.25 ACRES PER 100 FEET OF FENCE.
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT. REMOVE SEDIMENT WHEN ONE HALF THE HEIGHT OF THE FENCE HAS BEEN FILLED. REMOVED SEDIMENT SHALL BE DEPOSITED IN AN AREA TRIBUTARY TO A SEDIMENT BASIN OR OTHER FILTERING MEASURE.
SILT FENCE
City of Fort Collins
CITY OF FORT COLLINS UTILITIES FORT COLLINS, CO. (970) 221-6700
STORMWATER CONSTRUCTION DETAILS
APPROVED:
DATE: 12/27/00
DRAWN BY: NBJ
DETAIL D-28

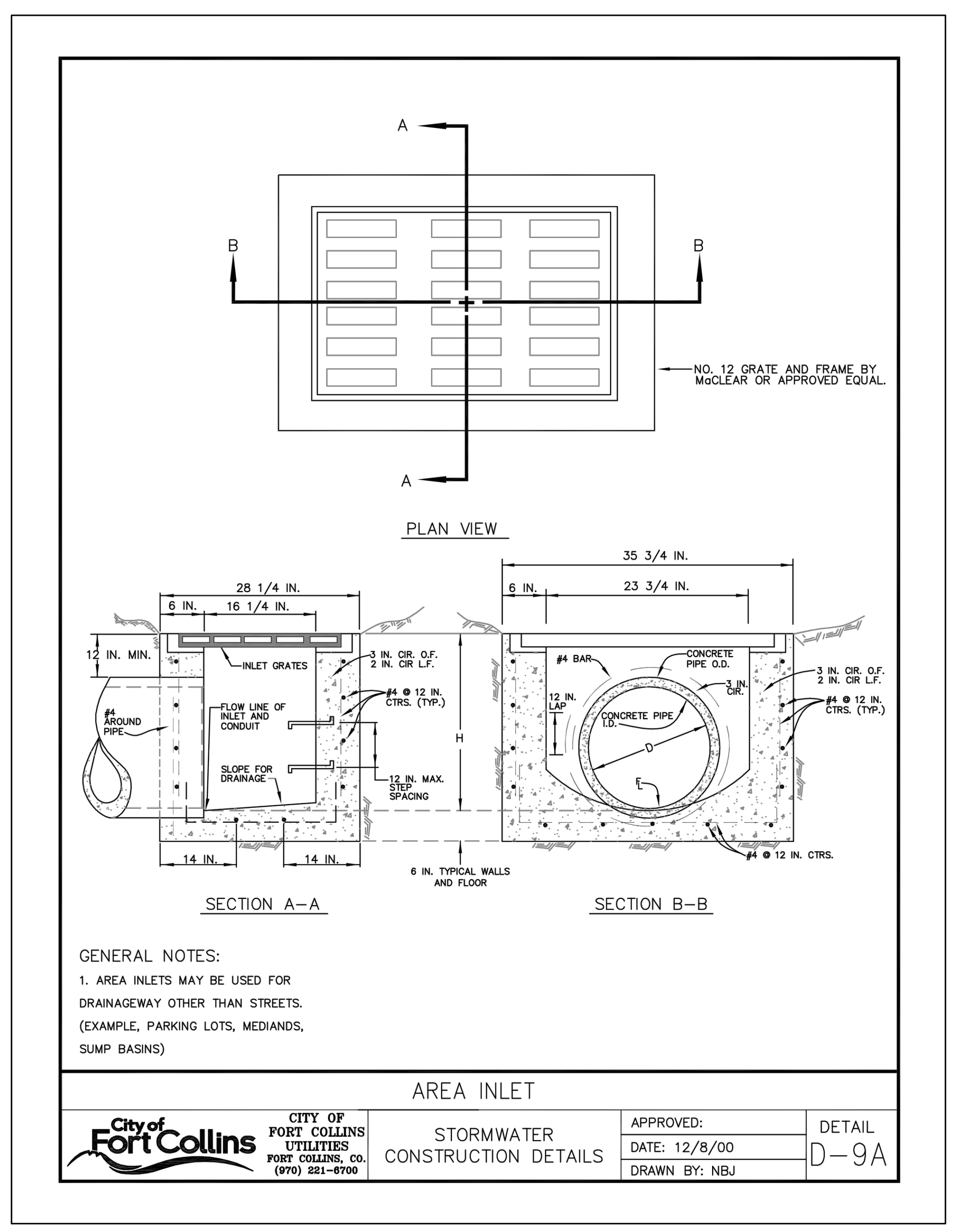
A C5.2 SILT FENCE


EROSION LOG
PLAN VIEW
SECTION A-A
TYPICAL STAKE INSTALLATION
OVERLAP JOINING DETAIL
J-HOOK JOINING DETAIL
JOINING EROSION LOG APPLICATIONS
EROSION LOG PAY ITEMS
PLAN VIEW
SECTION B-B
EROSION LOG FILTER AT DROP INLET
EROSION LOG APPLICATIONS
NOTE
1. STAKES SHALL BE INCLUDED IN THE COST OF THE EROSION LOGS.
PLAN VIEW
SECTION C-C
EROSION LOG CULVERT INLET PROTECTION
EROSION LOG CULVERT OUTLET PROTECTION
Colorado Department of Transportation
Division of Project Support
TEMPORARY EROSION CONTROL
STANDARD PLAN NO.
M-208-1
Sheet No. 2 of 11

B C5.2 WATTLE \ EROSION LOGS


Vehicle Tracking Control (VTC)
SM-4
VTC
SIDEWALK OR OTHER PAVED SURFACE
50 FOOT (MIN.)
20 FOOT (WIDTH CAN BE LESS IF CONST. VEHICLES ARE PHYSICALLY CONFINED ON BOTH SIDES)
PUBLIC ROADWAY
9" (MIN.)
UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, USE CDOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" MINUS ROCK
NON-WOVEN GEOTEXTILE FABRIC BETWEEN SOIL AND ROCK
INSTALL ROCK FLUSH WITH OR BELOW TOP OF PAVEMENT
COMPACTED SUBGRADE
SECTION A
NON-WOVEN GEOTEXTILE FABRIC
VTC-1. AGGREGATE VEHICLE TRACKING CONTROL
November 2010
Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3
VTC-3

C C5.2 TRACKING PAD


NO. 12 GRATE AND FRAME BY McCLEAR OR APPROVED EQUAL.
PLAN VIEW
SECTION A-A
SECTION B-B
GENERAL NOTES:
1. AREA INLETS MAY BE USED FOR DRAINAGEWAY OTHER THAN STREETS. (EXAMPLE, PARKING LOTS, MEDIANS, SUMP BASINS)
AREA INLET
City of Fort Collins
STORMWATER CONSTRUCTION DETAILS
APPROVED:
DATE: 12/8/00
DRAWN BY: NBJ
DETAIL D-9A

D C5.2 INLET

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: ______ City Engineer ______ Date

CHECKED BY: ______ Water & Wastewater Utility ______ Date

CHECKED BY: ______ Stormwater Utility ______ Date

CHECKED BY: ______ Parks & Recreation ______ Date

CHECKED BY: ______ Traffic Engineer ______ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
PaulS51@comcast.net

SEC

PROJECT
CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE
DETAILS

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

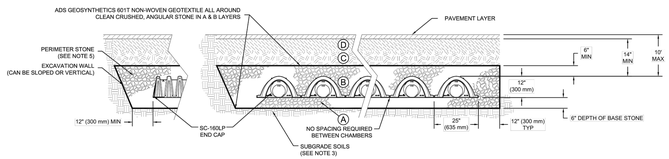
DRAWN BY: CH	SCALE: N/A
CHECKED BY: PS	DATE: 05/24/2018

SHEET NUMBER
C5.2
JOB NUMBER

ACCEPTABLE FILL MATERIALS: STORMTECH SC-160LP CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 14" (355 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145* A-1, A-2-4, A-3 OR AASHTO M43* 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43* 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43* 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. * *

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE"
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



NOTES:

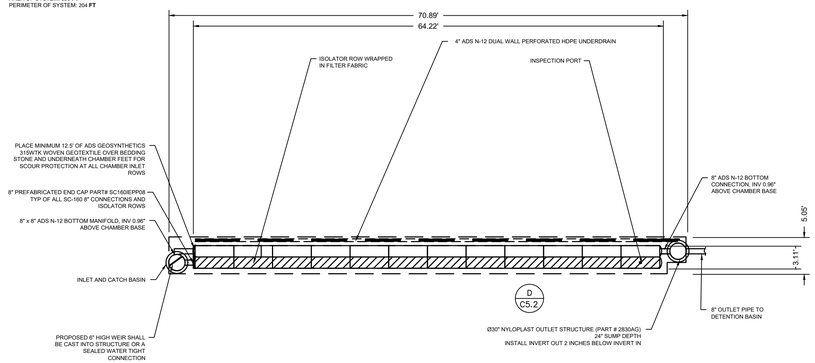
1. SC-160LP CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".*,^
2. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.*,^
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.*,^
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D'. AT THE SITE DESIGN ENGINEER'S DISCRETION.

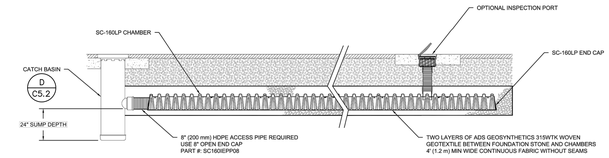
A C5.3 STORMTECH UNDERGROUND CHAMBER SYSTEM

CONCEPTUAL LAYOUT

(24) STORMTECH SC-160 CHAMBERS
(4) STORMTECH SC-160 END CAPS
INSTALLED WITH 6 " COVER STONE, 6 " BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 606 CF
AREA OF SYSTEM: 636 **FT²**
PERIMETER OF SYSTEM: 204 **FT**

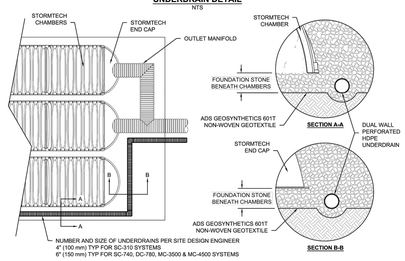
COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



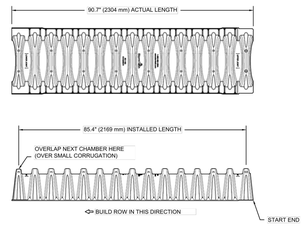


SC-160LP ISOLATOR ROW DETAIL
NTS

UNDERDRAIN DETAIL
NTS



SC-160LP TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	35.0" X 12.0" X 85.4"	(635 mm X 305 mm X 2169 mm)
CHAMBER STORAGE	6.85 CUBIC FEET	(0.19 m³)
MINIMUM INSTALLED STORAGE*	15.0 CUBIC FEET	(0.42 m³)
WEIGHT	24.0 lbs.	(10.9 kg)

*ASSUMES 6" (152 mm) ABOVE, 4" (100 mm) BELOW, AND STONE BETWEEN CHAMBERS WITH 40% STONE POROSITY.

PART #	STUB	A
SC160IEPP	6" (150 mm)	0.66" (16 mm)
	8" (200 mm)	0.80" (20 mm)
SC160IEPP08	8" (200 mm)	0.96" (24 mm)

ALL STUBS ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

NOTE: ALL DIMENSIONS ARE NOMINAL

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE^,ß). MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY^,ß) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

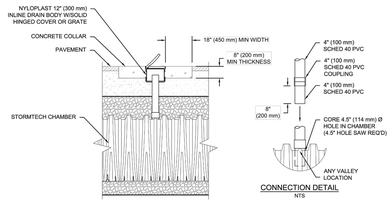
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.^,ß
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

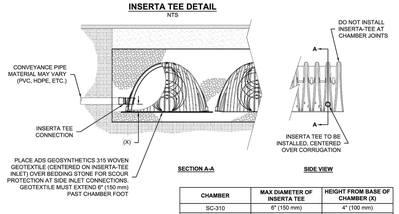


NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.

4" PVC INSPECTION PORT DETAIL
NTS

CONNECTION DETAIL
NTS

INSERTA TEE DETAIL
NTS



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

A C5.3 STORMTECH UNDERGROUND CHAMBER SYSTEM - CONTINUED

City of Fort Collins, Colorado
UTILITY PLAN APPROVAL

APPROVED: _____ City Engineer _____ Date
CHECKED BY: _____ Water & Wastewater Utility _____ Date
CHECKED BY: _____ Stormwater Utility _____ Date
CHECKED BY: _____ Parks & Recreation _____ Date
CHECKED BY: _____ Traffic Engineer _____ Date

SEAL

SORENSEN ENGINEERING & CONSTRUCTION, LLC
CIVIL / ENVIRONMENTAL ENGINEERING
1901 BEAR COURT
FORT COLLINS, CO 80525
PHONE: 970 590-1579
Paul551@comcast.net

PROJECT: CHERRY STREET COTTAGES
FORT COLLINS, CO

SHEET TITLE: DETAILS

OWNER:
EVAN GILMARTIN
2519 S. SHIELDS ST
FORT COLLINS, CO
970-308-3927

REVISIONS

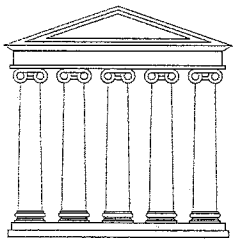
DRAWN BY: CH
CHECKED BY: PS
SCALE: N/A
DATE: 05/24/2018
SHEET NUMBER: C5.3
JOB NUMBER

Cherry Street Cottages
(previously referred to as "Pierce Subdivision")
Cherry Street and Lyons Street
Project Development Plan

Preliminary Drainage and Erosion Control Report

prepared for
Mr. Evan Gilmartin

December 5, 2016
Revised: June 5, 2017
Revised: April 20, 2018



Sorensen Engineering & Construction, LLC
Civil/Environmental Engineering

1901 Bear Court
Fort Collins, Colorado 80525
(970) 590-1579
paul@secengineering.net

IX. Preliminary Drainage and Erosion Control Report

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A. GENERAL LOCATION AND DESCRIPTION

1. Location

a. Vicinity Map

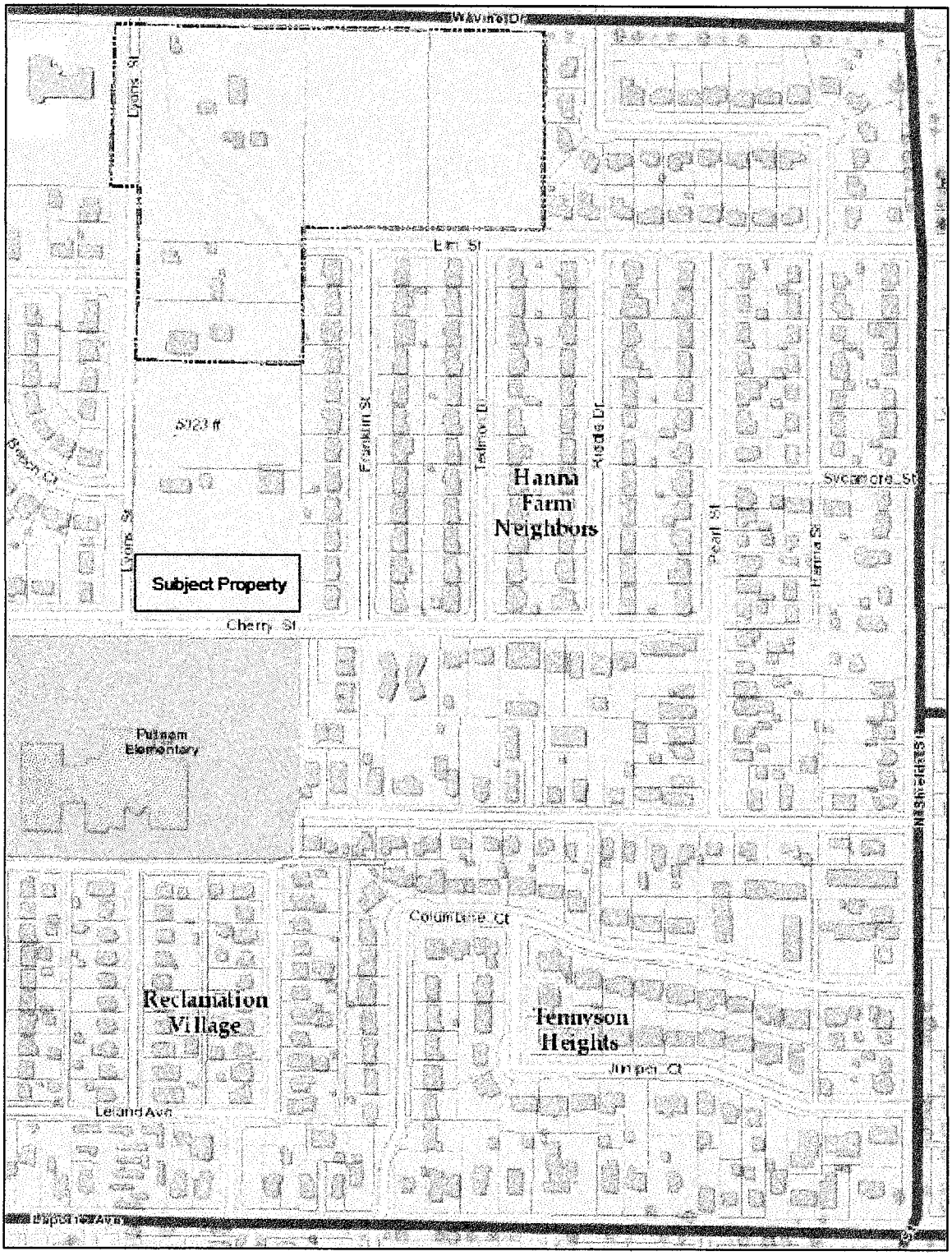


Figure 1. Vicinity Map

b. The Cherry Street Cottages project site is located in the Northeast quarter of Section 10, Township 7 North, Range 69 West of the 6th Principal Meridian, City of Fort Collins, County of Larimer, State of Colorado.

c. Cherry Street Cottages is bordered to the north by an existing residential property; to the east by single-family homes (Hanna Farm Neighborhood); to the west by Lyons Street and single family homes (Mountain View Heights); and to the south by Cherry Street and the Putnam School.

d. The General Location Map presented below identifies drainage flow entering and leaving the property, and is based on the City of Fort Collins West Vine Drainage Flood Risk Map. As shown, and discussed in detail below, a small channel of the West Vine 100-year floodway and floodplain exists along the south and east sides of the development.

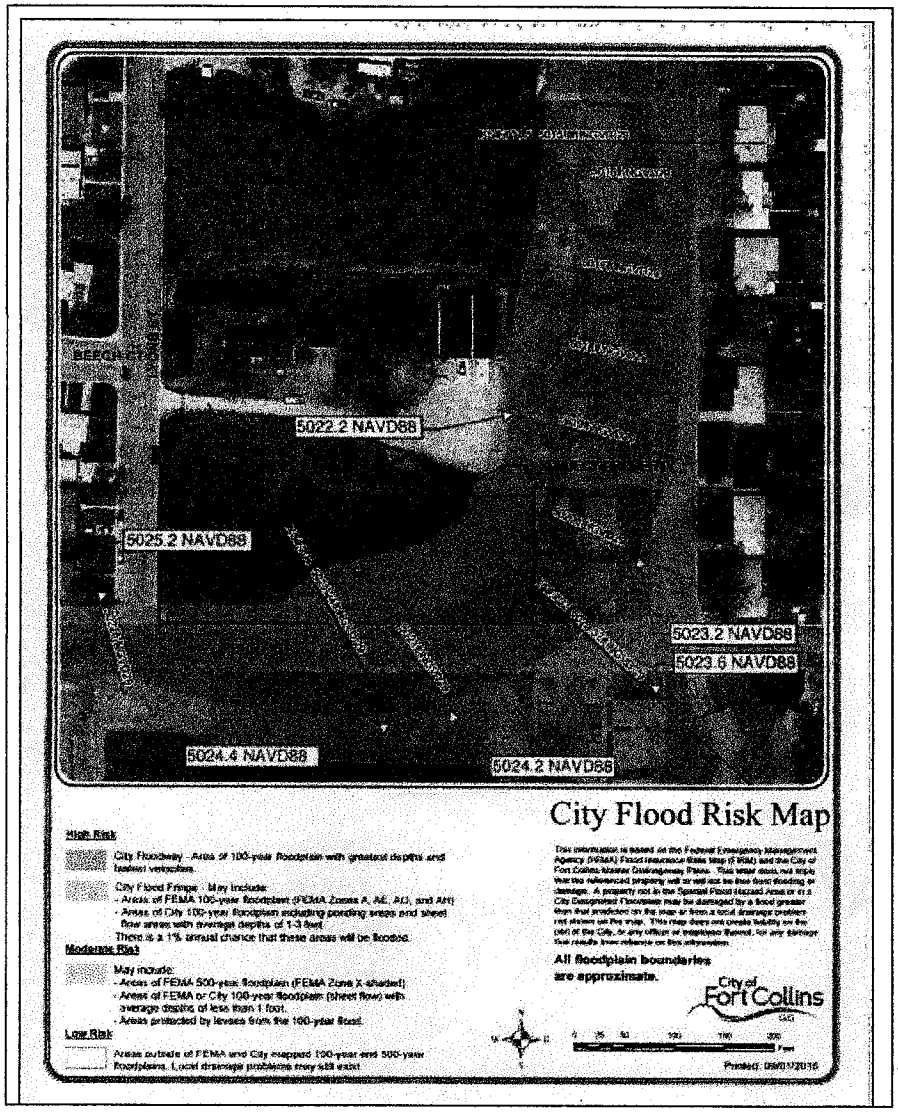


Figure 2. City Flood Risk Map

e. The Putnam School is present to the south across Cherry Street. Open property containing one single-family home is located to the north. Historic residential properties are present to the east and west, across Lyons Street.

2. Property Description

a. Area in Acres:
The Cherry Street Cottages property is comprised of approximately 1.01 acres.

b. Ground Cover:
As shown in the site aerial photograph (Figure 3), there are no existing improvements on the property, and the existing vegetation consists of native grasses. The existing on-site excess runoff drains to the south/southeast into the Cherry Street gutter, which flows to the east and then to the north along Franklin Street to the West Vine Drive Drainage, thence to the Poudre River. No "prominent features" including streams, canals, ponds, wetlands, or major utilities are present on the property.

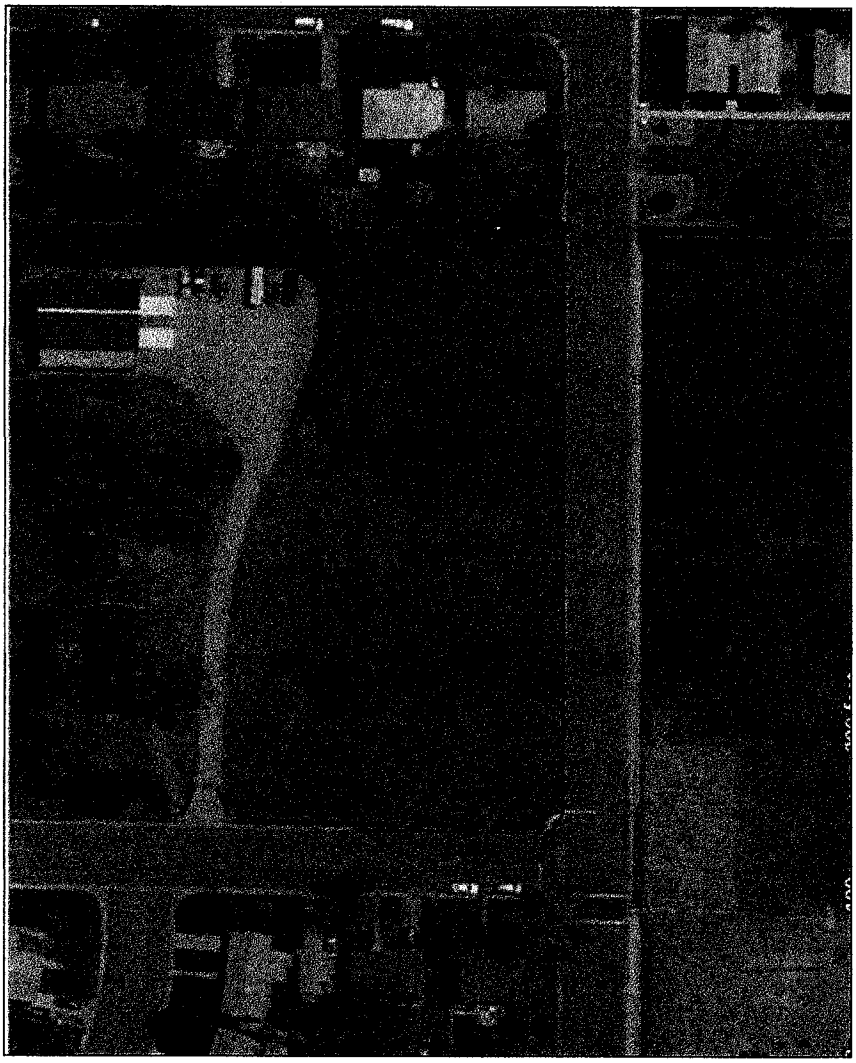


Figure 3. Property Aerial Photograph

c. Major Drainageways:
Aside from the aforementioned West Vine Basin drainage that exists along Cherry Street on the south side of the project, no other major drainageways exist in this vicinity.

d. General Project Description:
The proposed landscaping will include a retaining wall located coincident with the existing mapped floodway along the south sides of the property, curving to the north within Tract A, the eastern-most track. Tract A is dedicated for the stormwater detention pond to be situated outside of the floodway, but within the identified floodplain.

A Landscape Plan has been prepared in accordance with the PDP submittal requirements, and is submitted as a separate document from this Drainage Plan. Briefly, the Landscape Plan calls for an assortment of flowering plants and shrub beds and trees. As required by the Fort Collins Land Use Code, low-water-use plants and grasses are used as much as possible. The City Forester, Tim Buchanan, provided key input in preparing the landscape plan.

All proposed building footprints (building envelopes) and sidewalks are provided on the Cherry Street Cottages Site Plan, submitted as a separate part of this PDP application. Additionally, the Landscape Plan clearly shows all building pad sites, as well as the retaining wall, berms, planters, shrub beds, trees, etc.

The proposed Cherry Street Cottages will include nine (9) dwelling units, including primary dwelling units and secondary dwelling units on the three (3) western-most lots (Lots 1, 2, and 3), with one primary dwelling unit on the remaining three lots (Lots 4, 5, and 6). An access driveway/alley, dedicated as Tract B, will be located along the north side of the property, with rear garages for each lot. The secondary dwelling units on Lots 1,2, and 3 will consist of upstairs townhomes over the garages, and standard, single-story garages will be built in the rear portion of Lots 4, 5, and 6. Tract A will be dedicated for a stormwater detention pond, as shown in the Drainage Plan.

The 100-year floodplain and floodway boundaries as well as the base flood elevations across the property are clearly depicted on the attached Drainage Plan. The on-site detention pond and retaining wall are also shown on the Drainage Plan.

Soils encountered on the property generally consist of the Nunn–Fort Collins–Ulm association: deep, nearly level, well drained clay loams and loams that formed in alluvium. More site-specific mapping indicates a Table Mountain Loam at 0 to 1% slope. A representative profile would consist of a surface layer of grayish brown loam about 36 inches thick, with underlying material of brown fine sandy loam about 10 inches thick and yellowish brown, fine sandy loam about 5 inches thick. Below that is sand and gravel (Soil Survey of Larimer County Area Colorado, US Soil Conservation Service and Forest Service, 1980).

e. Irrigation facilities:
There are no irrigation ditches, laterals, or structures located on the property.

f. Proposed Land Use:
The proposed Cherry Street Cottages project will consist of six buildable lots, plus Tract A (eastern-most lot dedicated for the detention pond), and Tract B (northern portion of the site dedicated for the access driveway and drainage). Lots 1 through 6 (from west to east) will be accessed from a rear alley/driveway via Tract B. Each lot will consist of primary living units on the front half with garages built in the back half. Secondary living units will be built on the second floor of the garages on lots 1, 2, and 3, for a total of 9 living units on this 1-acre parcel.

Other improvements that are included with the Cherry Street Cottages project will be landscaping, as presented in the Landscape Plan, and a short retaining wall running the length of the project from Lyons Street to the detention pond in Tract A. The retaining wall will serve to elevate the lots as needed to place the bottom floor at approximately 18 inches above the Base Flood Elevation, discussed below.

The proposed Cherry Street Cottages project is located in Low Density Mixed-Use Neighborhood (LMN) zoning, which allows 4–9 dwelling units per acre.

3. Floodplain Submittal Requirements

The City of Fort Collins Floodplain Review Checklist—50% Development Review Checklist was reviewed, and each listed item has been completed and included with this submittal or marked as "Not Applicable (N/A)."

As shown on Figure 4, Cherry Street Cottages Floodplain Map, based on the City Flood Risk Map, the southern portion of the subject property is located in or adjacent to the City regulatory West Vine Basin 100-year floodplain, and the southeast corner of Tract A (detention pond area) is located in the 100-year Floodway and High Risk Flood Fringe of the West Vine Drainage Basin. Accordingly, no improvements are proposed for the area within the 100-year Floodway, and the aforementioned retaining wall as proposed is coincident with the floodway boundary. FEMA FIRM Panel 0978G, Panel 978 of 1420, shows that the subject property is not within a FEMA-designated floodplain (See Appendix D).

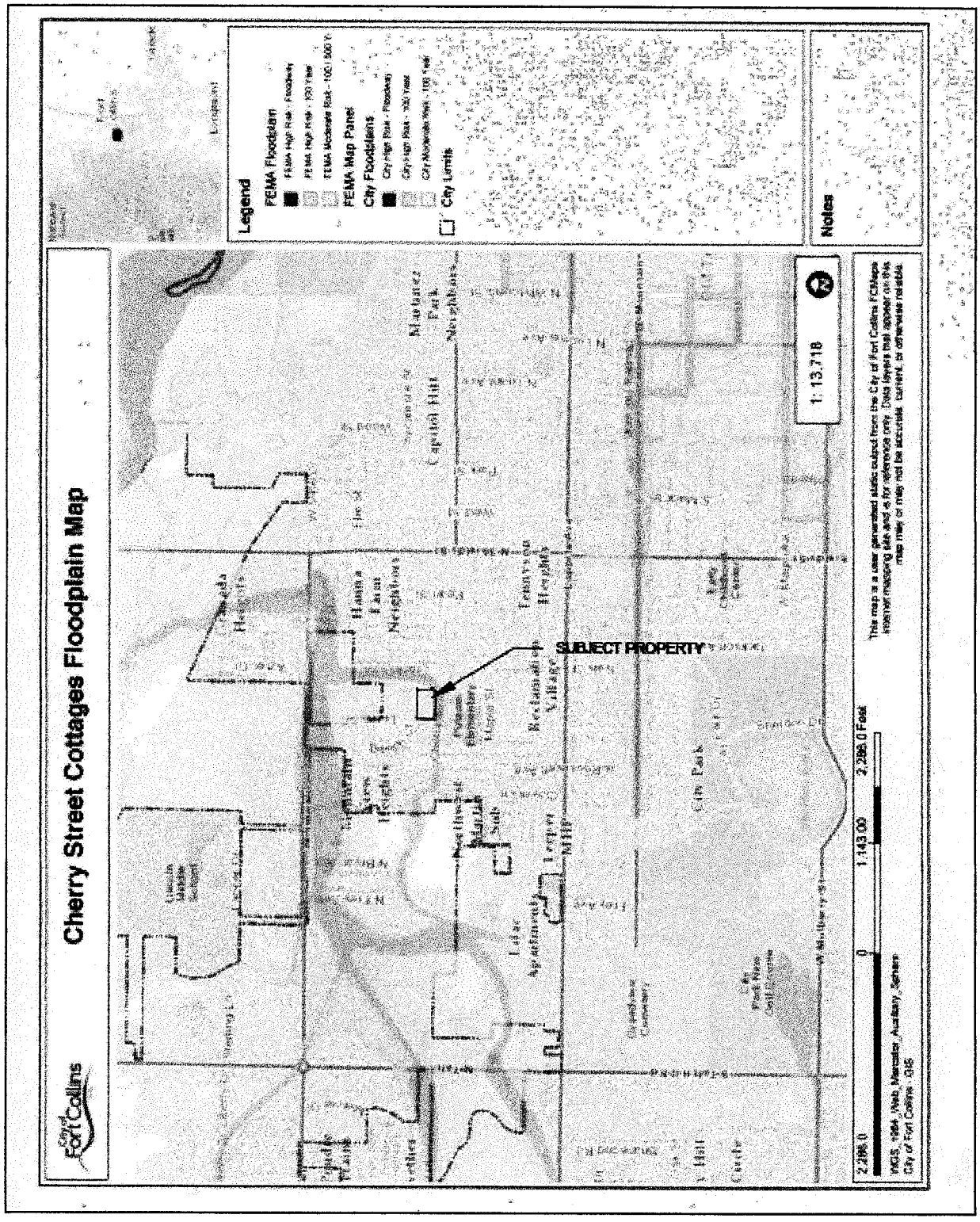


Figure 4. West Vine Drainage Floodplain Map

Homes and garages built on Lots 3, 4, 5, and 6 that are partially or totally within the City-designated floodplain will have spread footing foundations with slab-on-grade concrete floors. The lowest floor level will be at least 18-inches above the base flood elevation. As discussed below, this project will comply with safety regulations of Chapter 10 of City Code.

a. No new residential structures will be built in the floodway.

b. Non-structural development (fill, sidewalks, retaining wall, and vegetation) will be completed within the floodway, and such improvements will not cause a rise to the Base Flood Elevation (BFE) or a change to the boundaries of the floodway or flood fringe.

c. Proposed residential structures within the flood fringe will be completed with the lowest finished floor (including duct work, heating, ventilation and air-conditioning systems, etc.) elevated at least 18 inches above the BFE—also referred to as the Regulatory Flood Protection Elevation (RFPE). All houses located within the flood fringe will have spread footing foundations with slab on grade concrete floors. The floor elevations will be set at the RFPE, and no improvements, i.e. HVAC equipment, will be situated below this elevation. Table 1 provides base flood elevation, regulatory flood protection elevation, finished floor elevations, and HVAC elevations for all structures located within the floodplain. All elevations given represent the estimated elevation at the upstream edge of each structure.

Table 1. BFE, RFPE, FF, and HVAC Elevations for All Structures Located within the Floodplain:

Lot Number	Structure	BFE	RFPE	FF	HVAC
3	Home	5024.5	5026.0	5028.1	5028.1
4	Home	5024.3	5025.8	5027.8	5027.8
5	Home	5024.2	5025.7	5027.5	5027.5
6	Home Garage	5023.3 5023.8	5024.8 5025.3	5027.2 5027.2	5027.2 n/a

d. Basements are not proposed below the RFPE in any structure located in the flood fringe.

e. There are no critical facilities proposed within the 100-year floodplain.

f. A Floodplain Use Permit will be applied for prior to construction of any structures within the flood fringe, along with the appropriate permit application fee. The Applicant understands that a FEMA Elevation Certificate is required prior to issuance of the Certificate of Occupancy (CO) for any structures built in the 100-year floodplain.

g. As required by City regulatory requirements, No-Rise Certifications will be obtained for all non-structural development in the floodway before any development work in the floodway (sidewalks, retaining wall, detention pond berm) is initiated.

SEC reviewed the Fort Collins Master Plan Basin Recommended Improvements map, reproduced herein as Figure 5. With the implementation of recommended basin improvements, this exhibit indicates that the future floodplain may be eliminated from the Cherry Street location adjacent to the subject property.

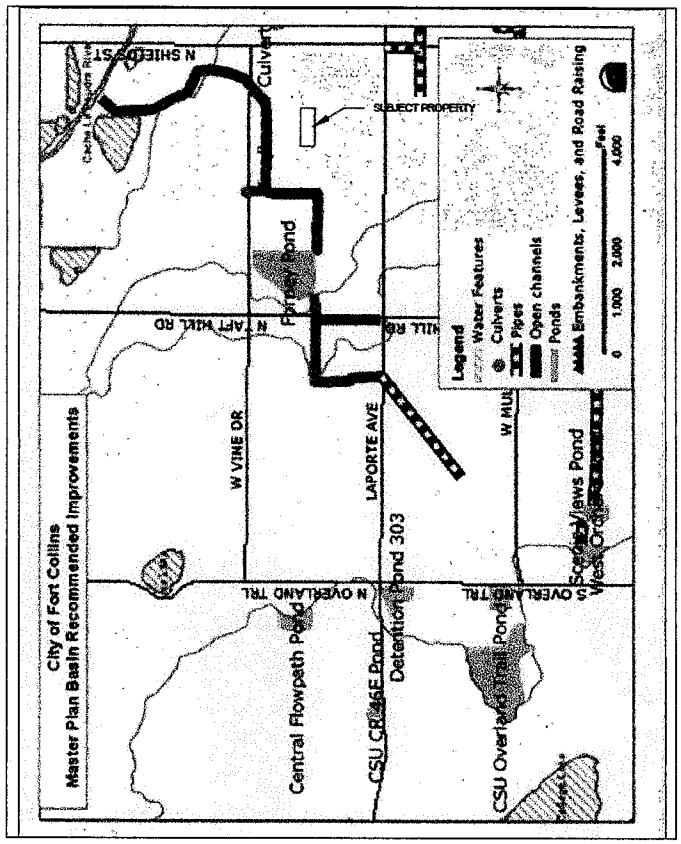


Figure 5. Fort Collins Master Plan Basin Recommended Improvements

B. DRAINAGE BASINS AND SUB-BASINS

1. Major Basin Description

a. The Cherry Street Cottages project is located within the West Vine Basin, located in northwest Fort Collins with a drainage area of approximately 2,350 acres. Accordingly, this drainage plan conforms to the West Vine Basin Master Drainage Plan (currently being updated) as well as the Fort Collins Stormwater Criteria Manual (FCSCM).

b. The City estimates that approximately 85% of the basin is in unincorporated Larimer County, and generally drains from west to east along five flow paths. Frequent drainage problems have arisen on occasion because of sporadic development that occurred within the basin with corresponding overall inadequate drainage facilities. Major storm events over the last approximately 20 years have created flooding problems in the vicinity of Irish Drive and Overland Trail, but not, to the Applicant's knowledge, specifically in the Cherry-Lyons Streets area. Moreover, the City of Fort Collins Master Plan Basin Recommended

Improvements, as shown by the Flooding Solution Map in the West Vine Basin Master Plan, indicates that the current designated floodplain and floodway may be eliminated in the Cherry-Lyons Streets area with future drainage improvements.

c. Future improvements to upstream irrigation facilities within the basin may result in a positive influence on the Cherry Street Cottages project and the immediate area of Cherry and Lyons Streets. There are no other irrigation facilities within the basin that will influence or be influenced by the Cherry Street Cottages project, and excess developed runoff from the subject property will be released in a controlled manner, minimizing the impact of this project on the overall drainage patterns within the West Vine Basin.

2. Sub-Basin Description

a. The Cherry Street Cottages project will occupy approximately 1 acre within the 2,350-acre West Vine Drainage Basin. Although this is a minuscule portion of the overall basin, the proposed project incorporates on-site detention for both water quality and discharge quantity benefits. Specific Best Management Practices (BMPs) and Low Impact Development (LID) requirements are met with this project, as discussed in detail below.

b. The southern flow path within the West Vine Basin contributes flow to Cherry Street on the south side of the proposed project, as depicted in Figure 2. As shown in Figure 5, "City of Fort Collins Master Plan Basin Recommended Improvements," future basin improvements appear to effectively remove the subject property from designated "problem" areas with respect to basin flooding.

c. The project site receives very little runoff from off-site properties, with the primary source of off-site runoff coming from the property to the north. A slight drainage divide exists just north of the property, directing runoff from that area to the east. This off-site drainage will enter the subject property via sheet flow along the north side of the property. A short retaining wall will be built along the north side of the access driveway, leaving a strip of approximately 4-feet wide that will be rocked and shaped into a small infiltration-runoff swale (LID method) to convey excess runoff to the east. The rock swale along the north side will revert to a grass swale at the northwest corner of the detention pond and convey excess runoff water from the north around the detention pond, discharging back to its historical point of discharge on Cherry Street.

C. DRAINAGE DESIGN CRITERIA

1. Optional Provisions

There are no optional provisions or deviations from the FCSCM proposed with the Cherry Street Cottages project.

2. Impervious Area

The scope of the proposed project does increase the impervious area of the property through the addition of nine (9) residential dwelling units and the associated rear-entry driveway and the access street. To the extent possible, Directly Connected Impervious Area (DCIA) will be minimized. For this 1+ acre parcel with a future mix of roof-tops (90% impervious), pavement (100%), gravel (40%), and open space/landscaping (2%), the weighted percent impervious for this developed site is 48.3%.

The overall stormwater management strategy for this project will utilize the "Four-Step Process" to minimize adverse impacts on receiving water quality, as follows:

a. *Step 1—Employ Runoff Reduction Practices.* Because of the proximity of the project property to the West Vine Drainage designated 100-year floodplain, the overall grading plan includes the importing of fill material to elevate the ground floor elevation of the homes within the designated floodplain to at least 18 inches above the BFE. This grading plan results in lot grading to create a slight southwest-to-northeast drainage pattern, directing on-site runoff across grassy area to the driveway/alley access street on the north side of the property, thence to the east and the detention pond. This changes the historic drainage pattern from north to south, discharging to Cherry Street. Stormwater runoff will pass through the detention pond with a controlled release back to Cherry Street, thereby reducing and slowing off-site runoff.

   The Cherry Street Cottages project will implement Low Impact Development (LID) strategies to reduce runoff peaks, volumes, and pollutant loading from frequently occurring precipitation events, i.e. 2-year storm events. To the extent practical, runoff will be routed across vegetated areas (by sheet flow, if possible) to surface-based BMPs such as grass swales and grass buffers. To fulfill the requirement that one-half of the new impervious area be treated with LID strategies, a stormwater inlet will be located in the center of the inverted crown-driveway at the east end of lot 3. This inlet will discharge runoff to a Stormtech Underground Chamber System® as manufactured by Advanced Drainage Systems, Inc. (ADS) and should effectively treat initial runoff flows from the west half of the project. Excess stormwater runoff, i.e from a precipitation event that exceeds the 2-year event runoff, will flow over the inlet and discharge directly to the detention pond. Additionally, excess runoff that is captured in the chambers will be discharged via a pipe in the end of the chambers to the detention pond inlet. Implementing these LID strategies should serve to somewhat mitigate the impacts of the increased impervious areas.

b. *Step 2—Implement BMPs That Provide a Water Quality Capture Volume (WCQV) with Slow Release.* For this project, efforts presented in Step 1 should effectively minimize excess runoff from frequently occurring storm events. After minimizing runoff, the remaining runoff will be treated through capture and slow release of the WQCV from the on-site detention pond. The outlet works for this project is designed to allow an historic release rate of 0.35 cubic feet per second (cfs).

c. *Step 3—Stabilize Drainageways.* As stated above, aside from the West Vine Basin Drainage, no other major drainageways are present on or adjacent to the property. This project will indirectly help to stabilize the West Vine Drainage through timed release of large precipitation events, serving to reduce peak flows in the immediate vicinity. Moreover, the project will pay not only onetime stormwater development fees, but also ongoing monthly stormwater utility fees, serving to help achieve City-wide drainage-way stability.

d. *Step 4—Implement Site-Specific and Other Source Control BMPs.* This step typically applies to industrial and commercial developments.

3. Development Criteria Reference and Constraints

a. There have been no previous drainage studies for this site.

b. There are no known drainage studies for any adjacent properties that will have any effect on the Cherry Street Cottages project.

c. Site constraints exist on the south and west sides by existing streets, and on the north by a minor drainage divide and the proposed access street/alley. The site is constrained on the east by a fully developed residential neighborhood. No other site constraints currently exist on the subject property.

4. Hydrologic Criteria

a. The City of Fort Collins Rainfall Intensity-Duration-Frequency Curves for the 2-year and 100-year design precipitation events, as provided in Figure RA-16 of the FCSCM, serve as the data source for all hydrologic computations associated with the Cherry Street Cottages project. Data provided in Table RA-7 are used for Rational Method runoff calculations.

b. The Rational Method is used to compute stormwater runoff with coefficients provided in Tables RO-11 and RO-12 of the FCSCM.

c. The Rational Formula-Based Detention Volume by the Modified FAA Method is used for detention storage calculations.

d. Design storm recurrence intervals of 2-years (Minor Storm) and 100-years (Major Storm) are used for these analyses.

5. Hydraulic Criteria

a. The proposed Cherry Street Cottages drainage plan is designed in accordance with criteria outlined in the FCSCM and/or the Urban Drainage and Flood Control District (UDFCD) Urban Storm Drainage Criteria Manual.

b. No other drainage facility design criteria are use for this design.

c. As previously stated, there are no natural drainageways within the subject property. Therefore, no modifications to natural drainageways are proposed, and no "Floodplain Modeling Study" would be required based on this criterion alone.

6. Floodplain Regulatory Compliance

a. As stated above, the City of Fort Collins Floodplain Review Checklist for 50% Submittals has been checked to assure compliance. Accordingly, it is the intent of the Applicant to comply with all applicable City of Fort Collins floodplain regulations.

7. Modifications of Criteria

a. No modifications are requested at this time.

D. DRAINAGE FACILITY DESIGN

1. General Concept

a. Drainage patterns on the subject property have historically consisted of runoff from the single-family residential property to the north. This runoff drainage has typically flowed to the south-southeast, and that basic drainage pattern will not be affected by this project. The primary objective of the Cherry Street Cottages drainage design is to maintain existing drainage patterns to the extent possible, while not adversely impacting adjacent properties.

b. As previously discussed, the primary off-site runoff occurs to the east into a developed residential property and south to Cherry Street. With the completion of the proposed project, the Applicant believes that off-site runoff may be somewhat reduced to the residential neighborhood to the east through the installation of on-site detention in Tract A at the east end of the proposed project. Runoff that previously made its way directly to the residential properties to the east will now be detained and slowly released to the Cherry Street curb and gutter, potentially serving to somewhat mitigate flooding of the properties to the east.

c. A list of Tables and Figures used in this report is provided in the Table of Contents at the front of this document. Each table or figure therein listed is located within the applicable section of this report.

d. Existing drainage patterns consist of primarily sheet flow to Cherry Street on the south. The proposed drainage patterns direct on-site runoff back to the north side of the property and thence to the east and the detention pond. Off-site runoff from the north will flow to a drainage swale that will convey flow around the detention pond located at the east end of the development and discharge back to its historic location on Cherry Street.

2. Specific Details

a. No specific design problems were encountered during design, aside from employing an iterative process to design and situate the detention pond in best accordance with both hydrologic/hydraulic factors and the owner's preferred pond location and configuration. No other specific or special design problems were encountered.

b. The Modified FAA Method was used to size the Detention Pond. Outlet design is in accordance with UDCM design parameters, and applicable equations are referenced in the design, as shown in Appendices A & B, Hydrologic and Hydraulic Computations, respectively. The pond volume was calculated to be 0.095 acre-feet (4,158 cubic feet) for the 100-year required detention that's based on the 100-year rainfall criterion for the City of Fort Collins. The available Water Quality Capture Volume (WQCV) is 0.012 AF. The corresponding 100-year water surface elevation (WSEL) is 5025.9. The WQCD storage volume of 0.017 AF WSEL is 5024.9, yielding a WQCV total maximum ponding depth (at the outlet) of 1.0 ft.

An orifice plate outlet is provided for controlled release from the detention pond. Four (4) rows of orifices, each with a 9/16-inch-diameter hole will restrict discharge to a cumulative rate of 0.01 cfs at a pond surface elevation of 5,024.9.

c. Table 2 presents a summary of detention pond design.

Table 2. Detention Pond Design Summary

Item	Quantity
Stage-Storage Curve	See Appendix B
Stage-Discharge Curve	See Appendix B
Detention Pond Required Volume (a-f)	0.095
Detention Pond Design Volume (a-f)	0.112
Water Quality Capture Volume (a-f)	0.042
Water Quality Elevation	5,024.9
Spillway Elevation	5,026.1
Pond Freeboard	1'
Outlet Size	Orifice Plate: 4 rows with 1 9/16-inch hole per row; 12-inch weir for overflow release; 1' emergency overflow weir

d. Maintenance access is open with no access limitations to the detention pond and associated outlet works.

e. There is an existing 9-foot utility easement along the south and west sides and a 6-foot utility and drainage easement along the north and east sides of the property. Tract A, the eastern-most lot, will be dedicated for the detention pond and related drainage features. No structures will be placed within the drainage easement, including playground equipment, but the area will be available for neighborhood activities during dry weather. The detention pond, access drive/alley, and the area south of the proposed detention wall will be dedicated for drainage and utility easements, and will be owned and maintained by the future homeowners association.

f. No off-site facilities are proposed for conveyance of minor and major flows to the major drainageway.

E. CONCLUSIONS

1. Compliance with Standards

a. This drainage plan is in compliance with City of Fort Collins Stormwater Criteria Manual.

b. This drainage plan is in compliance with the City of Fort Collins Master Drainage Plan and the West Vine Drainage Plan.

e. This drainage plan is in compliance with the City of Fort Collins floodplain regulations.

d. A Floodplain Use Permit application will be prepared in accordance with requirements provided in Fort Collins City Code, Section 10-27, Floodplain Use Permit.

e. This drainage plan is in compliance with Chapter 10 of City Code, as well as applicable State of Colorado and Federal regulations governing stormwater discharge.

2. Drainage Concept

a. The drainage design proposed for this project will effectively control damage associated with stormwater runoff. Runoff from existing pervious areas that will be converted to impervious areas will be controlled to release at the 2-year historic rate during the 100-year event.

b. The proposed development will have no impact on either the City or West Vine Basin Master Drainage Plans.

REFERENCES

City of Fort Collins Stormwater Criteria Manual, City of Fort Collins, Colorado, as adopted by Ordinance No. 174, 2011.

Soil Survey of Larimer County Area, Colorado, United States Department of Agriculture Soil Conservation Service, 1980.

Urban Storm Drainage Criteria Manual, Volumes 1–3, Urban Drainage and Flood Control District, Wright-McLaughlin Engineers, Denver, Colorado, revised April 2008.

APPENDIX A: HYDROLOGIC COMPUTATIONS

1. **Land use assumptions regarding adjacent properties**
   The Applicant assumes that existing land uses on adjacent properties to the south (Putnam Elementary School) and east and west (established residential properties) will remain unchanged from present uses. The land to the north currently contains one single-family home, and may be subject to future residential development. In that eventuality, the Applicant understands that no associated impact to the subject property should be realized, and in fact, runoff from that area to the north may be mitigated to some extent.

2. Initial (2-year) and major (100-year) storm runoff calculations are attached, including the historic and developed runoff computations using the UDFCD Rational Method.

Table 1

CHERRY STREET COTTAGES

DEVELOPED DRAINAGE

WEIGHTED PERCENT IMPERVIOUSNESS AND RUNOFF COEFFICIENT "C"

Land Use	Imperviousness (%)
Roof	90
Pavement	100
Gravel	40
Landscape/Open	2
Historic	2

NRCS Hydrologic Soil Group	C

Sub-Basin ID	Area												Weighted	Runoff Coefficient "C"			
	TOTAL		Roof		Pavement		Gravel		LC/Open		Historic		Imperviousness	2-Year	5-Year	10-Year	100-Year
	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(%)				
BASIN 1	30,606	0.70	10,500	0.24	5,016	0.12		0.00	15,090	0.35		0.00	48.3	0.43	0.47	0.55	0.72

[1]Runoff Coefficient "C" Values are from Table 6-5 in the USDCM.

Table 2

CHERRY STREET COTTAGES

DEVELOPED DRAINAGE

DEVELOPED T_c

Type of Land Surface	NRCS Conveyance Factor, K
Heavy meadow	2.5
Tillage/Field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

NRCS Hydrologic Soil Group	C

Sub Basin ID	Total Area	Overland Sheet Flow		Shallow Concentrated Flow					Eqn 6-3	Eqn 6-4	Eqn 6-2	Eqn 6-5	Final
		Length	Slope	Length	Slope	K	Imp.	C_5	T_i	T_t	T_c	T_c	T_c
	(ac)	(ft)	(%)	(ft)	(%)		(%)		(min)	(min)	(min)	(min)	(min)
BASIN 1	0.70	150	1.0%	270	0.5%	7	48.3	0.47	13.9	9.1	23.0	13.5	13.5

[1] $T_i = 0.395*(1.1-C_5)*L^{0.5}/S^{0.33}$ (Eq. 6-3)

[2] $T_t = L/(60*K*(So^{0.50}))$ (Eq. 6-4)

[3] $T_c = T_i + T_t$ (Eq. 6-2)

[4] $T_t = (18-15i)+(Lt/(60*(24i + 12)*(So^{0.5})))$ (Eq. 6-5)

Table 3
CHERRY STREET COTTAGES
DEVELOPED DRAINAGE
DEVELOPED PEAK FLOWS

	2-year	5-year	10-year	100-year
$^1P_1$	0.90	1.32	1.60	2.60

NRCS Hydrologic Soil Group	C

Sub-Basin ID	Total Area	Final T_c	Weighted Imperv.	Runoff Coefficient "C"[2]				Rainfall Intensity "I"[3]				Runoff[4]			
				2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year
	(ac)	(min)	(%)					(in/hour)	(in/hour)	(in/hour)	(in/hour)	(cfs)	(cfs)	(cfs)	(cfs)
BASIN 1	0.70	13.5	48.3	0.43	0.47	0.55	0.72	2.15	3.15	3.82	6.20	0.65	1.04	1.49	3.15

[1] P_1 for the 2-year, 5-year, 10-year and 100-year storms were taken from Figure 5-1 through Figure 5-6 of the USDCM.

[2] Table 6-5 (USDCM) along with the weighted imperviousness for each basin was used to find the composite "C" runoff coefficient.

[3] I Taken from Final Report OR $I = (28.5*P_1)/(10+T_c)^{0.786}$ (Eq. 5-3)

[4] Q = CIA

APPENDIX B: HYDRAULIC COMPUTATIONS

1. Culvert Capacities: N/A. No culverts are proposed.

2. Storm Sewer Capacity: N/A. No new storm sewers are proposed.

3. Street flow calculations: N/A. Because the detention pond outlet is designed to control release, no new stormwater runoff flow in excess of historic/existing flows will be generated by this project.

4. Storm inlet capacity: N/A. No new storm inlets are designed for this project.

5. Open Channel Design: A drainage swale will be placed along the east side of the detention pond for the purpose of conveying stormwater runoff from the property to the north around the detention pond, discharging back to its historic location on Cherry Street.

6. Check dam and/or channel drop design: N/A.

7. Detention facility design. The detention pond volume was calculated by the UDFCD Modified FAA Method. Model printouts are attached, including the 2-year and 100-year detention volumes, and stage-discharge graphs for both the detention basin and the WQCD outlet.

8. Downstream/outfall system capacity to the major drainageway system. The detention pond outfall will be to a concrete drain pan with rock to protect the pan edges during the 100-year event discharge. The drain pan will transport outfall discharge via a sidewalk chase to the existing Cherry Street curb and gutter.

9. Erosion protection measures for culverts, and storm sewer outlets: N/A.

	This is to convert % imp. to a C value						
100-year	(must insert % imp. and C pervious).					Required detention	
						ft^3	acre-ft.
'C' value	0.72					4157.7	0.095
Area	0.7	acres				Modified	Modified
Release Rate	0.35				M. FATER	D. JUDISH	C. LI
					5/95	Nov-97	Nov-98
DETENTION POND SIZING							
TIME	TIME	INTENSITY	Q 100	Runoff	Release	Required	Required
	cum	100 year		Volume	Cum total	Detention	Detention
(mins)	(secs)	(in/hr)	(cfs)	(ft^3)	(ft^3)	(ft^3)	(ac-ft)
0	0	0	0.00	0	0.0	0.0	0.0000
5	300	9.950	5.01	1504.44	105.0	1399.4	0.0321
10	600	7.720	3.89	2334.528	210.0	2124.5	0.0488
15	900	6.520	3.29	2957.472	315.0	2642.5	0.0607
20	1200	5.600	2.82	3386.88	420.0	2966.9	0.0681
25	1500	4.980	2.51	3764.88	525.0	3239.9	0.0744
30	1800	4.520	2.28	4100.544	630.0	3470.5	0.0797
35	2100	4.080	2.06	4318.272	735.0	3583.3	0.0823
40	2400	3.740	1.88	4523.904	840.0	3683.9	0.0846
45	2700	3.460	1.74	4708.368	945.0	3763.4	0.0864
50	3000	3.230	1.63	4883.76	1050.0	3833.8	0.0880
55	3300	3.030	1.53	5039.496	1155.0	3884.5	0.0892
60	3600	2.860	1.44	5189.184	1260.0	3929.2	0.0902
65	3900	2.720	1.37	5346.432	1365.0	3981.4	0.0914
70	4200	2.590	1.31	5482.512	1470.0	4012.5	0.0921
75	4500	2.480	1.25	5624.64	1575.0	4049.6	0.0930
80	4800	2.380	1.20	5757.696	1680.0	4077.7	0.0936
85	5100	2.290	1.15	5886.216	1785.0	4101.2	0.0942
90	5400	2.210	1.11	6014.736	1890.0	4124.7	0.0947
95	5700	2.130	1.07	6119.064	1995.0	4124.1	0.0947
100	6000	2.060	1.04	6229.44	2100.0	4129.4	0.0948
105	6300	2.000	1.01	6350.4	2205.0	4145.4	0.0952
110	6600	1.940	0.98	6453.216	2310.0	4143.2	0.0951
115	6900	1.890	0.95	6572.664	2415.0	4157.7	0.0954
120	7200	1.840	0.93	6676.992	2520.0	4157.0	0.0954
125	7500	1.790	0.90	6766.2	2625.0	4141.2	0.0951
130	7800	1.750	0.88	6879.6	2730.0	4149.6	0.0953
135	8100	1.710	0.86	6980.904	2835.0	4145.9	0.0952
140	8400	1.670	0.84	7070.112	2940.0	4130.1	0.0948
145	8700	1.630	0.82	7147.224	3045.0	4102.2	0.0942
150	9000	1.600	0.81	7257.6	3150.0	4107.6	0.0943
155	9300	1.570	0.79	7358.904	3255.0	4103.9	0.0942
160	9600	1.540	0.78	7451.136	3360.0	4091.1	0.0939
165	9900	1.510	0.76	7534.296	3465.0	4069.3	0.0934
170	10200	1.480	0.75	7608.384	3570.0	4038.4	0.0927
175	10500	1.450	0.73	7673.4	3675.0	3998.4	0.0918
180	10800	1.420	0.72	7729.344	3780.0	3949.3	0.0907
185	11100	1.400	0.71	7832.16	3885.0	3947.2	0.0906
190	11400	1.380	0.70	7928.928	3990.0	3938.9	0.0904
195	11700	1.360	0.69	8019.648	4095.0	3924.6	0.0901
200	12000	1.340	0.68	8104.32	4200.0	3904.3	0.0896
205	12300	1.320	0.67	8182.944	4305.0	3877.9	0.0890
210	12600	1.300	0.66	8255.52	4410.0	3845.5	0.0883
215	12900	1.280	0.65	8322.048	4515.0	3807.0	0.0874
220	13200	1.260	0.64	8382.528	4620.0	3762.5	0.0864
225	13500	1.240	0.62	8436.96	4725.0	3712.0	0.0852
230	13800	1.220	0.61	8485.344	4830.0	3655.3	0.0839
235	14100	1.210	0.61	8598.744	4935.0	3663.7	0.0841
240	14400	1.200	0.60	8709.12	5040.0	3669.1	0.0842

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
5023.9	0.00	2	0.000	0	0.000	0.00
5024	0.10	70	0.002	4	0.000	0.00
5024.1	0.20	336	0.008	22	0.001	0.00
5024.2	0.30	990	0.023	86	0.002	0.01
5024.3	0.40	1,762	0.040	223	0.005	0.01
5024.4	0.50	2,671	0.061	444	0.010	0.01
5024.5	0.60	2,764	0.063	720	0.017	0.01
5024.6	0.70	2,764	0.063	997	0.023	0.02
5024.7	0.80	2,764	0.063	1,273	0.029	0.02
5024.8	0.90	2,764	0.063	1,550	0.036	0.02
5024.9	1.00	2,765	0.063	1,826	0.042	0.03
5025	1.10	2,765	0.063	2,103	0.048	0.17
5025.1	1.20	2,765	0.063	2,379	0.055	0.25
5025.2	1.30	2,765	0.063	2,656	0.061	0.26
5025.3	1.40	2,766	0.063	2,932	0.067	0.27
5025.4	1.50	2,766	0.063	3,209	0.074	0.28
5025.5	1.60	2,766	0.063	3,485	0.080	0.29
5025.6	1.70	2,766	0.064	3,762	0.086	0.30
5025.7	1.80	2,767	0.064	4,039	0.093	0.31
5025.8	1.90	2,767	0.064	4,315	0.099	0.32
5025.9	2.00	2,768	0.064	4,592	0.105	0.33
5026 - Design Volume	2.10	2,768	0.064	4,897	0.112	0.34
5026.1	2.20	2,768	0.064	5,173	0.119	0.34
5026.2	2.30	2,769	0.064	5,450	0.125	0.57
5026.3	2.40	2,769	0.064	5,727	0.131	1.07
5026.4	2.50	2,769	0.064	6,004	0.138	1.83
5026.5	2.60	2,769	0.064	6,281	0.144	2.86
5026.6	2.70	2,770	0.064	6,558	0.151	4.20
5027.1 - Top of Freeboard	3.20	2,771	0.064	7,943	0.182	16.02

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

APPENDIX C: (RESERVED FOR FUTURE USE)

APPENDIX D: FEMA FIRM MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Colorado State Plane north zone (FIPSZONE 0501). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood **elevations** on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the **same vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

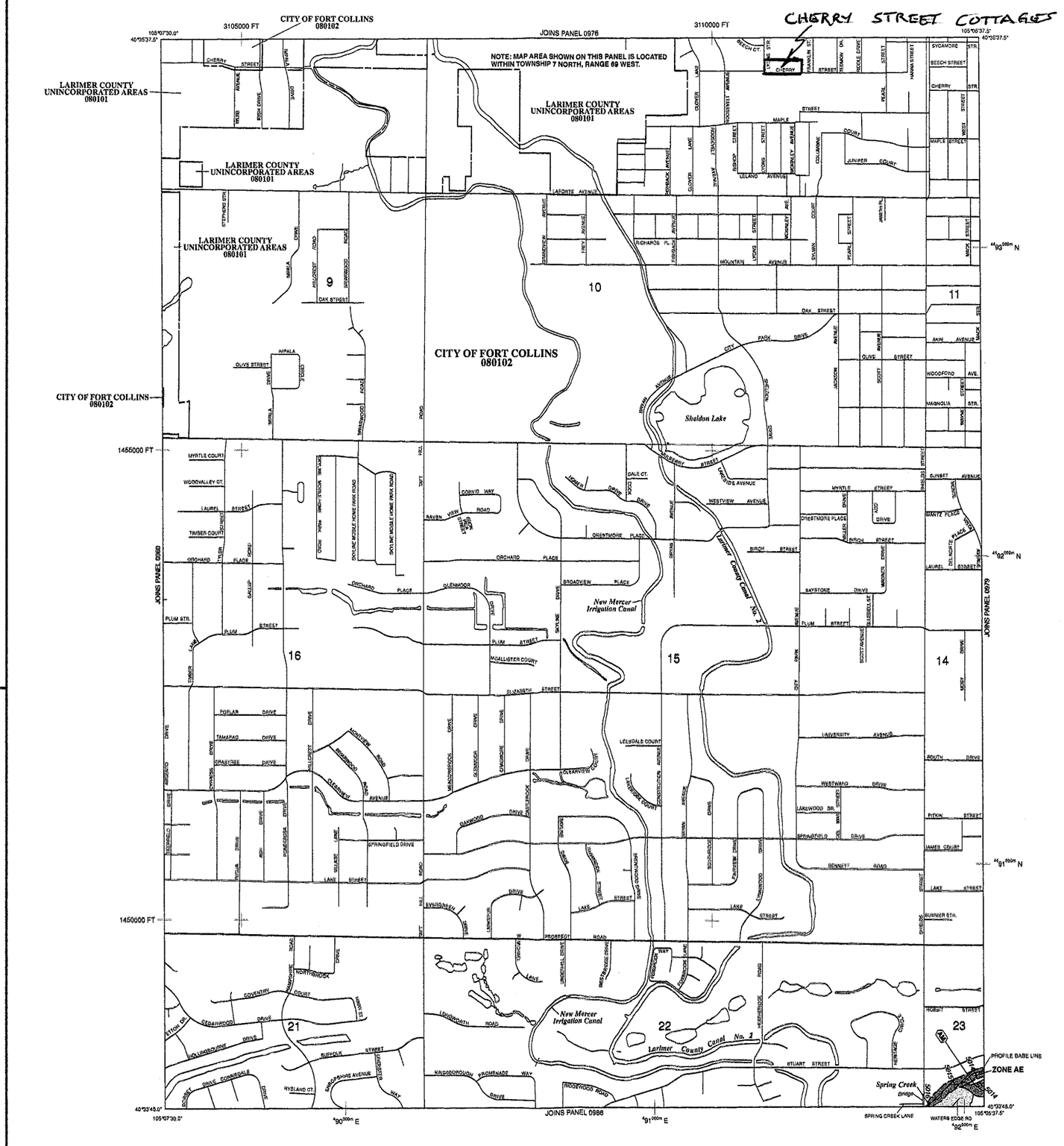
Base map information on this FIRM was provided by the Larimer County GIS and Mapping Department. Additional input was provided by the City of Fort Collins Geographic Information Services Division. These data are current as of 2010.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA **Map Service Center** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the **FEMA Map Service Center** website or by calling the FEMA Map Information eXchange.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, north zone (FIPSZONE 0501), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
December 19, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 2, 2012 - to change Special Flood Hazard Areas, to change floodways, to reflect updated topographic information, to change Base Flood Elevations, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
100 0 100 200 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0978G

FIRM

FLOOD INSURANCE RATE MAP

LARIMER COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 978 OF 1420
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LARIMER COUNTY	080101	0978	G
FORT COLLINS, CITY OF	080102	0978	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
08069C0978G

MAP REVISED
MAY 2, 2012

Federal Emergency Management Agency

APPENDIX E: EROSION CONTROL REPORT

Cherry Street Cottages

(previously referred to as "Pierce Subdivision")
Cherry Street and Lyons Street

Appendix E
Preliminary Erosion Control Report

prepared for
Mr. Evan Gilmartin

April 20, 2018

Sorensen Engineering & Construction, LLC
Civil/Environmental Engineering

1901 Bear Court
Fort Collins, Colorado 80525
(970) 590-1579

A. GENERAL LOCATION AND DESCRIPTION

A.1. Location

The Cherry Street Cottages project site is located in the NE ¼, Section 10, Township 7 North, Range 69 West of the 6th Principal Meridian, City of Fort Collins, County of Larimer, State of Colorado. The project site is bordered to the north by an existing single-family residential property, to the east by single-family homes (Hanna Farm Neighborhood), to the west by Lyons Street and single-family homes (Mountain View Heights), and to the south by Cherry Street and the Putnam School.

Best Management Practices (BMPs) are described in this report that will be implemented to reduce and minimize erosive forces and sediment transport off-site as a result of construction activities. BMPs will be implemented and maintained as needed during all construction activities, and they will be maintained after the conclusion of construction activities until final ground cover stabilization is complete and the threat of off-site sediment transport is removed.

A.2. Nature of Construction Activity at the Site

The total disturbed area will be roughly 40,000 square feet (0.918 acres). The proposed development will include nine (9) dwelling units, including primary dwelling units on each of six (6) lots, plus secondary dwelling units on the three western-most lots (Lots 1, 2, and 3). Construction activity will be typical of small residential developments, as discussed below.

An access driveway/alley will be located along the north side of the property. This driveway will be constructed of concrete and will have an inverted crown allowing it to convey site runoff to the detention pond. Tract A, dedicated as a stormwater detention pond, will be located on the east end of the property. The inlet to the detention pond will be located on the northwest corner of the pond, and the outlet will be located on the south side of the pond, discharging via a drain pan through a sidewalk chase to the Cherry Street curb and gutter flow.

A.3. Proposed Sequence of Major Activities

The project will be constructed in a single phase with the following sequence of construction activity:

1. Install and implement construction boundary erosion fence (silt fence), street inlet sediment protection, and vehicle tracking control;
2. Clear, grub, and stockpile topsoil—implement soil storage area sediment controls and other construction stormwater control BMPs, as discussed below;
3. Grade and construct entrance/access road and detention pond;
4. Complete home and garage construction on all lots;
5. Construct retention wall, sidewalks, detention pond outlet works;
6. Complete final grading, landscaping and final site stabilization—seed/sod all disturbed non-surfaced areas; and
7. Remove BMPs and complete final site cleanup.

A.4. Soil Data

In general, the soil on the site consists of loam classified as Hydrologic Soil Group C. Prior to construction of the access drive and individual homes, the contractor shall complete site-specific soil testing to confirm both pavement design and footing/foundation design criteria.

A.5. Existing Vegetative Cover

Existing vegetation consists of native grass cover across the entire property.

A.6. Location of Potential Pollution Sources

The contractor (as yet to be named) shall identify potential pollution sources and implement BMPs to minimize the risk of pollution outside the construction area. Potential pollution sources will generally be restricted to on-site locations and may include sediment discharge, vehicle maintenance and refueling activities that occur on-site, miscellaneous construction debris, and fugitive dust generation that could impact neighboring properties.

A.7. Receiving Watershed

Water released from the detention pond will flow to the Cherry Street curb and gutter in the southeast corner of the property, thence to street drainage and the West Vine Drainage, thence to the Poudre River.

A.8. List of Best Management Practices (BMPs)

The following is a list of proposed or potential BMPs that shall/may be implemented or utilized by the contractor as needed during construction.

Detail	ID	Description	Detail	ID	Description
EC-1	SR	Surface Roughening	S-7	-	Vehicle Maintenance, Fueling, and Storage
EC-2	TS/PS	Temporary and Permanent Seeding	S-9	-	Landscape Maintenance
EC-4	MU	Mulching	SC-1	SF	Silt Fence
EC-8	TOP	Temporary Outlet Protection	SC-5	RS	Rock Sock
EC-14	DC	Wind Erosion Dust Control	SC-6	IP	Inlet Protection
MM-1	CWA	Concrete Washout Area	SM-3	CF	Construction Fence
MM-2	SP	Stockpile Management	SM-4	VTC	Vehicle Tracking Control
MM-3	GH	Good Housekeeping Practices	SM-6	SSA	Stabilized Staging Area
S-5	GH	Good Housekeeping			

Detailed descriptions of the above BMPs are provided in Attachment 1 to this Erosion Control Report. The selected BMPs are based on *Urban Storm Drainage Criteria Manual*, Volume 3.

B. STORMWATER MANAGEMENT CONTROLS

B.1. Administrator

The selected contractor shall identify a person knowledgeable in erosion prevention and sediment control who will oversee the implementation, inspection, and maintenance of the erosion prevention and sediment control BMPs before and during construction. The contractor's inspector shall inspect the construction site once every seven (7) days and within 24 hours after a rainfall event of greater than 0.5 inches in a 24-hour period.

The contractor shall keep a record of inspections and maintenance conducted during construction. These records must be retained in the stormwater pollution prevention plan. Records of each inspection and maintenance activity shall include

- Date and time of inspection;
- Name of person(s) conducting inspection;
- Findings of inspection, including recommendations for corrective actions taken (including dates, times, and party completing maintenance activities);
- Date and amount of rainfall events greater than 0.5 inches in 24 hours;
- Documentation of changes made to the BMPs shown on the erosion control plan.

B.2. Identification of Potential Pollution Sources

Potential pollution sources include the following:

- **Disturbed and Stored Soils.** Soil disturbance will occur within the Cherry Street Cottages improvement area during both infrastructure and home construction activities. Silt fencing will be installed around the perimeter of the property. Soils excavated during home construction and road base material for the access driveway improvements may be stored temporarily on the property. Any soil stockpile will be within an area enclosed by silt fencing to prevent sediment transport from these areas.
- **Vehicle Tracking of Sediments.** Vehicles leaving the construction zone may carry soil and other potential pollutants off-site and onto adjacent City streets (Lyons and Cherry Streets). To control this, a vehicle-tracking pad will be situated at the driveway entrance off of Lyons Street at the exit point from the subject property to Lyons Street.
- **Contaminated Soils.** Contaminated soils are not anticipated for this site. However, construction equipment routine maintenance activities that may occur on-site or equipment malfunctions (e.g., leaking hydraulic hoses) could lead to discharge of petroleum contamination onto the ground surface. If this should happen, the equipment owner will bear responsibility for cleanup of the contaminated soil. The contractor will be required to maintain a well-equipped spill kit on-site, with adequate on-site personnel trained in Spill Prevention, Control, and Countermeasure (SPCC) practices to contain releases. Contaminated soils will be excavated and removed from the site, with "clean" soil remaining as verified by field sensing equipment (i.e., a portable volatile

organic compound [VOC] monitor and/or a photoionization detector [PID] calibrated for the appropriate compounds).

- **Loading and Unloading Operations.** Loading and unloading operations will be conducted in a designated area to be enclosed by silt fencing. Potential pollution from these activities will be controlled by vehicle tracking pad, silt fencing, and good housekeeping practices.
- **Outdoor Storage Activities.** Outdoor storage of building materials will be restricted to areas adjacent to the homes being built and will be within the silt fencing enclosed areas. Fertilizers and other chemicals will not be stored on this property.
- **Vehicle and Equipment Maintenance and Fueling Activities.** Vehicle and construction equipment maintenance and fueling activities may be conducted on-site within a silt-fenced area. Additionally, as discussed above, a well-equipped spill kit will be kept on-site, with contractor personnel trained in SPCC practices.
- **Significant Dust and Particulate Generating Processes.** Significant dust and particulate generating processes will be controlled by the application of water to exposed soils on an as-needed basis. A water truck will be on-site for water application to suppress dust generation.
- **Routine Maintenance Activities.** Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc. will be kept to a minimum. Such activities, if occurring on-site, will be conducted within the perimeter silt fencing and with spill kit(s) on hand to immediately clean up any release of such materials.
- **On-site Waste Management Practices.** On-site waste management practices will consist of dumpsters and/or roll-off containers located on-site for the duration of construction activities. Good housekeeping practices will include regular (daily) construction debris pickup and removal as well as general site maintenance.
- **Concrete Truck Equipment Washing.** A concrete washout pit will be established and maintained by the contractor during construction. This pit will be located near the northwest corner of the property, near the aforementioned vehicle tracking pad.
- **Dedicated Asphalt and Concrete Batch Plants.** There will be no dedicated asphalt or concrete batch plants on this site.
- **Non-industrial Waste Sources.** Non-industrial waste sources will be controlled by regular daily good housekeeping practices and the use of an on-site dumpster or roll-off container for non-industrial wastes, including worker trash. A portable toilet will be positioned on the property by the contractor and will be maintained for the duration of construction activities.
- **Other Potential Spills.** Other potential spills, possibly associated with groundwater and stormwater dewatering practices, are not anticipated for this project.

C. DRYLAND VEGETATION

Establishment of dryland vegetation is not anticipated for this project.

D. DETAILED CONSTRUCTION ACTIVITIES SEQUENCE

The selected general contractor will establish a more specific construction sequence and schedule, but the overall sequence of construction activity should follow the general path given below.

D.1. Installation of Temporary Erosion and Sediment Control Measures

Silt fencing will be installed around the property perimeter. On this relatively flat parcel, off-site sediment discharge will also be controlled with vehicle tracking and sediment filtering, to be established at the northwest corner of the property at the point of access from Lyons Street.

D.2. Sequence of Land Disturbing Activity

As mentioned above, the general contractor responsible for infrastructure installation (water and sewer pipe and other utility installation), as well as for the rear access driveway, will submit a detailed construction sequence schedule at the time of contracting. However, the following sequence will generally be followed:

1. Existing surface vegetation stripping and soil roughening;
2. Soil import and overlot grading;
3. Detention pond (Tract A) grading;
4. Access driveway grading and subgrade preparation;
5. Utilities installation, including electrical, water, and sewer pipe installation, with service stubs to each lot;
6. Access driveway surface finishing, consisting of a 6-inch inverted crown concrete surface;
7. Home site construction—the specific timing of work to be done on these lots as yet to be determined;
8. Construction of retaining wall, sidewalks, and detention pond outlet structure;
9. Final grading;
10. Establishment of final vegetation; and
11. Silt fencing and vehicle tracking pad removal.

D.3. Drainage Facility Construction

The only drainage facility required for this subdivision is the detention pond in Tract A, to be graded and shaped following the sequence outlined above.

D.4. Sediment Basins, Temporary Channel Stabilization

No sediment basin is required, nor will there be any channel stabilization requirements for this project.

D.5. Seeding

Immediately upon completion of access driveway and detention pond grading, the detention pond area of Tract A will be seeded for permanent vegetative cover. Also, immediately upon completion of the sidewalks and retaining wall, the parkway areas will be seeded (or sodded), and individual lots will be seeded (or sodded) as home construction progresses. The right-of-way outside of the access driveway surface will be seeded with native grasses appropriate for that area.

D.6. Mulching

Immediately upon seeding of all disturbed soils, mulch will be applied as required to all exposed soil surfaces to maintain soil moisture and protect the seeds and new growth.

D.7. Required Maintenance Activities

Long-term maintenance will include periodic (as needed) detention pond clean-out, specifically in the area of the inlet in the northwest corner of Tract A and the outlet works near the southwest corner of the detention pond in Tract A. Accumulated sediment will be removed. The perimeter silt fencing will be inspected once every 14 days and after every precipitation event of greater than 0.5 inches, and accumulated silt deposits will be removed. Damaged silt fencing will be replaced immediately upon discovery of damage. All other erosion control features, including wattles, rock socks, etc., will be inspected periodically and after each major precipitation event to assess condition. Cleanup and removal of accumulated silt and sediment will be undertaken immediately upon observation of the silt. The vehicle tracking pad and concrete washout pit will be regularly inspected and excessive material removed.

E. EROSION CONTROL SECURITY CALCULATIONS

Erosion control security calculations are provided in Attachment 2 to this report.

F. ATTACHMENTS

F.1. BMPs from *Urban Storm Drainage Criteria Manual* Volume 3
F.2. Erosion Control Security Calculations

Attachment 1. BMPs from *Urban Storm Drainage Criteria Manual*

Surface Roughening (SR) EC-1

Description

Surface roughening is an erosion control practice that involves tracking, scarifying, imprinting, or tilling a disturbed area to provide temporary stabilization of disturbed areas. Surface roughening creates variations in the soil surface that help to minimize wind and water erosion. Depending on the technique used, surface roughening may also help establish conditions favorable to establishment of vegetation.

Photograph SR-1. Surface roughening via imprinting for temporary stabilization.

Appropriate Uses

Surface roughening can be used to provide temporary stabilization of disturbed areas, such as when revegetation cannot be immediately established due to seasonal planting limitations. Surface roughening is not a stand-alone BMP, and should be used in conjunction with other erosion and sediment controls.

Surface roughening is often implemented in conjunction with grading and is typically performed using heavy construction equipment to track the surface. Be aware that tracking with heavy equipment will also compact soils, which is not desirable in areas that will be revegetated. Scarifying, tilling, or ripping are better surface roughening techniques in locations where revegetation is planned. Roughening is not effective in very sandy soils and cannot be effectively performed in rocky soil.

Design and Installation

Typical design details for surfacing roughening on steep and mild slopes are provided in Details SR-1 and SR-2, respectively.

Surface roughening should be performed either after final grading or to temporarily stabilize an area during active construction that may be inactive for a short time period. Surface roughening should create depressions 2 to 6 inches deep and approximately 6 inches apart. The surface of exposed soil can be roughened by a number of techniques and equipment. Horizontal grooves (running parallel to the contours of the land) can be made using tracks from equipment treads, stair-step grading, ripping, or tilling.

Fill slopes can be constructed with a roughened surface. Cut slopes that have been smooth graded can be roughened as a subsequent operation. Roughening should follow along the contours of the slope. The tracks left by truck mounted equipment working perpendicular to the contour can leave acceptable horizontal depressions; however, the equipment will also compact the soil.

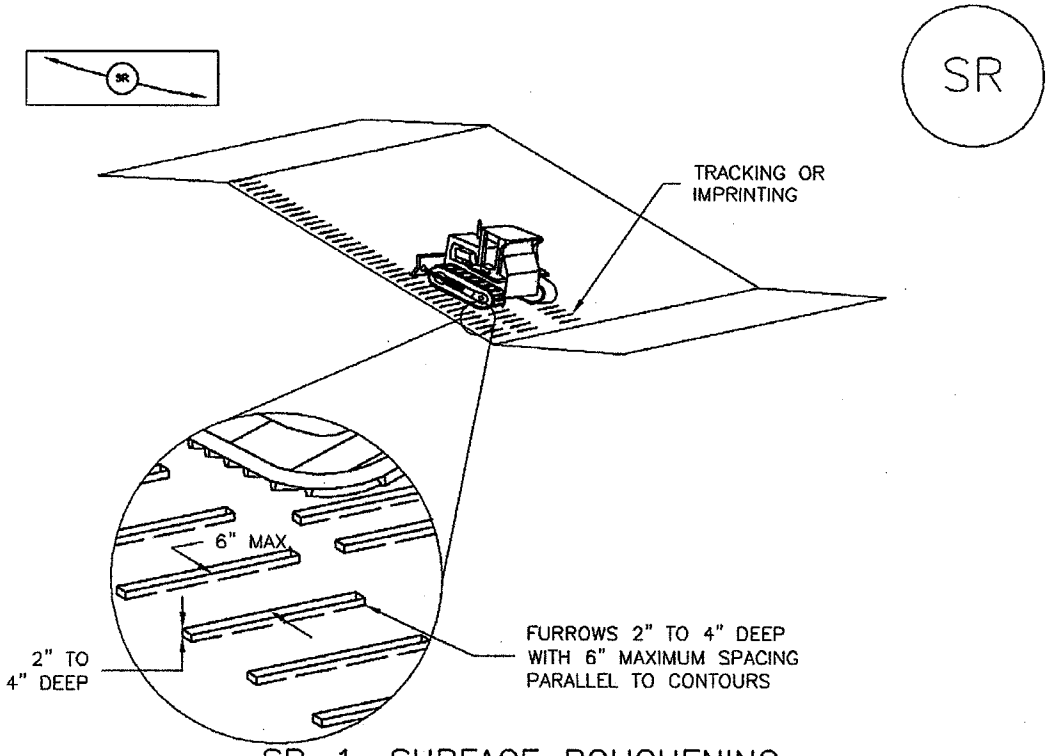
Surface Roughening	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

Maintenance and Removal

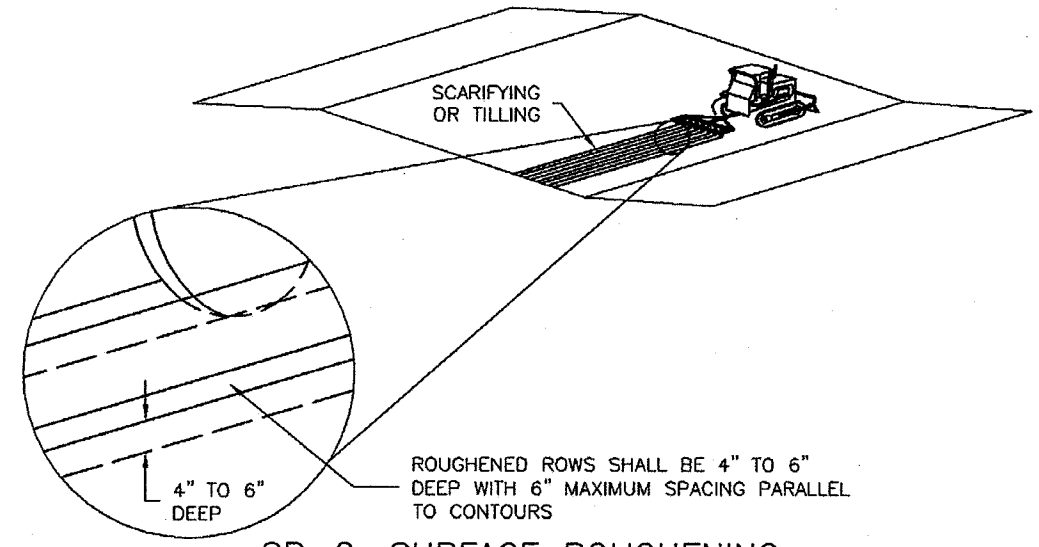
Care should be taken not to drive vehicles or equipment over areas that have been surface roughened. Tire tracks will smooth the roughened surface and may cause runoff to collect into rills and gullies.

Because surface roughening is only a temporary control, additional treatments may be necessary to maintain the soil surface in a roughened condition.

Areas should be inspected for signs of erosion. Surface roughening is a temporary measure, and will not provide long-term erosion control.



SR–1. SURFACE ROUGHENING
FOR STEEP SLOPES (3:1 OR STEEPER)



SR–2. SURFACE ROUGHENING
FOR LOW SLOPES (LESS THAN 3:1)

SURFACE ROUGHENING INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION(S) OF SURFACE ROUGHENING.

2. SURFACE ROUGHENING SHALL BE PROVIDED PROMPTLY AFTER COMPLETION OF FINISHED GRADING (FOR AREAS NOT RECEIVING TOPSOIL) OR PRIOR TO TOPSOIL PLACEMENT OR ANY FORECASTED RAIN EVENT.

3. AREAS WHERE BUILDING FOUNDATIONS, PAVEMENT, OR SOD WILL BE PLACED WITHOUT DELAY IN THE CONSTRUCTION SEQUENCE, SURFACE ROUGHENING IS NOT REQUIRED.

4. DISTURBED SURFACES SHALL BE ROUGHENED USING RIPPING OR TILLING EQUIPMENT ON THE CONTOUR OR TRACKING UP AND DOWN A SLOPE USING EQUIPMENT TREADS.

5. A FARMING DISK SHALL NOT BE USED FOR SURFACE ROUGHENING.

SURFACE ROUGHENING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACE UPON DISCOVERY OF THE FAILURE.

4. VEHICLES AND EQUIPMENT SHALL NOT BE DRIVEN OVER AREAS THAT HAVE BEEN SURFACE ROUGHENED.

5. IN NON-TURF GRASS FINISHED AREAS, SEEDING AND MULCHING SHALL TAKE PLACE DIRECTLY OVER SURFACE ROUGHENED AREAS WITHOUT FIRST SMOOTHING OUT THE SURFACE.

6. IN AREAS NOT SEEDED AND MULCHED AFTER SURFACE ROUGHENING, SURFACES SHALL BE RE-ROUGHENED AS NECESSARY TO MAINTAIN GROOVE DEPTH AND SMOOTH OVER RILL EROSION.

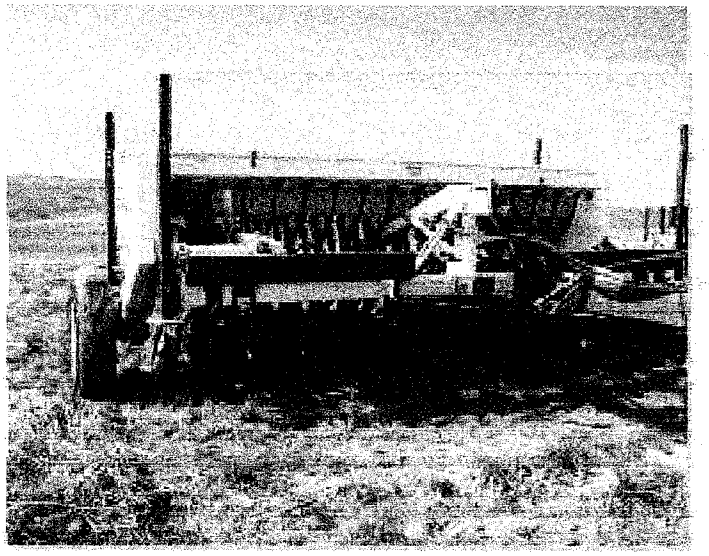
(DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Temporary and Permanent Seeding (TS/PS) EC-2

Description

Temporary seeding can be used to stabilize disturbed areas that will be inactive for an extended period. Permanent seeding should be used to stabilize areas at final grade that will not be otherwise stabilized. Effective seeding includes preparation of a seedbed, selection of an appropriate seed mixture, proper planting techniques, and protection of the seeded area with mulch, geotextiles, or other appropriate measures.



Photograph TS/PS -1. Equipment used to drill seed. Photo courtesy of Douglas County.

Appropriate Uses

When the soil surface is disturbed and will remain inactive for an extended period (typically 30 days or longer), proactive stabilization measures should be implemented. If the inactive period is short-lived (on the order of two weeks), techniques such as surface roughening may be appropriate. For longer periods of inactivity, temporary seeding and mulching can provide effective erosion control. Permanent seeding should be used on finished areas that have not been otherwise stabilized.

Typically, local governments have their own seed mixes and timelines for seeding. Check jurisdictional requirements for seeding and temporary stabilization.

Design and Installation

Effective seeding requires proper seedbed preparation, selection of an appropriate seed mixture, use of appropriate seeding equipment to ensure proper coverage and density, and protection with mulch or fabric until plants are established.

The USDCM Volume 2 *Revegetation* Chapter contains detailed seed mix, soil preparations, and seeding and mulching recommendations that may be referenced to supplement this Fact Sheet.

Drill seeding is the preferred seeding method. Hydroseeding is not recommended except in areas where steep slopes prevent use of drill seeding equipment, and even in these instances it is preferable to hand seed and mulch. Some jurisdictions do not allow hydroseeding or hydromulching.

Seedbed Preparation

Prior to seeding, ensure that areas to be revegetated have soil conditions capable of supporting vegetation. Overlot grading can result in loss of topsoil, resulting in poor quality subsoils at the ground surface that have low nutrient value, little organic matter content, few soil microorganisms, rooting restrictions, and conditions less conducive to infiltration of precipitation. As a result, it is typically necessary to provide stockpiled topsoil, compost, or other

Temporary and Permanent Seeding	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

soil amendments and rototill them into the soil to a depth of 6 inches or more.

Topsoil should be salvaged during grading operations for use and spread on areas to be revegetated later. Topsoil should be viewed as an important resource to be utilized for vegetation establishment, due to its *water-holding capacity, structure, texture, organic matter content, biological activity,* and *nutrient content.* The rooting depth of most native grasses in the semi-arid Denver metropolitan area is 6 to 18 inches. At a minimum, the upper 6 inches of topsoil should be stripped, stockpiled, and ultimately respread across areas that will be revegetated.

Where topsoil is not available, subsoils should be amended to provide an appropriate plant-growth medium. Organic matter, such as well digested compost, can be added to improve soil characteristics conducive to plant growth. Other treatments can be used to adjust soil pH conditions when needed. Soil testing, which is typically inexpensive, should be completed to determine and optimize the types and amounts of amendments that are required.

If the disturbed ground surface is compacted, rip or rototill the surface prior to placing topsoil. If adding compost to the existing soil surface, rototilling is necessary. Surface roughening will assist in placement of a stable topsoil layer on steeper slopes, and allow infiltration and root penetration to greater depth.

Prior to seeding, the soil surface should be rough and the seedbed should be firm, but neither too loose nor compacted. The upper layer of soil should be in a condition suitable for seeding at the proper depth and conducive to plant growth. Seed-to-soil contact is the key to good germination.

Seed Mix for Temporary Vegetation

To provide temporary vegetative cover on disturbed areas which will not be paved, built upon, or fully landscaped or worked for an extended period (typically 30 days or more), plant an annual grass appropriate for the time of planting and mulch the planted areas. Annual grasses suitable for the Denver metropolitan area are listed in Table TS/PS-1. These are to be considered only as general recommendations when specific design guidance for a particular site is not available. Local governments typically specify seed mixes appropriate for their jurisdiction.

Seed Mix for Permanent Revegetation

To provide vegetative cover on disturbed areas that have reached final grade, a perennial grass mix should be established. Permanent seeding should be performed promptly (typically within 14 days) after reaching final grade. Each site will have different characteristics and a landscape professional or the local jurisdiction should be contacted to determine the most suitable seed mix for a specific site. In lieu of a specific recommendation, one of the perennial grass mixes appropriate for site conditions and growth season listed in Table TS/PS-2 can be used. The pure live seed (PLS) rates of application recommended in these tables are considered to be absolute minimum rates for seed applied using proper drill-seeding equipment.

If desired for wildlife habitat or landscape diversity, shrubs such as rubber rabbitbrush (*Chrysothamnus nauseosus*), fourwing saltbush (*Atriplex canescens*) and skunkbrush sumac (*Rhus trilobata*) could be added to the upland seedmixes at 0.25, 0.5 and 1 pound PLS/acre, respectively. In riparian zones, planting root stock of such species as American plum (*Prunus americana*), woods rose (*Rosa woodsii*), plains cottonwood (*Populus sargentii*), and willow (*Populus spp.*) may be considered. On non-topsoiled upland sites, a legume such as Ladak alfalfa at 1 pound PLS/acre can be included as a source of nitrogen for perennial grasses.

Seeding dates for the highest success probability of perennial species along the Front Range are generally in the spring from April through early May and in the fall after the first of September until the ground freezes. If the area is irrigated, seeding may occur in summer months, as well. See Table TS/PS-3 for appropriate seeding dates.

Table TS/PS-1. Minimum Drill Seeding Rates for Various Temporary Annual Grasses

Species[a] (Common name)	Growth Season[b]	Pounds of Pure Live Seed (PLS)/acre[c]	Planting Depth (inches)
1. Oats	Cool	35 - 50	1 - 2
2. Spring wheat	Cool	25 - 35	1 - 2
3. Spring barley	Cool	25 - 35	1 - 2
4. Annual ryegrass	Cool	10 - 15	½
5. Millet	Warm	3 - 15	½ - ¾
6. Sudangrass	Warm	5–10	½ - ¾
7. Sorghum	Warm	5–10	½ - ¾
8. Winter wheat	Cool	20–35	1 - 2
9. Winter barley	Cool	20–35	1 - 2
10. Winter rye	Cool	20–35	1 - 2
11. Triticale	Cool	25–40	1 - 2

[a] Successful seeding of annual grass resulting in adequate plant growth will usually produce enough dead-plant residue to provide protection from wind and water erosion for an additional year. This assumes that the cover is not disturbed or mowed closer than 8 inches.

Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1 or where access limitations exist. When hydraulic seeding is used, hydraulic mulching should be applied as a separate operation, when practical, to prevent the seeds from being encapsulated in the mulch.

[b] See Table TS/PS-3 for seeding dates. Irrigation, if consistently applied, may extend the use of cool season species during the summer months.

[c] Seeding rates should be doubled if seed is broadcast, or increased by 50 percent if done using a Brillion Drill or by hydraulic seeding.

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses

Common[a] Name	Botanical Name	Growth Season[b]	Growth Form	Seeds/ Pound	Pounds of PLS/acre
Alakali Soil Seed Mix					
Alkali sacaton	*Sporobolus airoides*	Cool	Bunch	1,750,000	0.25
Basin wildrye	*Elymus cinereus*	Cool	Bunch	165,000	2.5
Sodar streambank wheatgrass	*Agropyron riparium 'Sodar'*	Cool	Sod	170,000	2.5
Jose tall wheatgrass	*Agropyron elongatum 'Jose'*	Cool	Bunch	79,000	7.0
Arriba western wheatgrass	*Agropyron smithii 'Arriba'*	Cool	Sod	110,000	5.5
Total					**17.75**
Fertile Loamy Soil Seed Mix					
Ephriam crested wheatgrass	*Agropyron cristatum 'Ephriam'*	Cool	Sod	175,000	2.0
Dural hard fescue	*Festuca ovina 'duriuscula'*	Cool	Bunch	565,000	1.0
Lincoln smooth brome	*Bromus inermis leyss 'Lincoln'*	Cool	Sod	130,000	3.0
Sodar streambank wheatgrass	*Agropyron riparium 'Sodar'*	Cool	Sod	170,000	2.5
Arriba western wheatgrass	*Agropyron smithii 'Arriba'*	Cool	Sod	110,000	7.0
Total					**15.5**
High Water Table Soil Seed Mix					
Meadow foxtail	*Alopecurus pratensis*	Cool	Sod	900,000	0.5
Redtop	*Agrostis alba*	Warm	Open sod	5,000,000	0.25
Reed canarygrass	*Phalaris arundinacea*	Cool	Sod	68,000	0.5
Lincoln smooth brome	*Bromus inermis leyss 'Lincoln'*	Cool	Sod	130,000	3.0
Pathfinder switchgrass	*Panicum virgatum 'Pathfinder'*	Warm	Sod	389,000	1.0
Alkar tall wheatgrass	*Agropyron elongatum 'Alkar'*	Cool	Bunch	79,000	5.5
Total					**10.75**
Transition Turf Seed Mix[c]					
Ruebens Canadian bluegrass	*Poa compressa 'Ruebens'*	Cool	Sod	2,500,000	0.5
Dural hard fescue	*Festuca ovina 'duriuscula'*	Cool	Bunch	565,000	1.0
Citation perennial ryegrass	*Lolium perenne 'Citation'*	Cool	Sod	247,000	3.0
Lincoln smooth brome	*Bromus inermis leyss 'Lincoln'*	Cool	Sod	130,000	3.0
Total					**7.5**

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses (cont.)

Common Name	Botanical Name	Growth Season[b]	Growth Form	Seeds/ Pound	Pounds of PLS/acre
Sandy Soil Seed Mix					
Blue grama	*Bouteloua gracilis*	Warm	Sod-forming bunchgrass	825,000	0.5
Camper little bluestem	*Schizachyrium scoparium 'Camper'*	Warm	Bunch	240,000	1.0
Prairie sandreed	*Calamovilfa longifolia*	Warm	Open sod	274,000	1.0
Sand dropseed	*Sporobolus cryptandrus*	Cool	Bunch	5,298,000	0.25
Vaughn sideoats grama	*Bouteloua curtipendula 'Vaughn'*	Warm	Sod	191,000	2.0
Arriba western wheatgrass	*Agropyron smithii 'Arriba'*	Cool	Sod	110,000	5.5
Total					**10.25**
Heavy Clay, Rocky Foothill Seed Mix					
Ephriam crested wheatgrass[d]	*Agropyron cristatum 'Ephriam'*	Cool	Sod	175,000	1.5
Oahe Intermediate wheatgrass	*Agropyron intermedium 'Oahe'*	Cool	Sod	115,000	5.5
Vaughn sideoats grama[e]	*Bouteloua curtipendula 'Vaughn'*	Warm	Sod	191,000	2.0
Lincoln smooth brome	*Bromus inermis leyss 'Lincoln'*	Cool	Sod	130,000	3.0
Arriba western wheatgrass	*Agropyron smithii 'Arriba'*	Cool	Sod	110,000	5.5
Total					**17.5**

[a] All of the above seeding mixes and rates are based on drill seeding followed by crimped straw mulch. These rates should be doubled if seed is broadcast and should be increased by 50 percent if the seeding is done using a Brillion Drill or is applied through hydraulic seeding. Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1. If hydraulic seeding is used, hydraulic mulching should be done as a separate operation.

[b] See Table TS/PS-3 for seeding dates.

[c] If site is to be irrigated, the transition turf seed rates should be doubled.

[d] Crested wheatgrass should not be used on slopes steeper than 6H to 1V.

[e] Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sideoats grama.

Table TS/PS-3. Seeding Dates for Annual and Perennial Grasses

	Annual Grasses (Numbers in table reference species in Table TS/PS-1)		Perennial Grasses	
Seeding Dates	**Warm**	**Cool**	**Warm**	**Cool**
January 1–March 15			✓	✓
March 16–April 30	4	1,2,3	✓	✓
May 1–May 15	4		✓	
May 16–June 30	4,5,6,7			
July 1–July 15	5,6,7			
July 16–August 31				
September 1–September 30		8,9,10,11		
October 1–December 31			✓	✓

Mulch

Cover seeded areas with mulch or an appropriate rolled erosion control product to promote establishment of vegetation. Anchor mulch by crimping, netting or use of a non-toxic tackifier. See the Mulching BMP Fact Sheet for additional guidance.

Maintenance and Removal

Monitor and observe seeded areas to identify areas of poor growth or areas that fail to germinate. Reseed and mulch these areas, as needed.

An area that has been permanently seeded should have a good stand of vegetation within one growing season if irrigated and within three growing seasons without irrigation in Colorado. Reseed portions of the site that fail to germinate or remain bare after the first growing season.

Seeded areas may require irrigation, particularly during extended dry periods. Targeted weed control may also be necessary.

Protect seeded areas from construction equipment and vehicle access.

Mulching (MU) EC-4

Description

Mulching consists of evenly applying straw, hay, shredded wood mulch, rock, bark or compost to disturbed soils and securing the mulch by crimping, tackifiers, netting or other measures. Mulching helps reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Although often applied in conjunction with temporary or permanent seeding, it can also be used for temporary stabilization of areas that cannot be reseeded due to seasonal constraints.

Mulch can be applied either using standard mechanical dry application methods or using hydromulching equipment that hydraulically applies a slurry of water, wood fiber mulch, and often a tackifier.

Photograph MU-1. An area that was recently seeded, mulched, and crimped.

Appropriate Uses

Use mulch in conjunction with seeding to help protect the seedbed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed areas where growing season constraints prevent effective reseeding. Disturbed areas should be properly mulched and tacked, or seeded, mulched and tacked promptly after final grade is reached (typically within no longer than 14 days) on portions of the site not otherwise permanently stabilized.

Standard dry mulching is encouraged in most jurisdictions; however, hydromulching may not be allowed in certain jurisdictions or may not be allowed near waterways.

Do not apply mulch during windy conditions.

Design and Installation

Prior to mulching, surface-roughen areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical because track walking with heavy equipment typically compacts the soil.

A variety of mulches can be used effectively at construction sites. Consider the following:

Mulch	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

- Clean, weed-free and seed-free cereal grain straw should be applied evenly at a rate of 2 tons per acre and must be tacked or fastened by a method suitable for the condition of the site. Straw mulch must be anchored (and not merely placed) on the surface. This can be accomplished mechanically by crimping or with the aid of tackifiers or nets. Anchoring with a crimping implement is preferred, and is the recommended method for areas flatter than 3:1. Mechanical crimpers must be capable of tucking the long mulch fibers into the soil to a depth of 3 inches without cutting them. An agricultural disk, while not an ideal substitute, may work if the disk blades are dull or blunted and set vertically; however, the frame may have to be weighted to afford proper soil penetration.

- Grass hay may be used in place of straw; however, because hay is comprised of the entire plant including seed, mulching with hay may seed the site with non-native grass species which might in turn out-compete the native seed. Alternatively, native species of grass hay may be purchased, but can be difficult to find and are more expensive than straw. Purchasing and utilizing a certified weed-free straw is an easier and less costly mulching method. When using grass hay, follow the same guidelines as for straw (provided above).

- On small areas sheltered from the wind and heavy runoff, spraying a tackifier on the mulch is satisfactory for holding it in place. For steep slopes and special situations where greater control is needed, erosion control blankets anchored with stakes should be used instead of mulch.

- Hydraulic mulching consists of wood cellulose fibers mixed with water and a tackifying agent and should be applied at a rate of no less than 1,500 pounds per acre (1,425 lbs of fibers mixed with at least 75 lbs of tackifier) with a hydraulic mulcher. For steeper slopes, up to 2000 pounds per acre may be required for effective hydroseeding. Hydromulch typically requires up to 24 hours to dry; therefore, it should not be applied immediately prior to inclement weather. Application to roads, waterways and existing vegetation should be avoided.

- Erosion control mats, blankets, or nets are recommended to help stabilize steep slopes (generally 3:1 and steeper) and waterways. Depending on the product, these may be used alone or in conjunction with grass or straw mulch. Normally, use of these products will be restricted to relatively small areas. Biodegradable mats made of straw and jute, straw-coconut, coconut fiber, or excelsior can be used instead of mulch. (See the ECM/TRM BMP for more information.)

- Some tackifiers or binders may be used to anchor mulch. Check with the local jurisdiction for allowed tackifiers. Manufacturer's recommendations should be followed at all times. (See the Soil Binder BMP for more information on general types of tackifiers.)

- Rock can also be used as mulch. It provides protection of exposed soils to wind and water erosion and allows infiltration of precipitation. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.

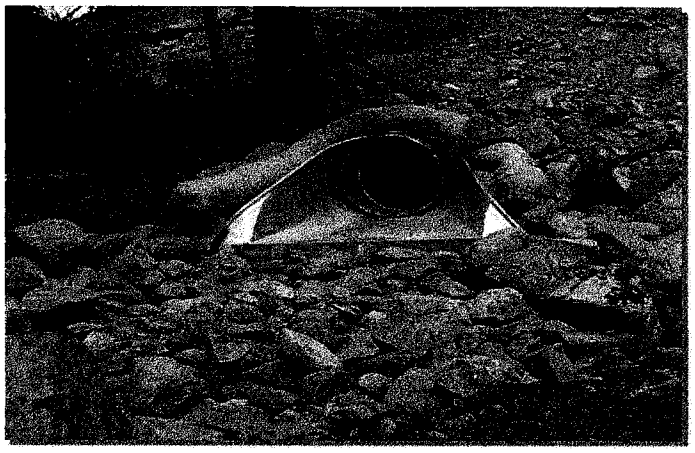
Maintenance and Removal

After mulching, the bare ground surface should not be more than 10 percent exposed. Reapply mulch, as needed, to cover bare areas.

Temporary Outlet Protection (TOP) EC-8

Description

Outlet protection helps to reduce erosion immediately downstream of a pipe, culvert, slope drain, rundown or other conveyance with concentrated, high-velocity flows. Typical outlet protection consists of riprap or rock aprons at the conveyance outlet.



Photograph TOP-1. Riprap outlet protection.

Appropriate Uses

Outlet protection should be used when a conveyance discharges onto a disturbed area where there is potential for accelerated erosion due to concentrated flow. Outlet protection should be provided where the velocity at the culvert outlet exceeds the maximum permissible velocity of the material in the receiving channel.

Note: This Fact Sheet and detail are for temporary outlet protection, outlets that are intended to be used for less than 2 years. For permanent, long-term outlet protection, see the *Major Drainage* chapter of Volume 1.

Design and Installation

Design outlet protection to handle runoff from the largest drainage area that may be contributing runoff during construction (the drainage area may change as a result of grading). Key in rock, around the entire perimeter of the apron, to a minimum depth of 6 inches for stability. Extend riprap to the height of the culvert or the normal flow depth of the downstream channel, whichever is less. Additional erosion control measures such as vegetative lining, turf reinforcement mat and/or other channel lining methods may be required downstream of the outlet protection if the channel is susceptible to erosion. See Design Detail OP-1 for additional information.

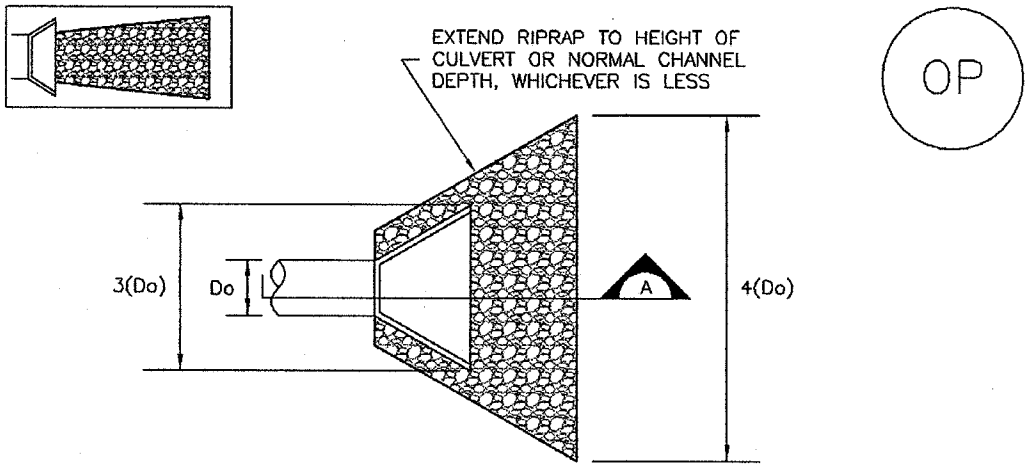
Maintenance and Removal

Inspect apron for damage and displaced rocks. If rocks are missing or significantly displaced, repair or replace as necessary. If rocks are continuously missing or displaced, consider increasing the size of the riprap or deeper keying of the perimeter.

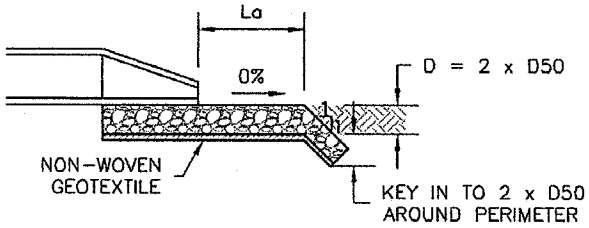
Remove sediment accumulated at the outlet before the outlet protection becomes buried and ineffective. When sediment accumulation is noted, check that upgradient BMPs, including inlet protection, are in effective operating condition.

Outlet protection may be removed once the pipe is no longer draining an upstream area, or once the downstream area has been sufficiently stabilized. If the drainage pipe is permanent, outlet protection can be left in place; however, permanent outlet protection should be designed and constructed in accordance with the requirements of the *Major Drainage* chapter of Volume 2.

Outlet Protection	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No



TEMPORARY OUTLET PROTECTION PLAN



SECTION A

TABLE OP-1. TEMPORARY OUTLET PROTECTION SIZING TABLE			
PIPE DIAMETER, Do (INCHES)	DISCHARGE, Q (CFS)	APRON LENGTH, La (FT)	RIPRAP D50 DIAMETER MIN (INCHES)
8	2.5 5	5 10	4 6
12	5 10	10 13	4 6
18	10 20 30 40	10 16 23 26	6 9 12 16
24	30 40 50 60	16 26 26 30	9 9 12 16

OP-1. TEMPORARY OUTLET PROTECTION

TEMPORARY OUTLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF OUTLET PROTECTION.
   -DIMENSIONS OF OUTLET PROTECTION.

2. DETAIL IS INTENDED FOR PIPES WITH SLOPE $\leq$ 10%. ADDITIONAL EVALUATION OF RIPRAP SIZING AND OUTLET PROTECTION DIMENSIONS REQUIRED FOR STEEPER SLOPES.

3. TEMPORARY OUTLET PROTECTION INFORMATION IS FOR OUTLETS INTENDED TO BE UTILIZED LESS THAN 2 YEARS.

TEMPORARY OUTLET PROTECTION INSPECTION AND MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

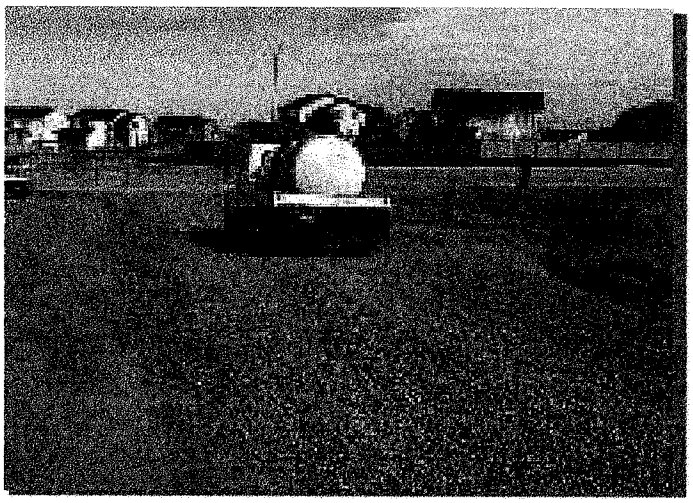
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM AURORA, COLORADO AND PREVIOUS VERSION OF VOLUME 3, NOT AVAILABLE IN AUTOCAD)

Wind Erosion/Dust Control (DC) EC-14

Description

Wind erosion and dust control BMPs help to keep soil particles from entering the air as a result of land disturbing construction activities. These BMPs include a variety of practices generally focused on either graded disturbed areas or construction roadways. For graded areas, practices such as seeding and mulching, use of soil binders, site watering, or other practices that provide prompt surface cover should be used. For construction roadways, road watering and stabilized surfaces should be considered.



Photograph DC-1. Water truck used for dust suppression. Photo courtesy of Douglas County.

Appropriate Uses

Dust control measures should be used on any site where dust poses a problem to air quality. Dust control is important to control for the health of construction workers and surrounding waterbodies.

Design and Installation

The following construction BMPs can be used for dust control:

- An irrigation/sprinkler system can be used to wet the top layer of disturbed soil to help keep dry soil particles from becoming airborne.
- Seeding and mulching can be used to stabilize disturbed surfaces and reduce dust emissions.
- Protecting existing vegetation can help to slow wind velocities across the ground surface, thereby limiting the likelihood of soil particles to become airborne.
- Spray-on soil binders form a bond between soil particles keeping them grounded. Chemical treatments may require additional permitting requirements. Potential impacts to surrounding waterways and habitat must be considered prior to use.
- Placing rock on construction roadways and entrances will help keep dust to a minimum across the construction site.
- Wind fences can be installed on site to reduce wind speeds. Install fences perpendicular to the prevailing wind direction for maximum effectiveness.

Wind Erosion Control/ Dust Control	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	Moderate

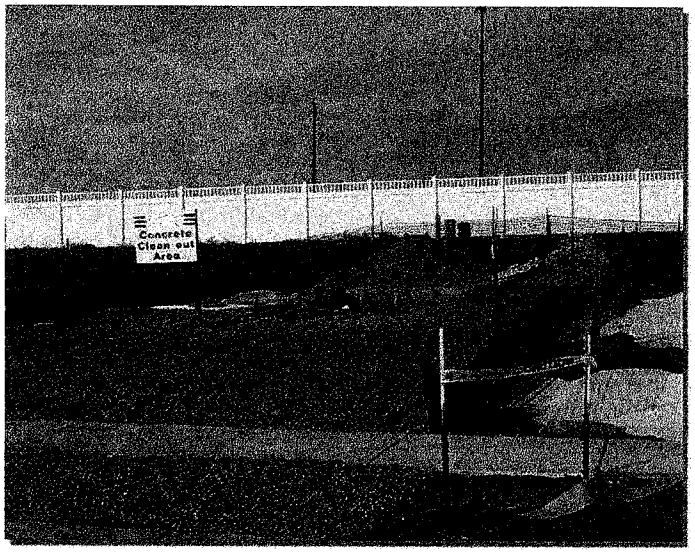
Maintenance and Removal

When using an irrigation/sprinkler control system to aid in dust control, be careful not to overwater. Overwatering will cause construction vehicles to track mud off-site.

Concrete Washout Area (CWA) MM-1

Description

Concrete waste management involves designating and properly managing a specific area of the construction site as a concrete washout area. A concrete washout area can be created using one of several approaches designed to receive wash water from washing of tools and concrete mixer chutes, liquid concrete waste from dump trucks, mobile batch mixers, or pump trucks. Three basic approaches are available: excavation of a pit in the ground, use of an above ground storage area, or use of prefabricated haul-away concrete washout containers. Surface discharges of concrete washout water from construction sites are prohibited.



Photograph CWA-1. Example of concrete washout area. Note gravel tracking pad for access and sign.

Appropriate Uses

Concrete washout areas must be designated on all sites that will generate concrete wash water or liquid concrete waste from onsite concrete mixing or concrete delivery.

Because pH is a pollutant of concern for washout activities, when unlined pits are used for concrete washout, the soil must have adequate buffering capacity to result in protection of state groundwater standards; otherwise, a liner/containment must be used. The following management practices are recommended to prevent an impact from unlined pits to groundwater:

- The use of the washout site should be temporary (less than 1 year), and
- The washout site should be not be located in an area where shallow groundwater may be present, such as near natural drainages, springs, or wetlands.

Design and Installation

Concrete washout activities must be conducted in a manner that does not contribute pollutants to surface waters or stormwater runoff. Concrete washout areas may be lined or unlined excavated pits in the ground, commercially manufactured prefabricated washout containers, or aboveground holding areas constructed of berms, sandbags or straw bales with a plastic liner.

Although unlined washout areas may be used, lined pits may be required to protect groundwater under certain conditions.

Do not locate an unlined washout area within 400 feet of any natural drainage pathway or waterbody or within 1,000 feet of any wells or drinking water sources. Even for lined concrete washouts, it is advisable to locate the facility away from waterbodies and drainage paths. If site constraints make these

Concrete Washout Area	
Functions	
Erosion Control	No
Sediment Control	No
Site/Material Management	Yes

setbacks infeasible or if highly permeable soils exist in the area, then the pit must be installed with an impermeable liner (16 mil minimum thickness) or surface storage alternatives using prefabricated concrete washout devices or a lined aboveground storage area should be used.

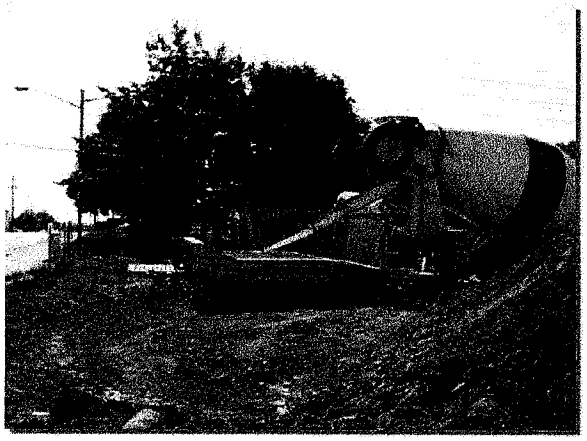
Design details with notes are provided in Detail CWA-1 for pits and CWA-2 for aboveground storage areas. Pre-fabricated concrete washout container information can be obtained from vendors.

Maintenance and Removal

A key consideration for concrete washout areas is to ensure that adequate signage is in place identifying the location of the washout area. Part of inspecting and maintaining washout areas is ensuring that adequate signage is provided and in good repair and that the washout area is being used, as opposed to washout in non-designated areas of the site.

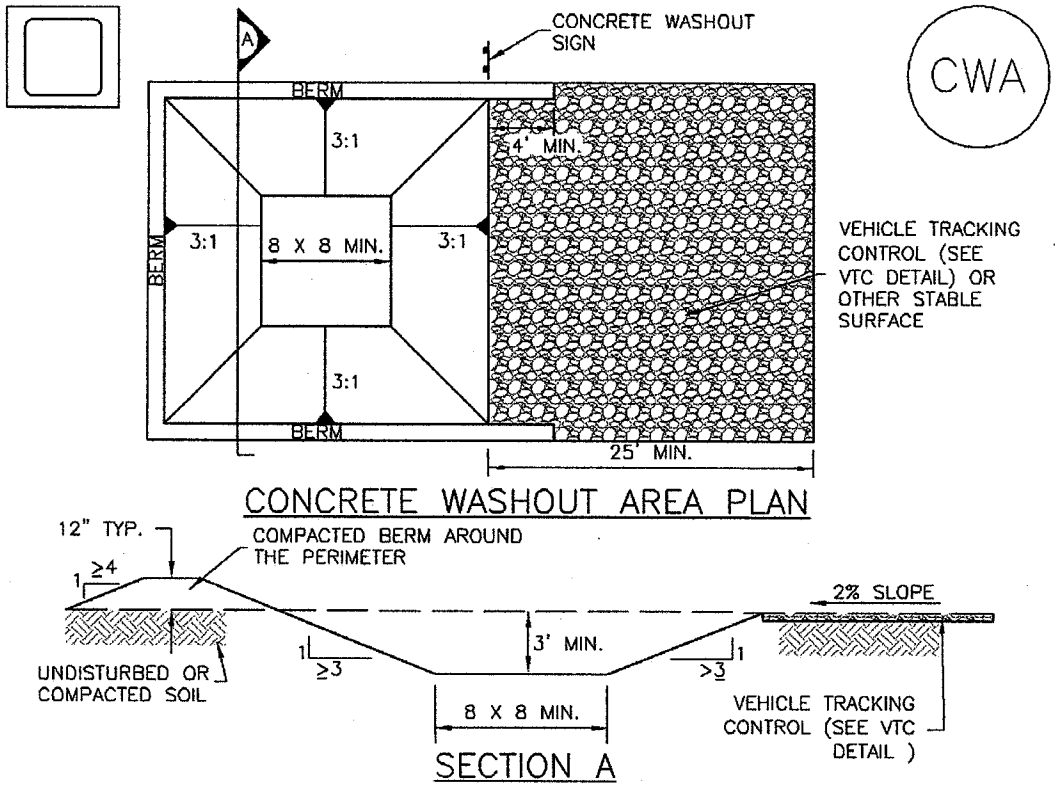
Remove concrete waste in the washout area, as needed to maintain BMP function (typically when filled to about two-thirds of its capacity). Collect concrete waste and deliver offsite to a designated disposal location.

Upon termination of use of the washout site, accumulated solid waste, including concrete waste and any contaminated soils, must be removed from the site to prevent on-site disposal of solid waste. If the wash water is allowed to evaporate and the concrete hardens, it may be recycled.



Photograph CWA-2. Prefabricated concrete washout. Photo courtesy of CDOT.

Photograph CWA-3. Earthen concrete washout. Photo courtesy of CDOT.



CWA–1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –CWA INSTALLATION LOCATION.

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CWA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

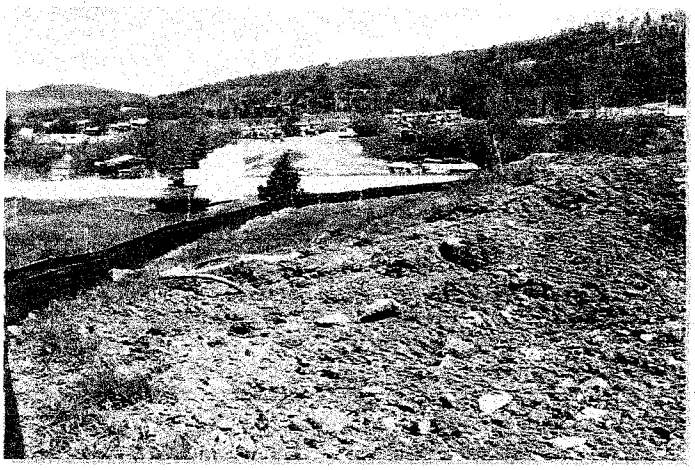
Stockpile Management (SP) MM-2

Description

Stockpile management includes measures to minimize erosion and sediment transport from soil stockpiles.

Appropriate Uses

Stockpile management should be used when soils or other erodible materials are stored at the construction site. Special attention should be given to stockpiles in close proximity to natural or manmade storm systems.



Photograph SP-1. A topsoil stockpile that has been partially revegetated and is protected by silt fence perimeter control.

Design and Installation

Locate stockpiles away from all drainage system components including storm sewer inlets. Where practical, choose stockpile locations that that will remain undisturbed for the longest period of time as the phases of construction progress. Place sediment control BMPs around the perimeter of the stockpile, such as sediment control logs, rock socks, silt fence, straw bales and sand bags. See Detail SP-1 for guidance on proper establishment of perimeter controls around a stockpile. For stockpiles in active use, provide a stabilized designated access point on the upgradient side of the stockpile.

Stabilize the stockpile surface with surface roughening, temporary seeding and mulching, erosion control blankets, or soil binders. Soils stockpiled for an extended period (typically for more than 60 days) should be seeded and mulched with a temporary grass cover once the stockpile is placed (typically within 14 days). Use of mulch only or a soil binder is acceptable if the stockpile will be in place for a more limited time period (typically 30-60 days). Timeframes for stabilization of stockpiles noted in this fact sheet are "typical" guidelines. Check permit requirements for specific federal, state, and/or local requirements that may be more prescriptive.

Stockpiles should not be placed in streets or paved areas unless no other practical alternative exists. See the Stabilized Staging Area Fact Sheet for guidance when staging in roadways is unavoidable due to space or right-of-way constraints. For paved areas, rock socks must be used for perimeter control and all inlets with the potential to receive sediment from the stockpile (even from vehicle tracking) must be protected.

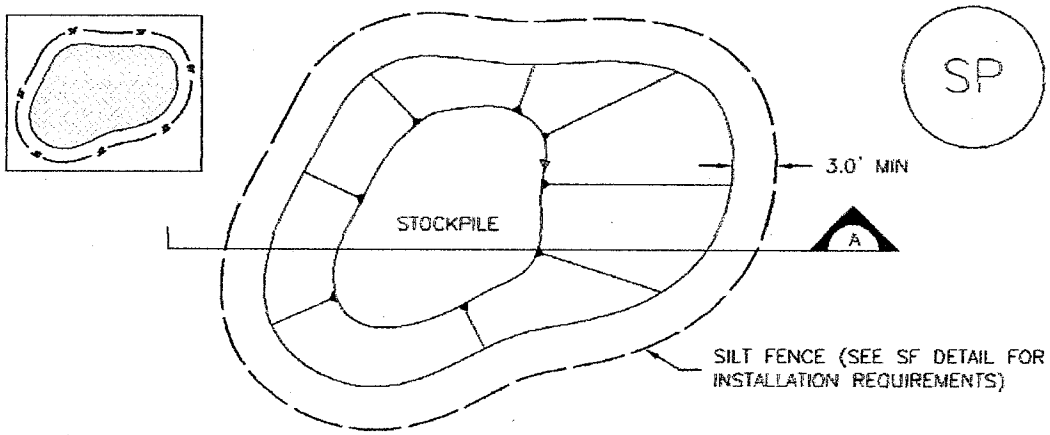
Maintenance and Removal

Inspect perimeter controls and inlet protection in accordance with their respective BMP Fact Sheets. Where seeding, mulch and/or soil binders are used, reseeding or reapplication of soil binder may be necessary.

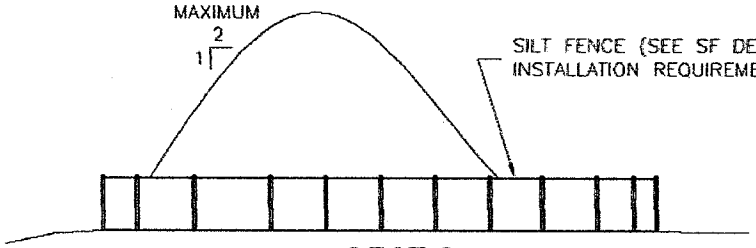
When temporary removal of a perimeter BMP is necessary to access a stockpile, ensure BMPs are reinstalled in accordance with their respective design detail section.

Stockpile Management	
Functions	
Erosion Control	Yes
Sediment Control	Yes
Site/Material Management	Yes

When the stockpile is no longer needed, properly dispose of excess materials and revegetate or otherwise stabilize the ground surface where the stockpile was located.



STOCKPILE PROTECTION PLAN



SECTION A

SP–1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF STOCKPILES.
   –TYPE OF STOCKPILE PROTECTION.

2. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.

3. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30–60 DAYS).

4. FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS, INCLUDING PERIMETER CONTROL, ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.

STOCKPILE PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

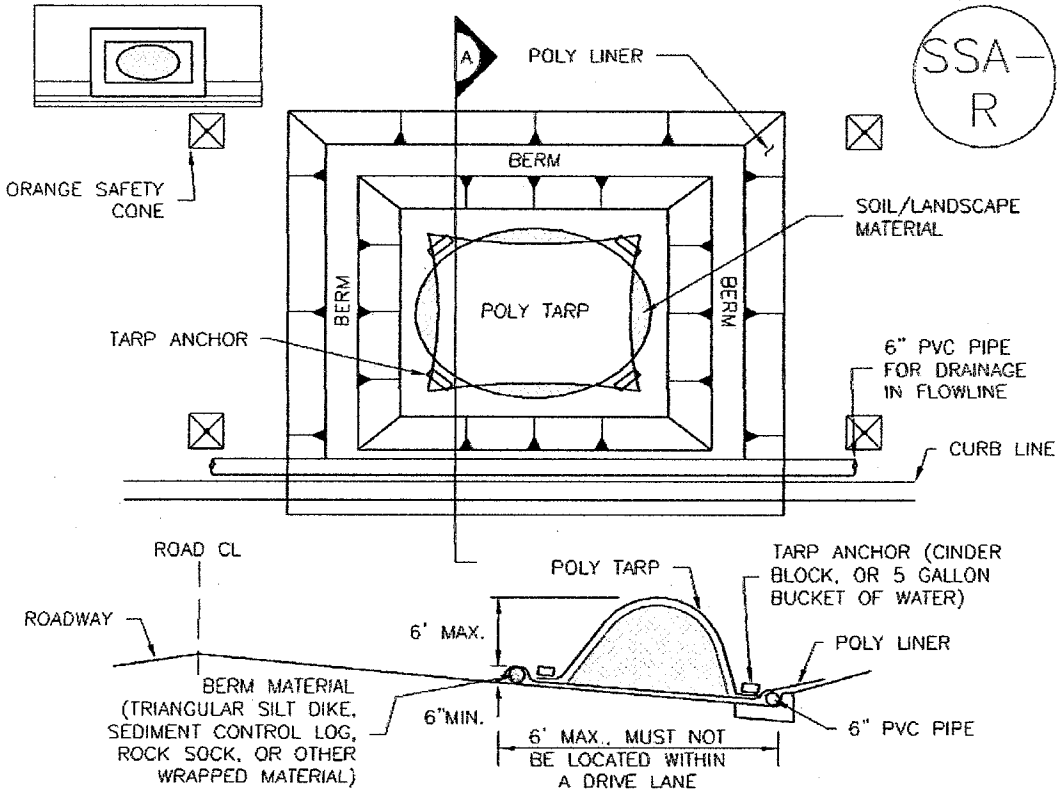
STOCKPILE PROTECTION MAINTENANCE NOTES

4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.

5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

(DETAILS ADAPTED FROM PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.



SP-2. MATERIALS STAGING IN ROADWAY

MATERIALS STAGING IN ROADWAYS INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF MATERIAL STAGING AREA(S).
   -CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. FEATURE MUST BE INSTALLED PRIOR TO EXCAVATION, EARTHWORK OR DELIVERY OF MATERIALS.

3. MATERIALS MUST BE STATIONED ON THE POLY LINER. ANY INCIDENTAL MATERIALS DEPOSITED ON PAVED SECTION OR ALONG CURB LINE MUST BE CLEANED UP PROMPTLY.

4. POLY LINER AND TARP COVER SHOULD BE OF SIGNIFICANT THICKNESS TO PREVENT DAMAGE OR LOSS OF INTEGRITY.

5. SAND BAGS MAY BE SUBSTITUTED TO ANCHOR THE COVER TARP OR PROVIDE BERMING UNDER THE BASE LINER.

6. FEATURE IS NOT INTENDED FOR USE WITH WET MATERIAL THAT WILL BE DRAINING AND/OR SPREADING OUT ON THE POLY LINER OR FOR DEMOLITION MATERIALS.

7. THIS FEATURE CAN BE USED FOR:
   -UTILITY REPAIRS.
   -WHEN OTHER STAGING LOCATIONS AND OPTIONS ARE LIMITED.
   -OTHER LIMITED APPLICATION AND SHORT DURATION STAGING.

MATERIALS STAGING IN ROADWAY MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. INSPECT PVC PIPE ALONG CURB LINE FOR CLOGGING AND DEBRIS. REMOVE OBSTRUCTIONS PROMPTLY.

5. CLEAN MATERIAL FROM PAVED SURFACES BY SWEEPING OR VACUUMING.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM AURORA, COLORADO)

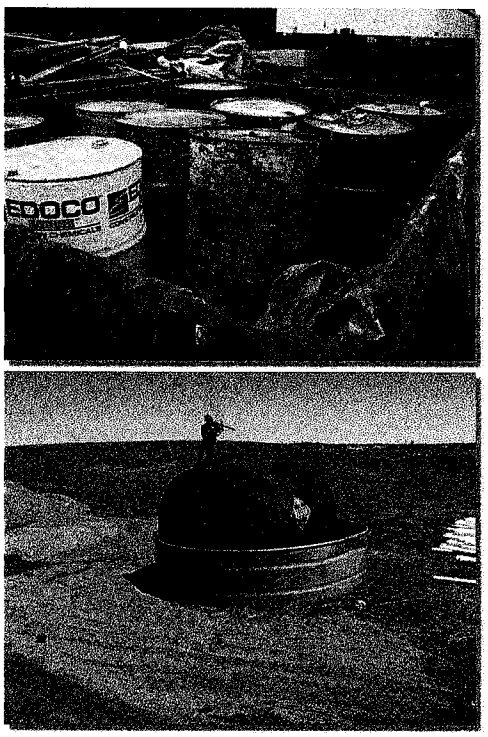
Good Housekeeping Practices (GH) MM-3

Description

Implement construction site good housekeeping practices to prevent pollution associated with solid, liquid and hazardous construction-related materials and wastes. Stormwater Management Plans (SWMPs) should clearly specify BMPs including these good housekeeping practices:

- Provide for waste management.
- Establish proper building material staging areas.
- Designate paint and concrete washout areas.
- Establish proper equipment/vehicle fueling and maintenance practices.
- Control equipment/vehicle washing and allowable non-stormwater discharges.
- Develop a spill prevention and response plan.

Acknowledgement: This Fact Sheet is based directly on EPA guidance provided in *Developing Your Stormwater Pollution Prevent Plan* (EPA 2007).



Photographs GH-1 and GH-2. Proper materials storage and secondary containment for fuel tanks are important good housekeeping practices. Photos courtesy of CDOT and City of Aurora.

Appropriate Uses

Good housekeeping practices are necessary at all construction sites.

Design and Installation

The following principles and actions should be addressed in SWMPs:

- **Provide for Waste Management.** Implement management procedures and practices to prevent or reduce the exposure and transport of pollutants in stormwater from solid, liquid and sanitary wastes that will be generated at the site. Practices such as trash disposal, recycling, proper material handling, and cleanup measures can reduce the potential for stormwater runoff to pick up construction site wastes and discharge them to surface waters. Implement a comprehensive set of waste-management practices for hazardous or toxic materials, such as paints, solvents, petroleum products, pesticides, wood preservatives, acids, roofing tar, and other materials. Practices should include storage, handling, inventory, and cleanup procedures, in case of spills. Specific practices that should be considered include:

  Solid or Construction Waste

  - Designate trash and bulk waste-collection areas on-site.

Good Housekeeping	
Functions	
Erosion Control	No
Sediment Control	No
Site/Material Management	Yes

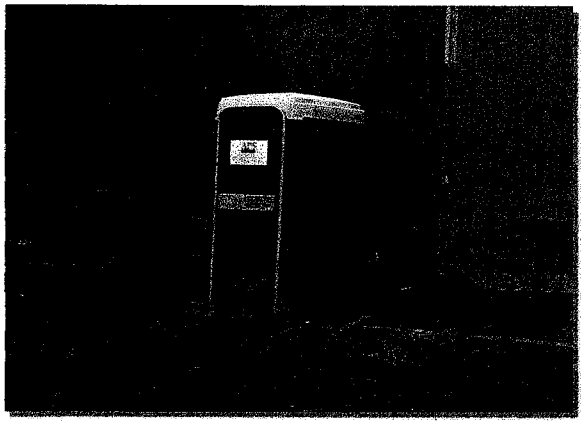
- Recycle materials whenever possible (e.g., paper, wood, concrete, oil).
- Segregate and provide proper disposal options for hazardous material wastes.
- Clean up litter and debris from the construction site daily.
- Locate waste-collection areas away from streets, gutters, watercourses, and storm drains. Waste-collection areas (dumpsters, and such) are often best located near construction site entrances to minimize traffic on disturbed soils. Consider secondary containment around waste collection areas to minimize the likelihood of contaminated discharges.
- Empty waste containers before they are full and overflowing.

Sanitary and Septic Waste

- Provide convenient, well-maintained, and properly located toilet facilities on-site.
- Locate toilet facilities away from storm drain inlets and waterways to prevent accidental spills and contamination of stormwater.
- Maintain clean restroom facilities and empty portable toilets regularly.
- Where possible, provide secondary containment pans under portable toilets.
- Provide tie-downs or stake-downs for portable toilets.
- Educate employees, subcontractors, and suppliers on locations of facilities.
- Treat or dispose of sanitary and septic waste in accordance with state or local regulations. Do not discharge or bury wastewater at the construction site.
- Inspect facilities for leaks. If found, repair or replace immediately.
- Special care is necessary during maintenance (pump out) to ensure that waste and/or biocide are not spilled on the ground.

Hazardous Materials and Wastes

- Develop and implement employee and subcontractor education, as needed, on hazardous and toxic waste handling, storage, disposal, and cleanup.
- Designate hazardous waste-collection areas on-site.
- Place all hazardous and toxic material wastes in secondary containment.



Photograph GH-3. Locate portable toilet facilities on level surfaces away from waterways and storm drains. Photo courtesy of WWE.

- Hazardous waste containers should be inspected to ensure that all containers are labeled properly and that no leaks are present.

- **Establish Proper Building Material Handling and Staging Areas.** The SWMP should include comprehensive handling and management procedures for building materials, especially those that are hazardous or toxic. Paints, solvents, pesticides, fuels and oils, other hazardous materials or building materials that have the potential to contaminate stormwater should be stored indoors or under cover whenever possible or in areas with secondary containment. Secondary containment measures prevent a spill from spreading across the site and may include dikes, berms, curbing, or other containment methods. Secondary containment techniques should also ensure the protection of groundwater. Designate staging areas for activities such as fueling vehicles, mixing paints, plaster, mortar, and other potential pollutants. Designated staging areas enable easier monitoring of the use of materials and clean up of spills. Training employees and subcontractors is essential to the success of this pollution prevention principle. Consider the following specific materials handling and staging practices:

  - Train employees and subcontractors in proper handling and storage practices.

  - Clearly designate site areas for staging and storage with signs and on construction drawings. Staging areas should be located in areas central to the construction site. Segment the staging area into sub-areas designated for vehicles, equipment, or stockpiles. Construction entrances and exits should be clearly marked so that delivery vehicles enter/exit through stabilized areas with vehicle tracking controls (See Vehicle Tracking Control Fact Sheet).

  - Provide storage in accordance with Spill Protection, Control and Countermeasures (SPCC) requirements and plans and provide cover and impermeable perimeter control, as necessary, for hazardous materials and contaminated soils that must be stored on site.

  - Ensure that storage containers are regularly inspected for leaks, corrosion, support or foundation failure, or other signs of deterioration and tested for soundness.

  - Reuse and recycle construction materials when possible.

- **Designate Concrete Washout Areas.** Concrete contractors should be encouraged to use the washout facilities at their own plants or dispatch facilities when feasible; however, concrete washout commonly occurs on construction sites. If it is necessary to provide for concrete washout areas on-site, designate specific washout areas and design facilities to handle anticipated washout water. Washout areas should also be provided for paint and stucco operations. Because washout areas can be a source of pollutants from leaks or spills, care must be taken with regard to their placement and proper use. See the Concrete Washout Area Fact Sheet for detailed guidance.

  Both self-constructed and prefabricated washout containers can fill up quickly when concrete, paint, and stucco work are occurring on large portions of the site. Be sure to check for evidence that contractors are using the washout areas and not dumping materials onto the ground or into drainage facilities. If the washout areas are not being used regularly, consider posting additional signage, relocating the facilities to more convenient locations, or providing training to workers and contractors.

  When concrete, paint, or stucco is part of the construction process, consider these practices which will help prevent contamination of stormwater. Include the locations of these areas and the maintenance and inspection procedures in the SWMP.

- Do not washout concrete trucks or equipment into storm drains, streets, gutters, uncontained areas, or streams. Only use designated washout areas.
- Establish washout areas and advertise their locations with signs. Ensure that signage remains in good repair.
- Provide adequate containment for the amount of wash water that will be used.
- Inspect washout structures daily to detect leaks or tears and to identify when materials need to be removed.
- Dispose of materials properly. The preferred method is to allow the water to evaporate and to recycle the hardened concrete. Full service companies may provide dewatering services and should dispose of wastewater properly. Concrete wash water can be highly polluted. It should not be discharged to any surface water, storm sewer system, or allowed to infiltrate into the ground in the vicinity of waterbodies. Washwater should not be discharged to a sanitary sewer system without first receiving written permission from the system operator.

- **Establish Proper Equipment/Vehicle Fueling and Maintenance Practices.** Create a clearly designated on-site fueling and maintenance area that is clean and dry. The on-site fueling area should have a spill kit, and staff should know how to use it. If possible, conduct vehicle fueling and maintenance activities in a covered area. Consider the following practices to help prevent the discharge of pollutants to stormwater from equipment/vehicle fueling and maintenance. Include the locations of designated fueling and maintenance areas and inspection and maintenance procedures in the SWMP.
  - Train employees and subcontractors in proper fueling procedures (stay with vehicles during fueling, proper use of pumps, emergency shutoff valves, etc.).
  - Inspect on-site vehicles and equipment regularly for leaks, equipment damage, and other service problems.
  - Clearly designate vehicle/equipment service areas away from drainage facilities and watercourses to prevent stormwater run-on and runoff.
  - Use drip pans, drip cloths, or absorbent pads when replacing spent fluids.
  - Collect all spent fluids, store in appropriate labeled containers in the proper storage areas, and recycle fluids whenever possible.

- **Control Equipment/Vehicle Washing and Allowable Non-Stormwater Discharges.** Implement practices to prevent contamination of surface and groundwater from equipment and vehicle wash water. Representative practices include:
  - Educate employees and subcontractors on proper washing procedures.
  - Use off-site washing facilities, when available.
  - Clearly mark the washing areas and inform workers that all washing must occur in this area.
  - Contain wash water and treat it using BMPs. Infiltrate washwater when possible, but maintain separation from drainage paths and waterbodies.

- Use high-pressure water spray at vehicle washing facilities without detergents. Water alone can remove most dirt adequately.
- Do not conduct other activities, such as vehicle repairs, in the wash area.
- Include the location of the washing facilities and the inspection and maintenance procedures in the SWMP.

- **Develop a Spill Prevention and Response Plan.** Spill prevention and response procedures must be identified in the SWMP. Representative procedures include identifying ways to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and response. The plan should also specify material handling procedures and storage requirements and ensure that clear and concise spill cleanup procedures are provided and posted for areas in which spills may potentially occur. When developing a spill prevention plan, include the following:
  - Note the locations of chemical storage areas, storm drains, tributary drainage areas, surface waterbodies on or near the site, and measures to stop spills from leaving the site.
  - Provide proper handling and safety procedures for each type of waste. Keep Material Safety Data Sheets (MSDSs) for chemical used on site with the SWMP.
  - Establish an education program for employees and subcontractors on the potential hazards to humans and the environment from spills and leaks.
  - Specify how to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities to request assistance. Emergency procedures and contact numbers should be provided in the SWMP and posted at storage locations.
  - Describe the procedures, equipment and materials for immediate cleanup of spills and proper disposal.
  - Identify personnel responsible for implementing the plan in the event of a spill. Update the spill prevention plan and clean up materials as changes occur to the types of chemicals stored and used at the facility.

Spill Prevention, Control, and Countermeasure (SPCC) Plan

Construction sites may be subject to 40 CFR Part 112 regulations that require the preparation and implementation of a SPCC Plan to prevent oil spills from aboveground and underground storage tanks. The facility is subject to this rule if it is a non-transportation-related facility that:

- Has a total storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons.
- Could reasonably be expected to discharge oil in quantities that may be harmful to navigable waters of the United States and adjoining shorelines.

Furthermore, if the facility is subject to 40 CFR Part 112, the SWMP should reference the SPCC Plan. To find out more about SPCC Plans, see EPA's website on SPPC at www.epa.gov/oilspill/spcc.htm.

Reporting Oil Spills

In the event of an oil spill, contact the National Response Center toll free at 1-800-424- 8802 for assistance, or for more details, visit their website: www.nrc.uscg.mil.

Maintenance and Removal

Effective implementation of good housekeeping practices is dependent on clear designation of personnel responsible for supervising and implementing good housekeeping programs, such as site cleanup and disposal of trash and debris, hazardous material management and disposal, vehicle and equipment maintenance, and other practices. Emergency response "drills" may aid in emergency preparedness.

Checklists may be helpful in good housekeeping efforts.

Staging and storage areas require permanent stabilization when the areas are no longer being used for construction-related activities.

Construction-related materials, debris and waste must be removed from the construction site once construction is complete.

Design Details

See the following Fact Sheets for related Design Details:

MM-1 Concrete Washout Area

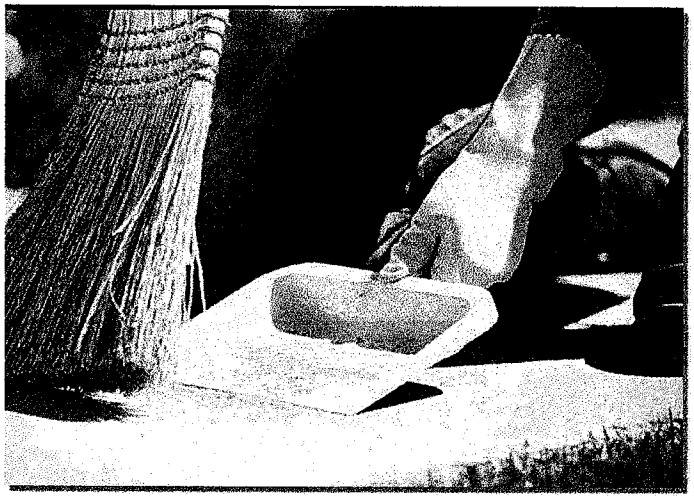
MM-2 Stockpile Management

SM-4 Vehicle Tracking Control

Design details are not necessary for other good housekeeping practices; however, be sure to designate where specific practices will occur on the appropriate construction drawings.

Description

Good housekeeping practices are designed to maintain a clean and orderly work environment. The most effective first steps towards preventing pollution in stormwater from work sites simply involve using common sense to improve the facility's basic housekeeping methods. Poor housekeeping practices result in increased waste and potential for stormwater contamination.



Photograph GH-1. Use dry clean-up methods to remove spilled materials. Photo courtesy of Colorado Nonpoint Source Program.

A clean and orderly work site reduces the possibility of accidental spills caused by mishandling of chemicals and equipment and should reduce safety hazards to personnel. A well-maintained material and chemical storage area will reduce the possibility of stormwater mixing with pollutants.

Some simple procedures a facility can use to promote good housekeeping include improved operation and maintenance of machinery and processes, material storage practices, material inventory controls, routine and regular clean-up schedules, maintaining well organized work areas, signage, and educational programs for employees and the general public about all of these practices.

Appropriate Uses

Good housekeeping practices require education and training, typically targeted to industries and businesses, municipal employees, as well as the general public.

Practice Guidelines

Good housekeeping practices include these general areas:

- Operation and Maintenance
- Material Storage
- Material Inventory
- Training and Participation.

Operation and Maintenance

Consider implementing the following practices:

- Maintain dry and clean floors and ground surfaces by using brooms, shovels, vacuums or cleaning machines, rather than wet clean-up methods.
- Regularly collect and dispose of garbage and waste material.

- Routinely inspect equipment to ensure that it is functioning properly without leaking and conduct preventative maintenance and needed repairs.
- Train employees on proper clean up and spill response procedures.
- Designate separate areas of the site for auto parking, vehicle refueling and routine maintenance.
- Promptly clean up leaks, drips and other spills.
- Cover and maintain dumpsters and waste receptacles. Add additional dumpsters or increase frequency of waste collection if overflowing conditions reoccur.
- Where outdoor painting and sanding occur, implement these practices:
    - Conduct these activities in designated areas that provide adequate protection to prevent overspray and uncontrolled emissions. All operations should be conducted on paved surfaces to facilitate cleanup.
    - Use portable containment as necessary for outside operations.
    - Clean up and properly dispose of excess paint, paint chips, protective coatings, grit waste, etc.
- Maintain vegetation on facility grounds in a manner that minimizes erosion. Follow the Landscape Maintenance and Pesticide, Herbicide and Fertilizer Usage BMPs to ensure that minimum amounts of chemicals needed for healthy vegetation are applied in a manner that minimizes transport of these materials in runoff.

Material Storage Practices

Proper storage techniques include the following:

- Provide adequate aisle space to facilitate material transfer and ease of access for inspection.
- Store containers, drums, and bags away from direct traffic routes to reduce container damage resulting in accidental spills.
- Stack containers according to manufacturer's instructions to avoid damaging the containers from improper weight distribution. Also store materials in accordance with directions in Material Safety Data Sheets (MSDSs).
- Store containers on pallets or similar devices to prevent corrosion of containers that results from containers coming in contact with moisture on the ground.
- Store toxic or hazardous liquids within curbed areas or secondary containers.

Material Inventory Practices

An up-to-date materials inventory can keep material costs down by preventing overstocking, track how materials are stored and handled onsite, and identify which materials and activities pose the most risk to the environment. Assign responsibility of hazardous material inventory to individuals trained to handle such materials. A material inventory should include these steps:

- Identify all chemical substances present at work site. Perform a walk-through of the site, review

purchase orders, list all chemical substances used and obtain Material Safety Data Sheets (MSDS) for all chemicals.

- Label all containers. Labels should provide name and type of substance, stock number, expiration date, health hazards, handling suggestions, and first aid information. Much of, this information can be found on an MSDS.
- Clearly identify special handling, storage, use and disposal considerations for hazardous materials on the material inventory.
- Institute a shelf-life program to improve material tracking and inventory that can reduce the amount of materials that are overstocked and ensure proper disposal of expired materials. Careful tracking of materials ordered can result in more efficient materials use. Decisions on the amounts of hazardous materials that are stored on site should include an evaluation of any emergency control systems that are in place. All storage areas for hazardous materials should be designed to contain spills.

Training and Participation

Frequent and proper training in good housekeeping techniques reduces the likelihood that chemicals or equipment will be mishandled. To promote good housekeeping, consider implementing these practices:

- Discuss good housekeeping practices in training programs and meetings.
- Publicize pollution prevention concepts through posters or signs.
- Post bulletin boards with updated good housekeeping procedures, tips and reminders.

Vehicle Maintenance, Fueling and Storage S-7

Description

Areas where vehicles are fueled, maintained, and stored/parked can be pollutant "hot spots" that can result in hydrocarbons, trace metals, and other pollutants being transported in stormwater runoff. Proper fueling operations, storage of automotive fluids and effective spill cleanup procedures can help reduce contamination of stormwater runoff from vehicle maintenance and fueling facilities.

Photograph VF-1. Use drip pans to collect leaks from vehicles until repairs can be completed. Photo courtesy of Tom Gore.

Fuel-related spills can occur due to inattention during fueling or "topping off" fuel tanks. Common activities at commercial, industrial and municipal maintenance shops include parts cleaning, vehicle fluid replacement, and equipment replacement and repair. Some of the wastes generated at automobile maintenance facilities include solvents (degreasers, paint thinners, etc.), antifreeze, brake fluid and brake pad dust, battery acid, motor oil, fuel, and lubricating grease. Fleet storage areas and customer and employee parking can also be a source of vehicle-related contamination from leaks, antifreeze spills, etc.

Appropriate Uses

These BMP guidelines are applicable to vehicle maintenance, fueling, fleet storage and parking facilities. Be aware that washing vehicles and equipment outdoors or in areas where wash water flows onto the ground can pollute stormwater. Vehicle wash water is considered process wastewater that should not be discharged to the storm sewer system. Consult state and federal discharge permit requirements for proper disposal of vehicle washwater, which is typically accomplished through discharge to the sanitary sewer system.

Practice Guidelines[1]

Vehicle Maintenance

The most effective way to minimize wastes generated by automotive maintenance activities is to prevent their production in the first place. Consider adopting these practices:

- Perform maintenance activities inside or under cover. When repairs cannot be performed indoors, be sure to use drip pans or absorbents.
- Keep equipment clean and free of excessive oil and grease buildup.

[1] Guidelines adapted from the USEPA Menu of BMPs.

- Promptly cleanup spills using dry methods and properly dispose of waste. When water is required, use as little as possible to clean spills, leaks, and drips.
- Use a solvent collection service to collect spent solvent used for parts cleaning. Where practical, use detergent-based, steam cleaning, or pressure-based cleaning systems instead of organic solvent degreasers when practical. (Be aware that cleaning water discharged into the sanitary sewer may require pre-treatment prior to discharge.)
- When using liquids for cleaning, use a centralized station to ensure that solvents and residues stay in one area. Locate drip pans and draining boards to direct solvents back into a solvent sink or holding tank for reuse.
- Store used oil for recycling in labeled tanks. Locate used oil tanks and drums away from storm drains, flowing streams, and preferably indoors.
- Use non-hazardous or less hazardous alternatives when practical. For example, replace chlorinated organic solvents with non-chlorinated ones like kerosene or mineral spirits.
- Properly recycle or dispose of grease, oil, antifreeze, brake fluid, cleaning solutions, hydraulic fluid, batteries, transmission fluid, worn parts, filters, and rags.
- Drain and crush oil filters before recycling or disposal.
- Drain all fluids and remove batteries from salvage vehicles and equipment.
- Closely monitor parked vehicles for leaks and place pans under any leaks to collect the fluids for proper disposal or recycling.
- Install berms or other measures to contain spills and prevent work surface runoff from entering storm drains.
- Develop and follow a spill prevention plan. This includes a variety of measures such as spill kits and knowing where storm drains are located and how to protect them (e.g., drain mat, berm) when larger spills occur. (See the Spill Prevention, Containment and Control BMP for more information.)
- Conduct periodic employee training to reinforce proper disposal practices.
- Promptly transfer used fluids to recycling drums or hazardous waste containers.
- Store cracked batteries in leak-proof secondary containers.
- Inspect outdoor storage areas regularly for drips, spills and improperly stored materials (unlabeled containers, auto parts that might contain grease or fluids, etc.). This is particularly important for parking areas for vehicles awaiting repair.
- Structural stormwater BMPs in vehicle hotspot areas require routine cleanout of oil and grease, sometimes monthly or more frequently. During periods of heavy rainfall, cleanout is required more often to ensure that pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the BMP working efficiently.

Vehicle Fueling

- Designated fueling areas should be designed to prevent stormwater runoff and spills. For example, fuel-dispensing areas should be paved with concrete or an equivalent impervious surface, with an adequate slope to prevent ponding, and separated from the rest of the site by a grade break or berm that prevents run-on of stormwater.
- Fuel dispensing areas should be covered. The cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area so that the fueling area is completely covered. It may be necessary to install and maintain an oil capture device in catch basins that have the potential to receive runoff from the fueling area.
- For facilities where equipment is being fueled with a mobile fuel truck, establish a designated fueling area. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs, it is prevented from entering the storm drain. A form of secondary containment should be used when transferring fuel from the tank truck to the fuel tank. Storm drains in the vicinity should also be covered. Install vapor recovery nozzles to help control drips, as well as reduce air pollution.
- Keep spill response information and spill cleanup materials onsite and readily available.
- Fuel-dispensing areas should be inspected regularly and repair promptly completed. Inspectors should:
    - Check for external corrosion and structural failure in aboveground tanks.
    - Check for spills and overfills due to operator error.
    - Check for failure of any piping systems.
    - Check for leaks or spills during pumping of liquids or gases from a truck or rail car to a storage facility or vice versa.
    - Visually inspect new tank or container installations for loose fittings, poor welds, and improper or poorly fitted gaskets.
    - Inspect tank foundations, connections, coatings, tank walls, and piping systems. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Aboveground and belowground tanks should be tested periodically for integrity by a qualified professional.
- Dry cleanup methods should be employed when cleaning up fuel-dispensing areas. Such methods include sweeping to remove litter and debris and using rags and absorbents for leaks and spills. Water should not be used to wash these areas. During routine cleaning, use a damp cloth on the pumps and a damp mop on the pavement, rather than spraying with a hose. Fuel dispensing nozzles should be fitted with "hold-open latches" (automatic shutoff) except where prohibited by local fire departments. Signs can be posted at the fuel dispenser or island warning vehicle owners/operators against "topping off" vehicle fuel tanks.
- Written procedures that describe these BMPs should be provided to employees who will be using fueling systems.

Description

Proper landscape maintenance, including maintenance of vegetated stormwater BMPs, is important to reduce nutrient and chemical loading to the storm drain system, reduce nuisance flows and standing water in stormwater BMPs, and maintain healthy vegetation that helps minimize erosion. Additionally, when landscapes and vegetated BMPs are over-irrigated, the ground remains saturated and capacity to infiltrate runoff is reduced.

Photograph LM-1. Over-irrigation and overspray can wash fertilizers and lawn chemicals into the storm drain system. These flows can comingle with storm runoff and cause nuisance flow conditions in stormwater BMPs. Photo courtesy of the City of Westminster.

Appropriate Uses

Appropriate lawn care practices are applicable to residential, commercial, municipal, and some industrial operations.

Practice Guidelines[1]

Practice guidelines for a healthy lawn that reduces pollution during both wet and dry weather conditions include a combination of practices such as mowing, aeration, fertilization, and irrigation. Also, see the Pesticide, Herbicide, and Fertilizer Usage BMP for information on proper use of these chemicals and Integrated Pest Management (IPM) strategies.

Lawn Mowing and Grass Clipping Waste Disposal

- Keep lawn clippings and debris out of gutters. When blowing walkways or mowing lawns, direct equipment so that the clippings blow back onto the lawn rather than into the street, or collect clippings blown onto the street and properly dispose of them.
- Mulch-mowing turfgrass at a height of 2.5 to 3 inches helps turfgrass develop deeper root systems. No more than one-third of the grass blade should be removed in a single mowing. Mulched grass clippings can return roughly 25 to 30% of the needed nitrogen that grass requires to be healthy, thereby reducing fertilizer requirements. Avoid throwing grass clippings onto streets and sidewalks to reduce nutrient pollution to surface waterbodies.
- Minimize thatch development by mowing at appropriate frequencies and heights for the grass type, avoiding overwatering, preventing over fertilization, and aerating the turf.

---

[1] These practice guidelines have been adapted from the *GreenCO Best Management Practices for the Conservation and Protection of Water Quality in Colorado: Moving Toward Sustainability* (GreenCO and WWE 2008). See this manual for additional detail and references.

Lawn Aeration

- Aerate turf once or twice per year, as needed, in the early spring and/or late fall to aid in capturing the natural precipitation during non-weed germination periods and prior to adding organic materials and fertilizers. Aeration reduces soil compaction and helps control thatch in lawns while helping water and fertilizer move into the root zone.

- A lawn can be aerated at any time the ground is not frozen, but should not be done when it is extremely hot and dry. Heavy traffic areas will require aeration more frequently.

- Do not use spike-type aerators, which compact the soil. Holes should be two to three inches deep and no more than two to four inches apart. Lawns should be thoroughly watered the day before aerating so plugs can be pulled more deeply and easily. Mark all sprinkler heads, shallow irrigation lines, and buried cable TV lines before aerating so those lines will not be damaged.

Phosphorus

Phosphorus is commonly overused and application should be based on soil tests. Phosphorus washing into surface waterbodies leads to excessive algae growth.

Phosphorous does not move out of the soil like nitrogen, so constant additions are unnecessary.

Fertilizer Application

- Apply fertilizer when needed to achieve a clearly defined objective such as increasing shoot growth, root growth, flowering or fruiting; enhancing foliage color, and plant appearance; or correcting or preventing nutrient deficiencies.

- Because manufactured fertilizers can be relatively high in nutrient content, it is critical to follow the manufacturer's directions, using the minimum amount recommended. Over-application "burns" leaves and may lead to water pollution, thatch buildup, excessive mowing, and weed growth.

- Only apply nutrients the plants can use. Fertilizer labels identify product contents in terms of ratios that indicate percentage of ingredients by product weight.

Soil Testing

There are several qualified laboratories in Colorado that provide soils tests to determine recommendations for fertilizer type and application rates. There are also commercially available quick test kits that are less accurate but could be used by a homeowner. Without an analysis, a homeowner may be buying unnecessary fertilizer or applying too much. A $20 to $40 soil analysis has potential to save an owner much more.

The CSU Extension program offers a soil testing service. Contact the CSU Extension for your county or visit http://www.ext.colostate.edu for more information including a list of laboratories.

- When practical and appropriate, base fertilizer application on soil analysis. Be aware that at many new development sites, soil conditions following grading often no longer consist of topsoil. "Basement" soils with poor texture and low nutrient content may be present. As a result, soil amendment is often needed to improve the physical properties (tilth) of the soil to provide a better environment for plant roots to improve nutrient uptake. Soil analysis can help to identify soil amendments that improve both the physical and nutrient characteristics of the soil, as well as identify fertilization requirements.

- Utilize split applications of slow-release (controlled-release) fertilizer forms such as IBDU, sulfur-coated urea and natural organic-based fertilizers (not to be confused with raw manure) to minimize the risk of nutrients leaching into groundwater or running off in surface water. When properly applied, other forms of fertilizer can also be safely used, provided that over-watering and over-fertilization do not occur.

- When applying fertilizer, broadcast it uniformly over the targeted area of the landscape. Keep fertilizer off streets, sidewalks, and driveways to prevent water pollution. Fertilizer that inadvertently falls on impervious surfaces should be swept back onto the lawn.

- Recommendations for fertilizer application vary among industry professionals. CSU Extension's fertilizer recommendations for established Colorado lawns are provided in the table below. Site-specific conditions should also be considered when determining the need for fertilizer.

Table LM-1. CSU Extension Recommendations for Nitrogen Application Rate

	Nitrogen Application Rate in Pounds/1,000 sq. ft.				
Turfgrass Species	Mid-March to April[A,B]	May to Mid-June[B]	July to Early August[B]	Mid-August to Mid-September[B, C]	Early October to Early November[B, D]
High Maintenance Bluegrass Ryegrass	0.5-1	1	Not Required	1	1-2 (optional)
Low Maintenance Bluegrass	0.5	0.5-1	Not Required	1	1 (optional)
Tall Fescue	0.5	0.5-1	Not Required	1	1 (optional)
Fine Fescue	0.5	0.5-1	Not Required	0.5-1	None
Buffalo grass, Blue Grama, Bermuda grass	None	0.5-1	0.5-1	None	None

Notes:

[A] The March-April nitrogen application may not be needed if prior fall fertilization was completed. If spring green-up and growth is satisfactory, delay fertilizing to May or June.

[B] Application rates may be reduced by 1/4 to 1/3 when grass clippings are left on the lawn.

[C] On very sandy soils do not fertilize turf after late September to prevent nitrogen from leaching into groundwater during the winter months.

[D] Apply when the grass is still green and at least 2-3 weeks prior to the ground freezing. Optional nitrogen applications are indicated for use where higher quality or heavily-used turf is present.

Source: T. Koski and V. Skinner, CSU Extension, 2003.

- If possible, properly irrigate turf following fertilization to help grass utilize applied nutrients and to minimize the potential for fertilizer burn. Care should be taken to avoid excessive irrigation that would result in fertilizer being washed away. Similarly, avoid application of fertilizer immediately prior to heavy rainfall.

- Fall is the best time of year to fertilize bluegrass lawns. Over-application of nitrogen fertilizer in April may cause grass to grow too fast before roots can support the growth, resulting in less heat tolerance.

- Generally, the Colorado Nursery and Greenhouse Association recommends waiting until the second growing season to fertilize ornamental (woody) plants. Commercial fertilizer should not be used in the backfill where it comes in direct contact with the roots.

- Maintain a buffer zone around wells or surface waterbodies where fertilizers are not applied to minimize pollution. Consult the fertilizer product label and local regulations and landscape ordinances for appropriate distances. Research in this area is limited; however, CSU Extension recommends a buffer of 6 to 10 feet for mowed turf areas.

- In areas with sandy soils, it is particularly important to avoid over-application of fertilizer that could leach into groundwater. These areas may be particularly well suited to slow-release fertilizer forms and conservative application rates.

Lawn Irrigation

- The approximate amount of water that needs to be applied **each week** for an average, traditional lawn to supplement normal rainfall is listed in Table 2. (Water utilities may provide additional guidance in terms of suggested run-times for various sprinkler types; http://www.denverwater.org/Conservation/.)

Table LM-2. General Guideline for Approximate Supplemental Water for an Average Traditional Lawn (inches per week)

Condition[3]	April[1]	May	June	July	Aug	Sept	Oct[2]
Non-Drought Conditions	1/4"	1"	1½"	1½"	1¼"	1"	1/2"
During Drought Restrictions (approx. 20% reduction)	1/4"	3/4"	1¼"	1¼"	1"	3/4"	1/2"

[1] For established lawns, water may not be required during April. Base decision on weather conditions.
[2] For established lawns, water is typically not required after Oct 15.
[3] Under less-than-average rainfall conditions, the amounts shown in the chart should be increased. If there is greater-than-normal rainfall, then the amount of supplemental water should be reduced.

- Consult with the CSU Extension Turfgrass program for recommendations for irrigating turfgrasses with lower water requirements (e.g. blue grama, buffalo grass). For native grasses, irrigation may be unnecessary or limited to certain conditions.

- Irrigate the lawn uniformly until the soil is moist to a depth of 4 to 6 inches to encourage deep roots. Frequent, light sprinklings moisten only the surface and may cause shallow-rooted turf and increase weed seed germination. Properly maintain the irrigation system to ensure that the irrigation is being applied at appropriate rates and to the turfgrass, not the sidewalk.

- Maintain irrigation systems in good operating condition with uniform distribution of water. "Smart" irrigation controllers and weather sensors can reduce water waste by shutting off irrigation during storm events and helping owners water according to the needs of the plants to replace water lost to evapotranspiration (ET).

- Proper irrigation can minimize the amount of fertilizer and other chemicals that are leached below the root zone of the grass or washed away by runoff.

Silt Fence (SF) SC-1

Description

A silt fence is a woven geotextile fabric attached to wooden posts and trenched into the ground. It is designed as a sediment barrier to intercept sheet flow runoff from disturbed areas.

Photograph SF-1. Silt fence creates a sediment barrier, forcing sheet flow runoff to evaporate or infiltrate.

Appropriate Uses

A silt fence can be used where runoff is conveyed from a disturbed area as sheet flow. Silt fence is not designed to receive concentrated flow or to be used as a filter fabric. Typical uses include:

- Down slope of a disturbed area to accept sheet flow.
- Along the perimeter of a receiving water such as a stream, pond or wetland.
- At the perimeter of a construction site.

Design and Installation

Silt fence should be installed along the contour of slopes so that it intercepts sheet flow. The maximum recommended tributary drainage area per 100 lineal feet of silt fence, installed along the contour, is approximately 0.25 acres with a disturbed slope length of up to 150 feet and a tributary slope gradient no steeper than 3:1. Longer and steeper slopes require additional measures. This recommendation only applies to silt fence installed along the contour. Silt fence installed for other uses, such as perimeter control, should be installed in a way that will not produce concentrated flows. For example, a "J-hook" installation may be appropriate to force runoff to pond and evaporate or infiltrate in multiple areas rather than concentrate and cause erosive conditions parallel to the silt fence.

See Detail SF-1 for proper silt fence installation, which involves proper trenching, staking, securing the fabric to the stakes, and backfilling the silt fence. Properly installed silt fence should not be easily pulled out by hand and there should be no gaps between the ground and the fabric.

Silt fence must meet the minimum allowable strength requirements, depth of installation requirement, and other specifications in the design details. Improper installation of silt fence is a common reason for silt fence failure; however, when properly installed and used for the appropriate purposes, it can be highly effective.

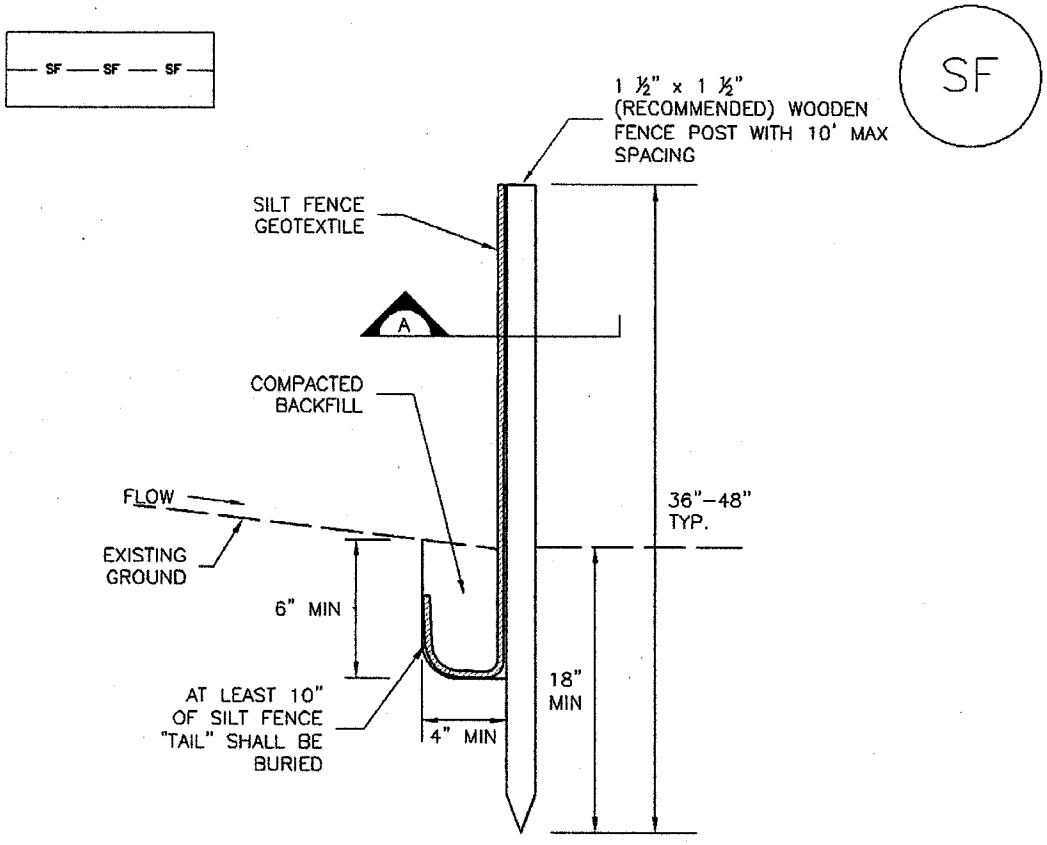
Silt Fence	
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	No

Maintenance and Removal

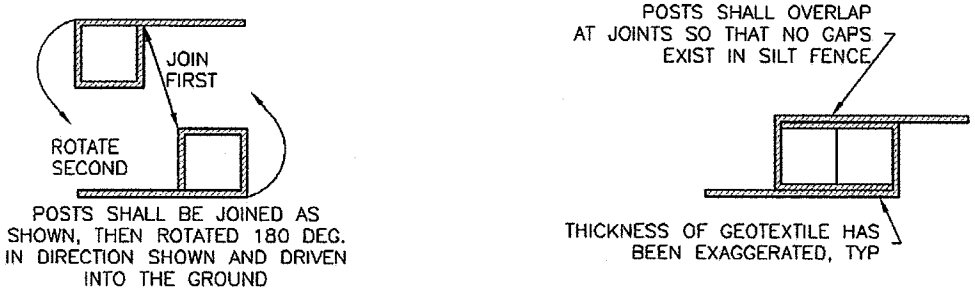
Inspection of silt fence includes observing the material for tears or holes and checking for slumping fence and undercut areas bypassing flows. Repair of silt fence typically involves replacing the damaged section with a new section. Sediment accumulated behind silt fence should be removed, as needed to maintain BMP effectiveness, typically before it reaches a depth of 6 inches.

Silt fence may be removed when the upstream area has reached final stabilization.

Photograph SF-2. When silt fence is not installed along the contour, a "J-hook" installation may be appropriate to ensure that the BMP does not create concentrated flow parallel to the silt fence. Photo courtesy of Tom Gore.



SILT FENCE



SECTION A

SF–1. SILT FENCE

SILT FENCE INSTALLATION NOTES

1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2–5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.

2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.

3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.

4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.

5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.

6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J–HOOK." THE "J–HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' – 20').

7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".

5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.

6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.

7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Rock Sock (RS) SC-5

Description

A rock sock is constructed of gravel that has been wrapped by wire mesh or a geotextile to form an elongated cylindrical filter. Rock socks are typically used either as a perimeter control or as part of inlet protection. When placed at angles in the curb line, rock socks are typically referred to as curb socks. Rock socks are intended to trap sediment from stormwater runoff that flows onto roadways as a result of construction activities.

Photograph RS-1. Rock socks placed at regular intervals in a curb line can help reduce sediment loading to storm sewer inlets. Rock socks can also be used as perimeter controls.

Appropriate Uses

Rock socks can be used at the perimeter of a disturbed area to control localized sediment loading. A benefit of rock socks as opposed to other perimeter controls is that they do not have to be trenched or staked into the ground; therefore, they are often used on roadway construction projects where paved surfaces are present.

Use rock socks in inlet protection applications when the construction of a roadway is substantially complete and the roadway has been directly connected to a receiving storm system.

Design and Installation

When rock socks are used as perimeter controls, the maximum recommended tributary drainage area per 100 lineal feet of rock socks is approximately 0.25 acres with disturbed slope length of up to 150 feet and a tributary slope gradient no steeper than 3:1. A rock sock design detail and notes are provided in Detail RS-1. Also see the Inlet Protection Fact Sheet for design and installation guidance when rock socks are used for inlet protection and in the curb line.

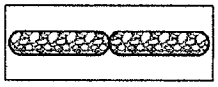
When placed in the gutter adjacent to a curb, rock socks should protrude no more than two feet from the curb in order for traffic to pass safely. If located in a high traffic area, place construction markers to alert drivers and street maintenance workers of their presence.

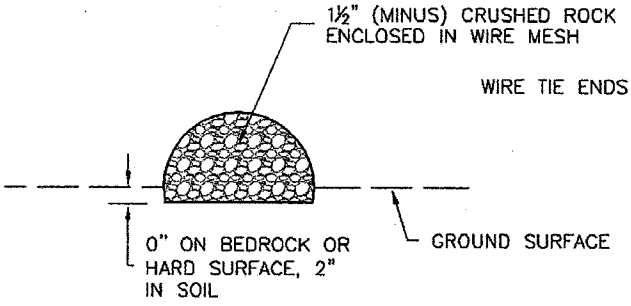
Maintenance and Removal

Rock socks are susceptible to displacement and breaking due to vehicle traffic. Inspect rock socks for damage and repair or replace as necessary. Remove sediment by sweeping or vacuuming as needed to maintain the functionality of the BMP, typically when sediment has accumulated behind the rock sock to one-half of the sock's height.

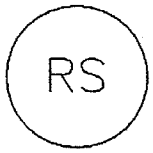
Once upstream stabilization is complete, rock socks and accumulated sediment should be removed and properly disposed.

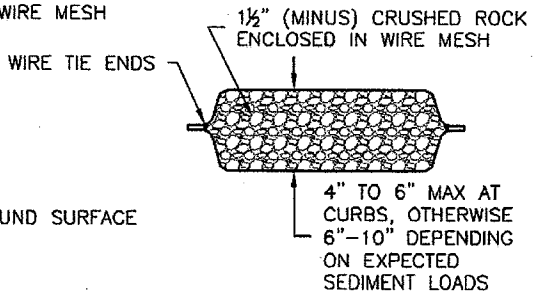
Rock Sock	
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	No



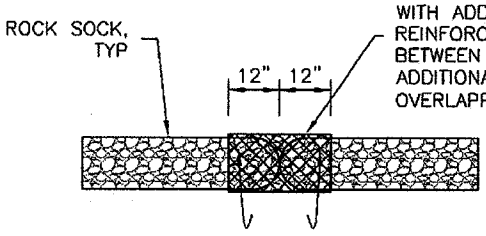


ROCK SOCK SECTION





ROCK SOCK PLAN



ROCK SOCK JOINTING

ANY GAP AT JOINT SHALL BE FILLED WITH AN ADEQUATE AMOUNT OF 1½" (MINUS) CRUSHED ROCK AND WRAPPED WITH ADDITIONAL WIRE MESH SECURED TO ENDS OF ROCK REINFORCED SOCK. AS AN ALTERNATIVE TO FILLING JOINTS BETWEEN ADJOINING ROCK SOCKS WITH CRUSHED ROCK AND ADDITIONAL WIRE WRAPPING, ROCK SOCKS CAN BE OVERLAPPED (TYPICALLY 12–INCH OVERLAP) TO AVOID GAPS.

GRADATION TABLE	
SIEVE SIZE	MASS PERCENT PASSING SQUARE MESH SIEVES
	NO. 4
2"	100
1½"	90 – 100
1"	20 – 55
¾"	0 – 15
⅜"	0 – 5
MATCHES SPECIFICATIONS FOR NO. 4 COARSE AGGREGATE FOR CONCRETE PER AASHTO M43. ALL ROCK SHALL BE FRACTURED FACE, ALL SIDES.	

ROCK SOCK INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION(S) OF ROCK SOCKS.

2. CRUSHED ROCK SHALL BE 1½" (MINUS) IN SIZE WITH A FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON THIS SHEET (1½" MINUS).

3. WIRE MESH SHALL BE FABRICATED OF 10 GAGE POULTRY MESH, OR EQUIVALENT, WITH A MAXIMUM OPENING OF ½", RECOMMENDED MINIMUM ROLL WIDTH OF 48"

4. WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6" CENTERS ALONG ALL JOINTS AND AT 2" CENTERS ON ENDS OF SOCKS.

5. SOME MUNICIPALITIES MAY ALLOW THE USE OF FILTER FABRIC AS AN ALTERNATIVE TO WIRE MESH FOR THE ROCK ENCLOSURE.

RS–1. ROCK SOCK PERIMETER CONTROL

ROCK SOCK MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SOCKS SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, OR DAMAGED BEYOND REPAIR.

5. SEDIMENT ACCUMULATED UPSTREAM OF ROCK SOCKS SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ½ OF THE HEIGHT OF THE ROCK SOCK.

6. ROCK SOCKS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN ROCK SOCKS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF ROCK SOCK INSTALLATION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY OTHER SIMILAR PROPRIETARY PRODUCTS ON THE MARKET. UDFCD NEITHER NDORSES NOR DISCOURAGES USE OF PROPRIETARY PROTECTION PRODUCTS; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

Inlet Protection (IP) SC-6

Description

Inlet protection consists of permeable barriers installed around an inlet to filter runoff and remove sediment prior to entering a storm drain inlet. Inlet protection can be constructed from rock socks, sediment control logs, silt fence, block and rock socks, or other materials approved by the local jurisdiction. Area inlets can also be protected by over-excavating around the inlet to form a sediment trap.

Photograph IP-1. Inlet protection for a curb opening inlet.

Appropriate Uses

Install protection at storm sewer inlets that are operable during construction. Consider the potential for tracked-out sediment or temporary stockpile areas to contribute sediment to inlets when determining which inlets must be protected. This may include inlets in the general proximity of the construction area, not limited to downgradient inlets. Inlet protection is not a stand-alone BMP and should be used in conjunction with other upgradient BMPs.

Design and Installation

To function effectively, inlet protection measures must be installed to ensure that flows do not bypass the inlet protection and enter the storm drain without treatment. However, designs must also enable the inlet to function without completely blocking flows into the inlet in a manner that causes localized flooding. When selecting the type of inlet protection, consider factors such as type of inlet (e.g., curb or area, sump or on-grade conditions), traffic, anticipated flows, ability to secure the BMP properly, safety and other site-specific conditions. For example, block and rock socks will be better suited to a curb and gutter along a roadway, as opposed to silt fence or sediment control logs, which cannot be properly secured in a curb and gutter setting, but are effective area inlet protection measures.

Several inlet protection designs are provided in the Design Details. Additionally, a variety of proprietary products are available for inlet protection that may be approved for use by local governments. If proprietary products are used, design details and installation procedures from the manufacturer must be followed. Regardless of the type of inlet protection selected, inlet protection is most effective when combined with other BMPs such as curb socks and check dams. Inlet protection is often the last barrier before runoff enters the storm sewer or receiving water.

Design details with notes are provided for these forms of inlet protection:

IP-1. Block and Rock Sock Inlet Protection for Sump or On-grade Inlets

IP-2. Curb (Rock) Socks Upstream of Inlet Protection, On-grade Inlets

Inlet Protection (various forms)	
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	No

IP-3. Rock Sock Inlet Protection for Sump/Area Inlet

IP-4. Silt Fence Inlet Protection for Sump/Area Inlet

IP-5. Over-excavation Inlet Protection

IP-6. Straw Bale Inlet Protection for Sump/Area Inlet

CIP-1. Culvert Inlet Protection

Propriety inlet protection devices should be installed in accordance with manufacturer specifications.

More information is provided below on selecting inlet protection for sump and on-grade locations.

Inlets Located in a Sump

When applying inlet protection in sump conditions, it is important that the inlet continue to function during larger runoff events. For curb inlets, the maximum height of the protective barrier should be lower than the top of the curb opening to allow overflow into the inlet during larger storms without excessive localized flooding. If the inlet protection height is greater than the curb elevation, particularly if the filter becomes clogged with sediment, runoff will not enter the inlet and may bypass it, possibly causing localized flooding, public safety issues, and downstream erosion and damage from bypassed flows.

Area inlets located in a sump setting can be protected through the use of silt fence, concrete block and rock socks (on paved surfaces), sediment control logs/straw wattles embedded in the adjacent soil and stacked around the area inlet (on pervious surfaces), over-excavation around the inlet, and proprietary products providing equivalent functions.

Inlets Located on a Slope

For curb and gutter inlets on paved sloping streets, block and rock sock inlet protection is recommended in conjunction with curb socks in the gutter leading to the inlet. For inlets located along unpaved roads, also see the Check Dam Fact Sheet.

Maintenance and Removal

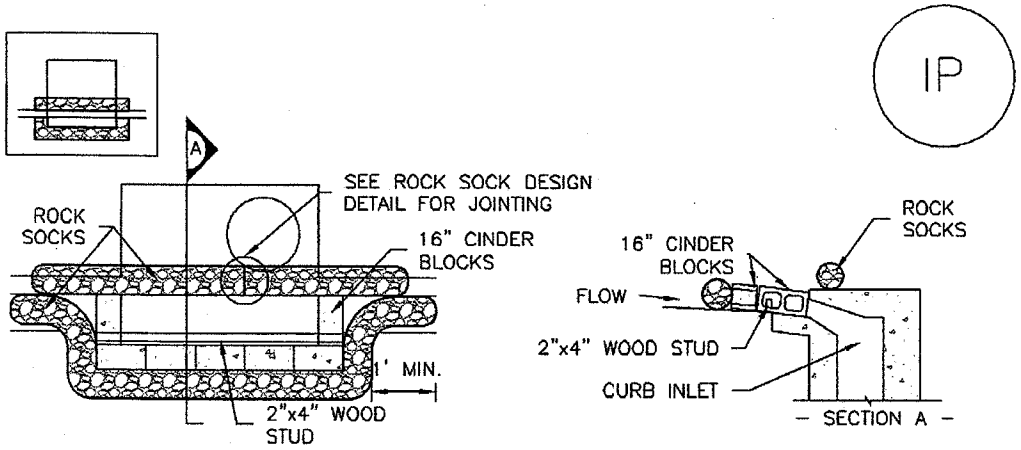
Inspect inlet protection frequently. Inspection and maintenance guidance includes:

- Inspect for tears that can result in sediment directly entering the inlet, as well as result in the contents of the BMP (e.g., gravel) washing into the inlet.
- Check for improper installation resulting in untreated flows bypassing the BMP and directly entering the inlet or bypassing to an unprotected downstream inlet. For example, silt fence that has not been properly trenched around the inlet can result in flows under the silt fence and directly into the inlet.
- Look for displaced BMPs that are no longer protecting the inlet. Displacement may occur following larger storm events that wash away or reposition the inlet protection. Traffic or equipment may also crush or displace the BMP.
- Monitor sediment accumulation upgradient of the inlet protection.

- Remove sediment accumulation from the area upstream of the inlet protection, as needed to maintain BMP effectiveness, typically when it reaches no more than half the storage capacity of the inlet protection. For silt fence, remove sediment when it accumulates to a depth of no more than 6 inches. Remove sediment accumulation from the area upstream of the inlet protection as needed to maintain the functionality of the BMP.

- Propriety inlet protection devices should be inspected and maintained in accordance with manufacturer specifications. If proprietary inlet insert devices are used, sediment should be removed in a timely manner to prevent devices from breaking and spilling sediment into the storm drain.

Inlet protection must be removed and properly disposed of when the drainage area for the inlet has reached final stabilization.



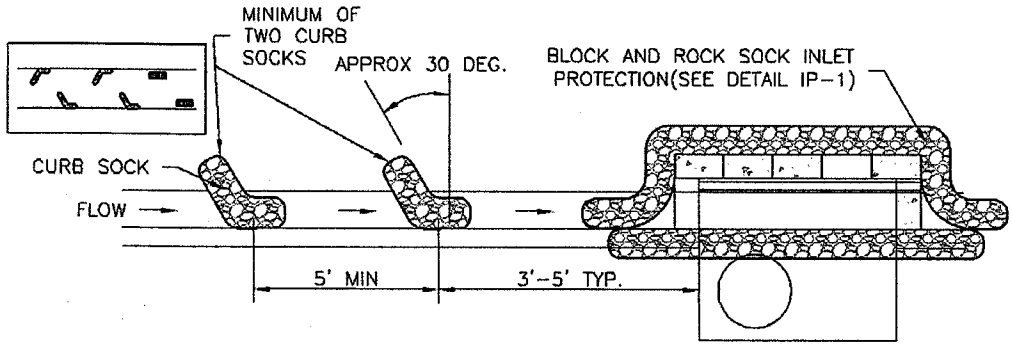
IP-1. BLOCK AND ROCK SOCK SUMP OR ON GRADE INLET PROTECTION

BLOCK AND CURB SOCK INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. CONCRETE "CINDER" BLOCKS SHALL BE LAID ON THEIR SIDES AROUND THE INLET IN A SINGLE ROW, ABUTTING ONE ANOTHER WITH THE OPEN END FACING AWAY FROM THE CURB.

3. GRAVEL BAGS SHALL BE PLACED AROUND CONCRETE BLOCKS, CLOSELY ABUTTING ONE ANOTHER AND JOINTED TOGETHER IN ACCORDANCE WITH ROCK SOCK DESIGN DETAIL.



IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION

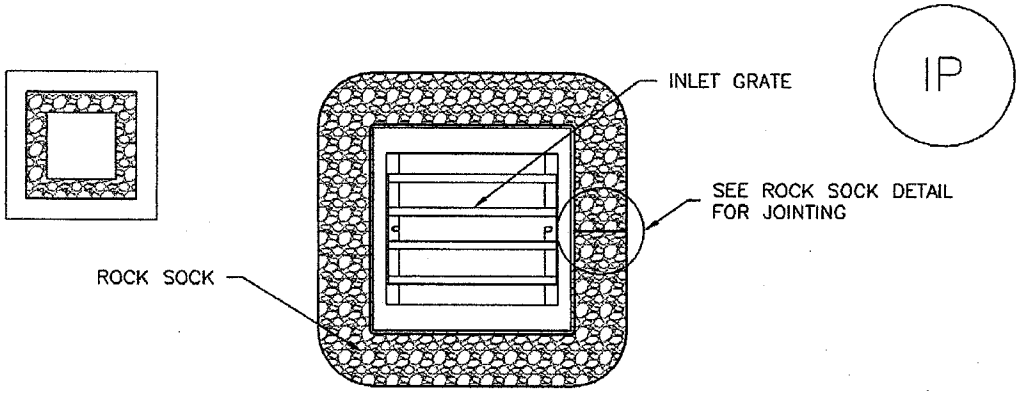
CURB ROCK SOCK INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL INSTALLATION REQUIREMENTS.

2. PLACEMENT OF THE SOCK SHALL BE APPROXIMATELY 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.

3. SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED A MINIMUM OF 5 FEET APART.

4. AT LEAST TWO CURB SOCKS IN SERIES ARE REQUIRED UPSTREAM OF ON-GRADE INLETS.

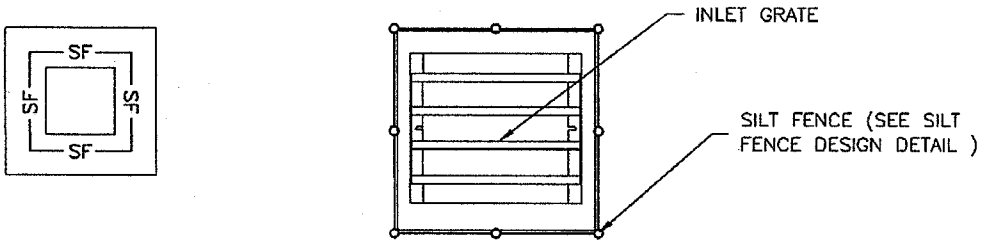


IP–3. ROCK SOCK SUMP/AREA INLET PROTECTION

ROCK SOCK SUMP/AREA INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF ROCK SOCKS FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.



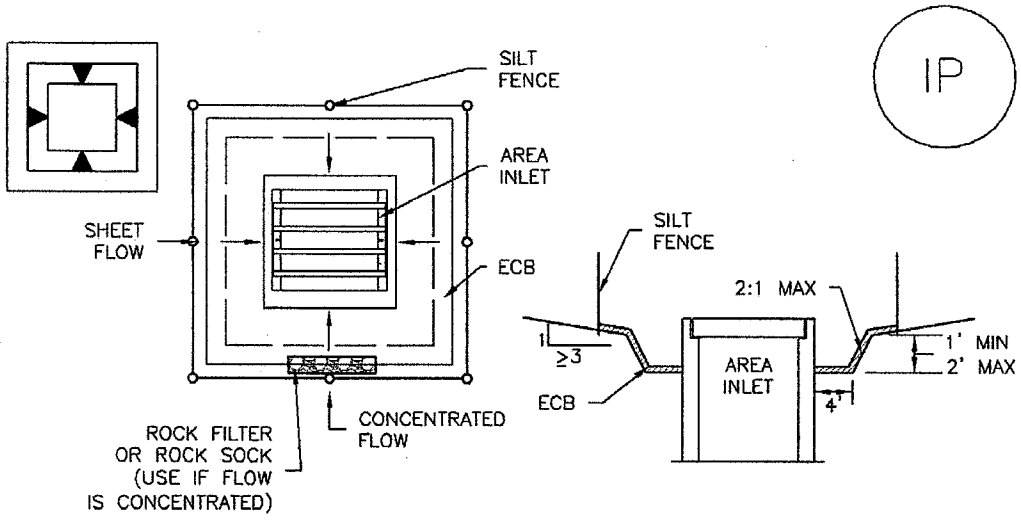
IP–4. SILT FENCE FOR SUMP INLET PROTECTION

SILT FENCE INLET PROTECTION INSTALLATION NOTES

1. SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.

3. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.



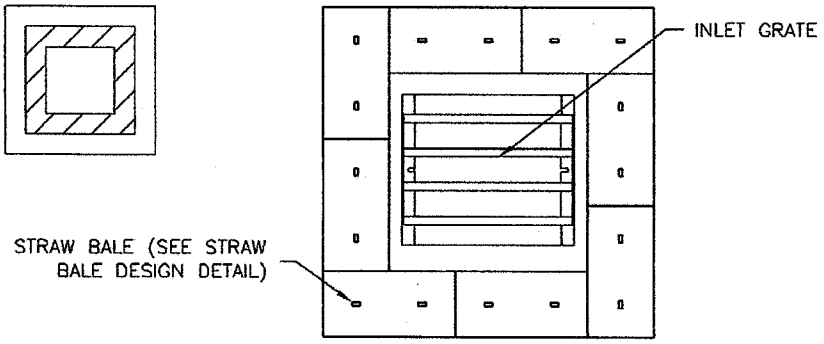
IP–5. OVEREXCAVATION INLET PROTECTION

OVEREXCAVATION INLET PROTECTION INSTALLATION NOTES

1. THIS FORM OF INLET PROTECTION IS PRIMARILY APPLICABLE FOR SITES THAT HAVE NOT YET REACHED FINAL GRADE AND SHOULD BE USED ONLY FOR INLETS WITH A RELATIVELY SMALL CONTRIBUTING DRAINAGE AREA.

2. WHEN USING FOR CONCENTRATED FLOWS, SHAPE BASIN IN 2:1 RATIO WITH LENGTH ORIENTED TOWARDS DIRECTION OF FLOW.

3. SEDIMENT MUST BE PERIODICALLY REMOVED FROM THE OVEREXCAVATED AREA.

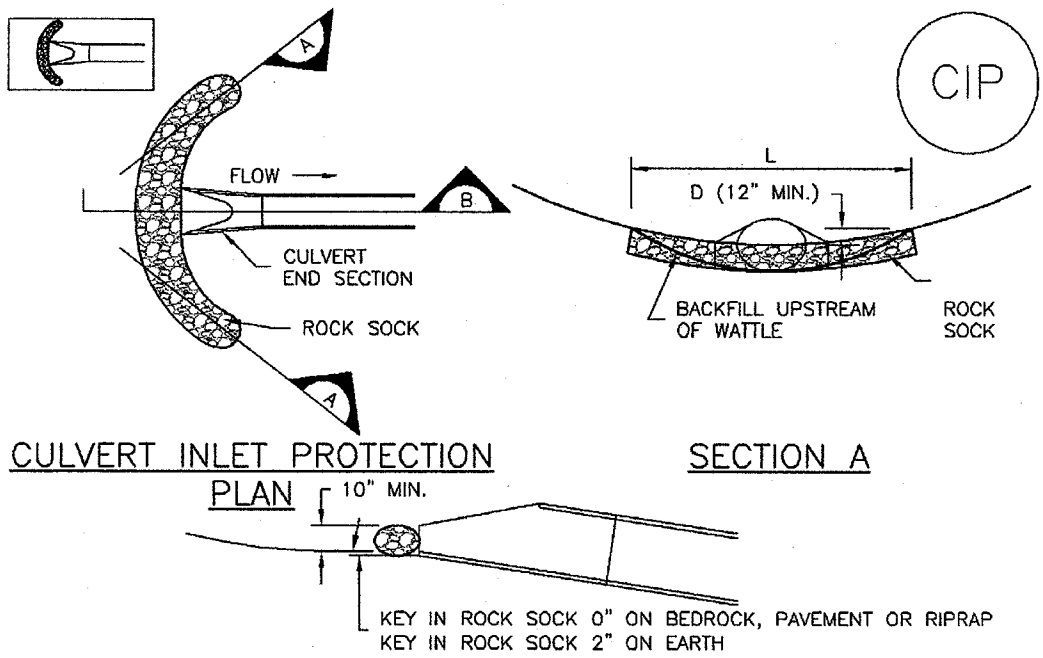


IP–6. STRAW BALE FOR SUMP INLET PROTECTION

STRAW BALE BARRIER INLET PROTECTION INSTALLATION NOTES

1. SEE STRAW BALE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. BALES SHALL BE PLACED IN A SINGLE ROW AROUND THE INLET WITH ENDS OF BALES TIGHTLY ABUTTING ONE ANOTHER.



CULVERT INLET PROTECTION PLAN

SECTION A

SECTION B

CIP–1. CULVERT INLET PROTECTION

CULVERT INLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   –LOCATION OF CULVERT INLET PROTECTION.

2. SEE ROCK SOCK DESIGN DETAIL FOR ROCK GRADATION REQUIREMENTS AND JOINTING DETAIL.

CULVERT INLET PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE CULVERT SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS ½ THE HEIGHT OF THE ROCK SOCK.

5. CULVERT INLET PROTECTION SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

GENERAL INLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF INLET PROTECTION.
   -TYPE OF INLET PROTECTION (IP.1, IP.2, IP.3, IP.4, IP.5, IP.6)

2. INLET PROTECTION SHALL BE INSTALLED PROMPTLY AFTER INLET CONSTRUCTION OR PAVING IS COMPLETE (TYPICALLY WITHIN 48 HOURS). IF A RAINFALL/RUNOFF EVENT IS FORECAST, INSTALL INLET PROTECTION PRIOR TO ONSET OF EVENT.

3. MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

INLET PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED AS NECESSARY TO MAINTAIN BMP EFFECTIVENESS, TYPICALLY WHEN STORAGE VOLUME REACHES 50% OF CAPACITY, A DEPTH OF 6" WHEN SILT FENCE IS USED, OR ¼ OF THE HEIGHT FOR STRAW BALES.

5. INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED, UNLESS THE LOCAL JURISDICTION APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.

6. WHEN INLET PROTECTION AT AREA INLETS IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF INLET PROTECTION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY INLET PROTECTION METHODS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY INLET PROTECTION; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

NOTE: SOME MUNICIPALITIES DISCOURAGE OR PROHIBIT THE USE OF STRAW BALES FOR INLET PROTECTION. CHECK WITH LOCAL JURISDICTION TO DETERMINE IF STRAW BALE INLET PROTECTION IS ACCEPTABLE.

Construction Fence (CF) SM-3

Description

A construction fence restricts site access to designated entrances and exits, delineates construction site boundaries, and keeps construction out of sensitive areas such as natural areas to be preserved as open space, wetlands and riparian areas.

Photograph CF-1. A construction fence helps delineate areas where existing vegetation is being protected. Photo courtesy of Douglas County.

Appropriate Uses

A construction fence can be used to delineate the site perimeter and locations within the site where access is restricted to protect natural resources such as wetlands, waterbodies, trees, and other natural areas of the site that should not be disturbed.

If natural resource protection is an objective, then the construction fencing should be used in combination with other perimeter control BMPs such as silt fence, sediment control logs or similar measures.

Design and Installation

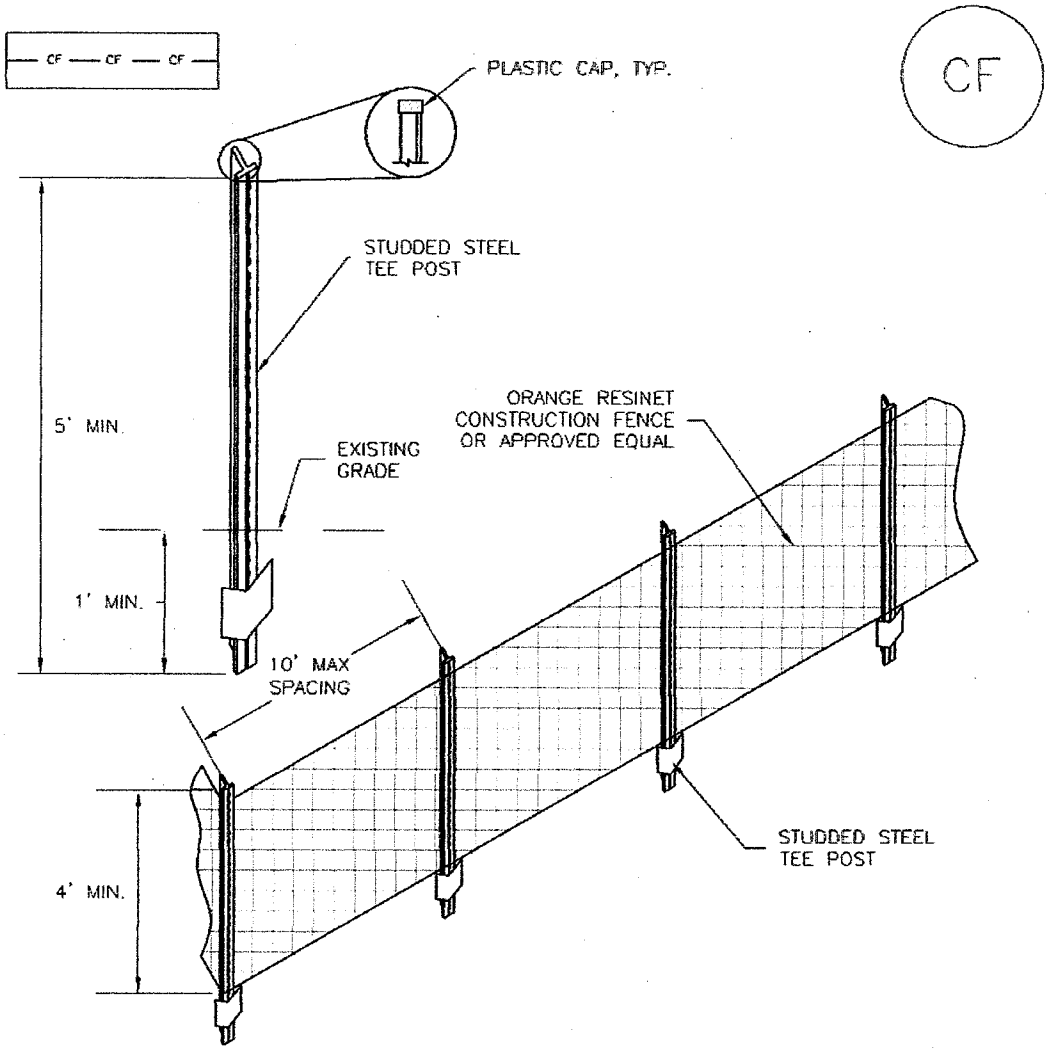
Construction fencing may be chain link or plastic mesh and should be installed following manufacturer's recommendations. See Detail CF-1 for typical installations.

Do not place construction fencing in areas within work limits of machinery.

Maintenance and Removal

- Inspect fences for damage; repair or replace as necessary.
- Fencing should be tight and any areas with slumping or fallen posts should be reinstalled.
- Fencing should be removed once construction is complete.

Construction Fence	
Functions	
Erosion Control	No
Sediment Control	No
Site/Material Management	Yes



CF-1. PLASTIC MESH CONSTRUCTION FENCE

CONSTRUCTION FENCE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF CONSTRUCTION FENCE.

2. CONSTRUCTION FENCE SHOWN SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

3. CONSTRUCTION FENCE SHALL BE COMPOSED OF ORANGE, CONTRACTOR-GRADE MATERIAL THAT IS AT LEAST 4' HIGH. METAL POSTS SHOULD HAVE A PLASTIC CAP FOR SAFETY.

4. STUDDED STEEL TEE POSTS SHALL BE UTILIZED TO SUPPORT THE CONSTRUCTION FENCE. MAXIMUM SPACING FOR STEEL TEE POSTS SHALL BE 10'.

5. CONSTRUCTION FENCE SHALL BE SECURELY FASTENED TO THE TOP, MIDDLE, AND BOTTOM OF EACH POST.

CONSTRUCTION FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. CONSTRUCTION FENCE SHALL BE REPAIRED OR REPLACED WHEN THERE ARE SIGNS OF DAMAGE SUCH AS RIPS OR SAGS. CONSTRUCTION FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

5. WHEN CONSTRUCTION FENCES ARE REMOVED, ALL DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION, MAINTENANCE, AND/OR REMOVAL OF THE FENCE SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

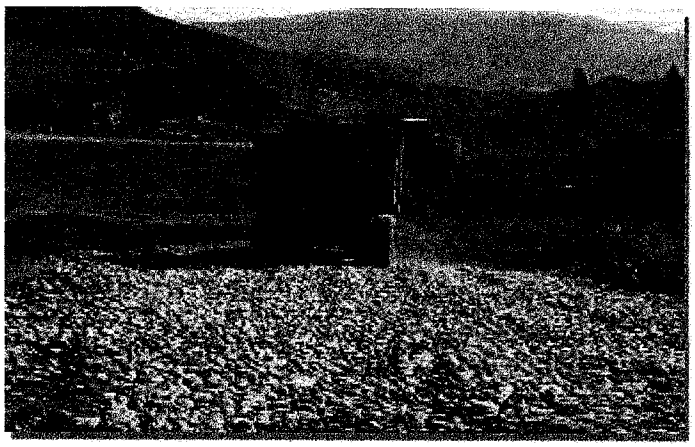
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

Vehicle Tracking Control (VTC) SM-4

Description

Vehicle tracking controls provide stabilized construction site access where vehicles exit the site onto paved public roads. An effective vehicle tracking control helps remove sediment (mud or dirt) from vehicles, reducing tracking onto the paved surface.



Photograph VTC-1. A vehicle tracking control pad constructed with properly sized rock reduces off-site sediment tracking.

Appropriate Uses

Implement a stabilized construction entrance or vehicle tracking control where frequent heavy vehicle traffic exits the construction site onto a paved roadway. An effective vehicle tracking control is particularly important during the following conditions:

- Wet weather periods when mud is easily tracked off site.
- During dry weather periods where dust is a concern.
- When poorly drained, clayey soils are present on site.

Although wheel washes are not required in designs of vehicle tracking controls, they may be needed at particularly muddy sites.

Design and Installation

Construct the vehicle tracking control on a level surface. Where feasible, grade the tracking control towards the construction site to reduce off-site runoff. Place signage, as needed, to direct construction vehicles to the designated exit through the vehicle tracking control. There are several different types of stabilized construction entrances including:

VTC-1. Aggregate Vehicle Tracking Control. This is a coarse-aggregate surfaced pad underlain by a geotextile. This is the most common vehicle tracking control, and when properly maintained can be effective at removing sediment from vehicle tires.

VTC-2. Vehicle Tracking Control with Construction Mat or Turf Reinforcement Mat. This type of control may be appropriate for site access at very small construction sites with low traffic volume over vegetated areas. Although this application does not typically remove sediment from vehicles, it helps protect existing vegetation and provides a stabilized entrance.

Vehicle Tracking Control	
Functions	
Erosion Control	Moderate
Sediment Control	Yes
Site/Material Management	Yes

VTC-3. Stabilized Construction Entrance/Exit with Wheel Wash. This is an aggregate pad, similar to VTC-1, but includes equipment for tire washing. The wheel wash equipment may be as simple as hand-held power washing equipment to more advance proprietary systems. When a wheel wash is provided, it is important to direct wash water to a sediment trap prior to discharge from the site.

Vehicle tracking controls are sometimes installed in combination with a sediment trap to treat runoff.

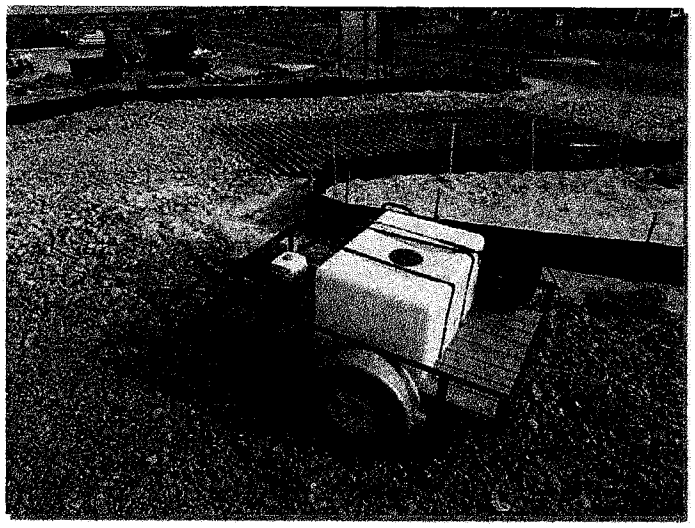
Maintenance and Removal

Inspect the area for degradation and replace aggregate or material used for a stabilized entrance/exit as needed. If the area becomes clogged and ponds water, remove and dispose of excess sediment or replace material with a fresh layer of aggregate as necessary.

With aggregate vehicle tracking controls, ensure rock and debris from this area do not enter the public right-of-way.

Remove sediment that is tracked onto the public right of way daily or more frequently as needed. Excess sediment in the roadway indicates that the stabilized construction entrance needs maintenance.

Ensure that drainage ditches at the entrance/exit area remain clear.

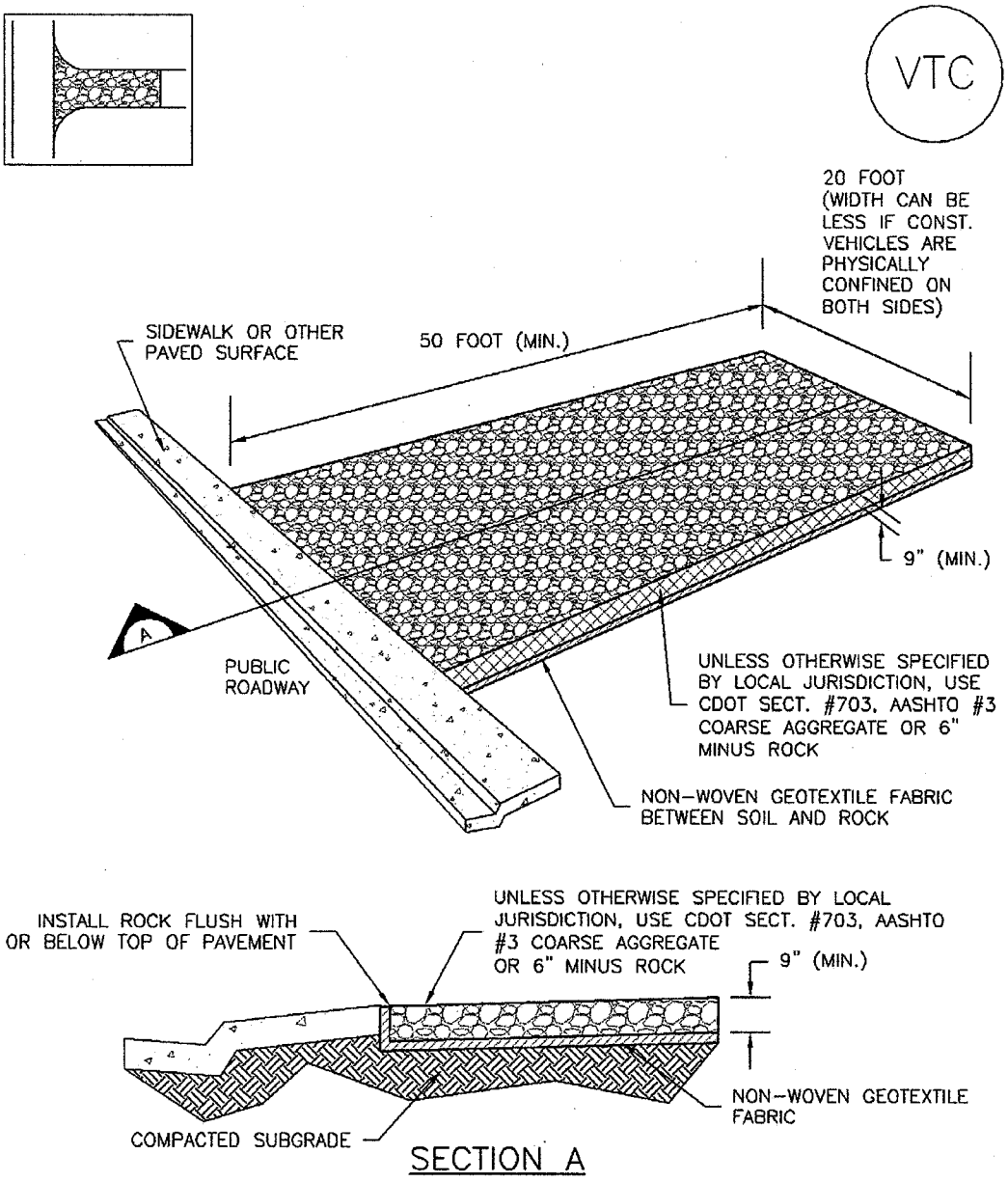


Photograph VTC-2. A vehicle tracking control pad with wheel wash facility. Photo courtesy of Tom Gore.

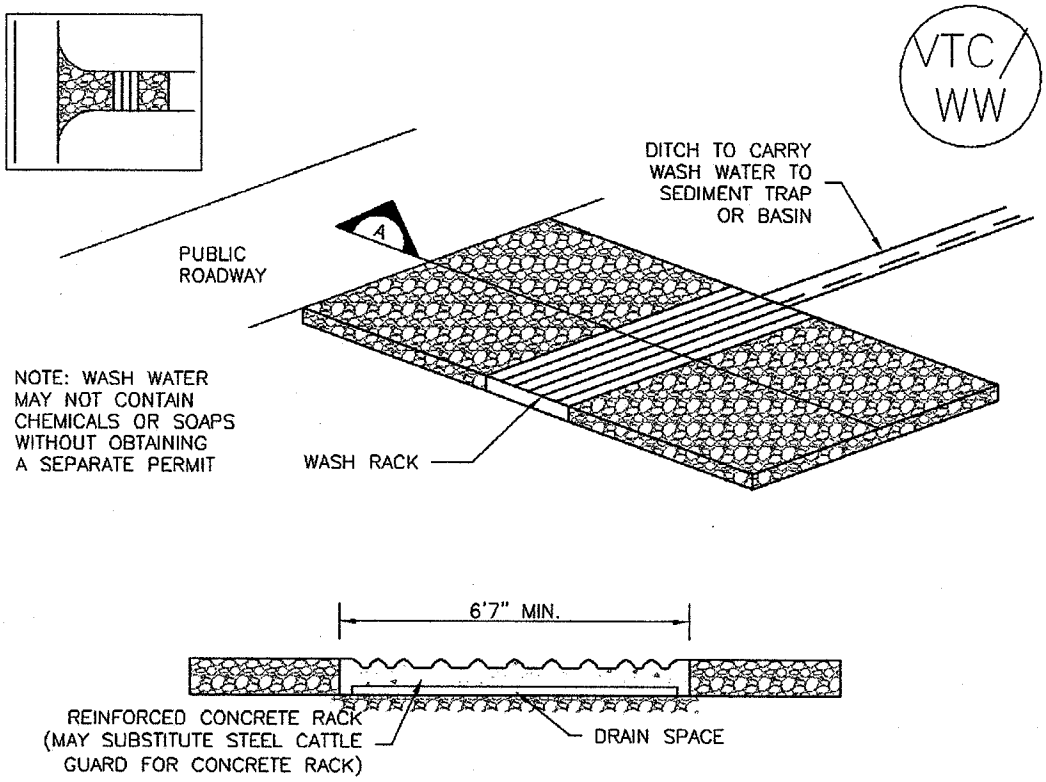
A stabilized entrance should be removed only when there is no longer the potential for vehicle tracking to occur. This is typically after the site has been stabilized.

When wheel wash equipment is used, be sure that the wash water is discharged to a sediment trap prior to discharge. Also inspect channels conveying the water from the wash area to the sediment trap and stabilize areas that may be eroding.

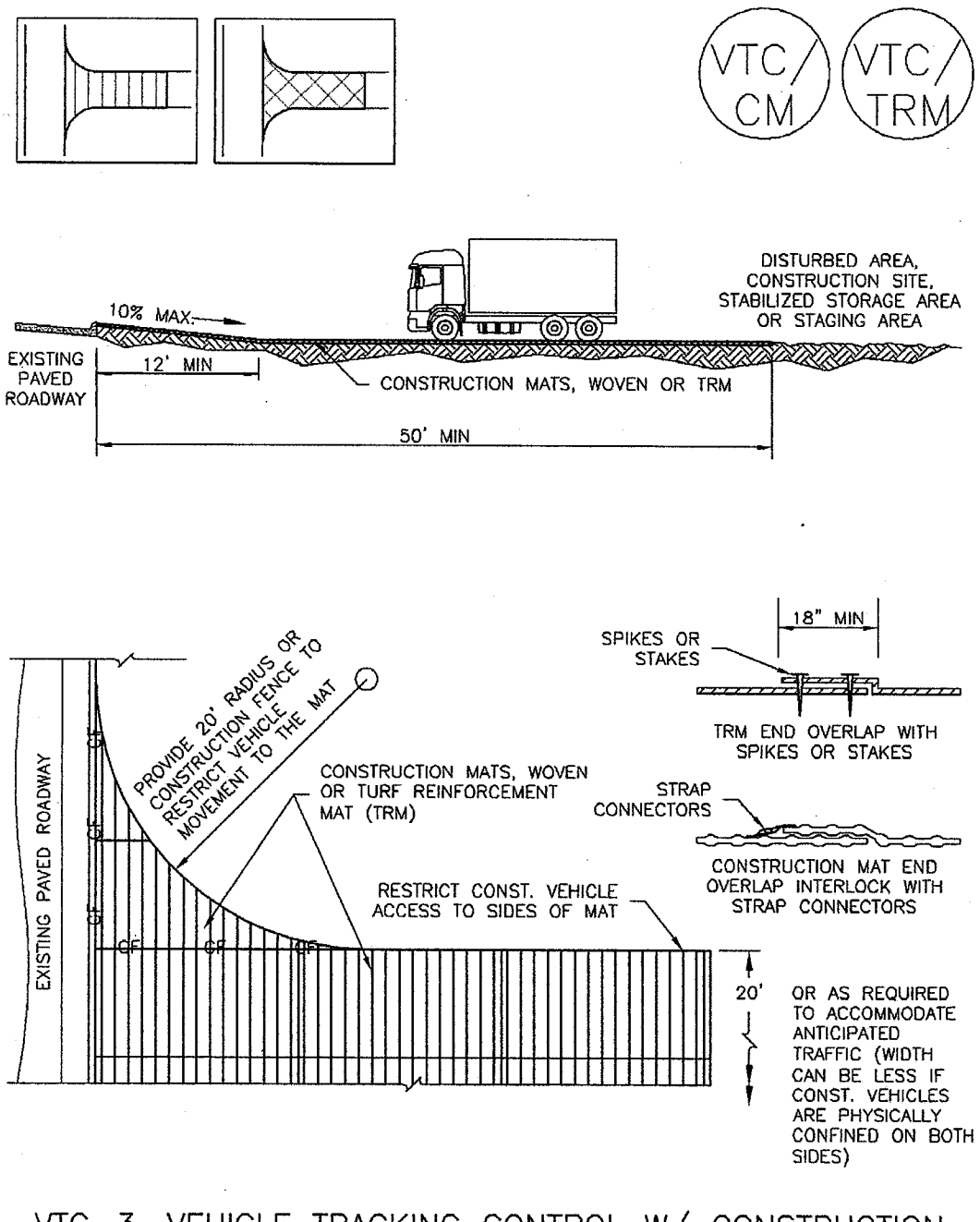
When a construction entrance/exit is removed, excess sediment from the aggregate should be removed and disposed of appropriately. The entrance should be promptly stabilized with a permanent surface following removal, typically by paving.



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL



VTC–2. AGGREGATE VEHICLE TRACKING CONTROL WITH WASH RACK



VTC–3. VEHICLE TRACKING CONTROL W/ CONSTRUCTION MAT OR TURF REINFORCEMENT MAT (TRM)

STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF CONSTRUCTION ENTRANCE(S)/EXIT(S).
   -TYPE OF CONSTRUCTION ENTRANCE(S)/EXITS(S) (WITH/WITHOUT WHEEL WASH, CONSTRUCTION MAT OR TRM).

2. CONSTRUCTION MAT OR TRM STABILIZED CONSTRUCTION ENTRANCES ARE ONLY TO BE USED ON SHORT DURATION PROJECTS (TYPICALLY RANGING FROM A WEEK TO A MONTH) WHERE THERE WILL BE LIMITED VEHICULAR ACCESS.

3. A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED RIGHT-OF-WAYS.

4. STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

5. A NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.

6. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

STABILIZED CONSTRUCTION ENTRANCE/EXIT MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY TO THE STABILIZED ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.

5. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED THROUGHOUT THE DAY AND AT THE END OF THE DAY BY SHOVELING OR SWEEPING. SEDIMENT MAY NOT BE WASHED DOWN STORM SEWER DRAINS.

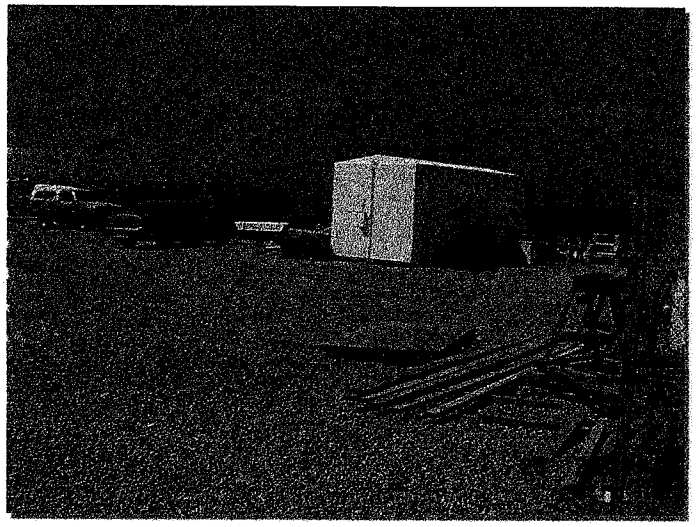
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM CITY OF BROOMFIELD, COLORADO, NOT AVAILABLE IN AUTOCAD)

Stabilized Staging Area (SSA) SM-6

Description

A stabilized staging area is a clearly designated area where construction equipment and vehicles, stockpiles, waste bins, and other construction-related materials are stored. The contractor office trailer may also be located in this area. Depending on the size of the construction site, more than one staging area may be necessary.



Photograph SSA-1. Example of a staging area with a gravel surface to prevent mud tracking and reduce runoff. Photo courtesy of Douglas County.

Appropriate Uses

Most construction sites will require a staging area, which should be clearly designated in SWMP drawings. The layout of the staging area may vary depending on the type of construction activity. Staging areas located in roadways due to space constraints require special measures to avoid materials being washed into storm inlets.

Design and Installation

Stabilized staging areas should be completed prior to other construction activities beginning on the site. Major components of a stabilized staging area include:

- Appropriate space to contain storage and provide for loading/unloading operations, as well as parking if necessary.
- A stabilized surface, either paved or covered, with 3-inch diameter aggregate or larger.
- Perimeter controls such as silt fence, sediment control logs, or other measures.
- Construction fencing to prevent unauthorized access to construction materials.
- Provisions for Good Housekeeping practices related to materials storage and disposal, as described in the Good Housekeeping BMP Fact Sheet.
- A stabilized construction entrance/exit, as described in the Vehicle Tracking Control BMP Fact Sheet, to accommodate traffic associated with material delivery and waste disposal vehicles.

Over-sizing the stabilized staging area may result in disturbance of existing vegetation in excess of that required for the project. This increases costs, as well as requirements for long-term stabilization following the construction period. When designing the stabilized staging area, minimize the area of disturbance to the extent practical.

Stabilized Staging Area	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material	Yes

Minimizing Long-Term Stabilization Requirements

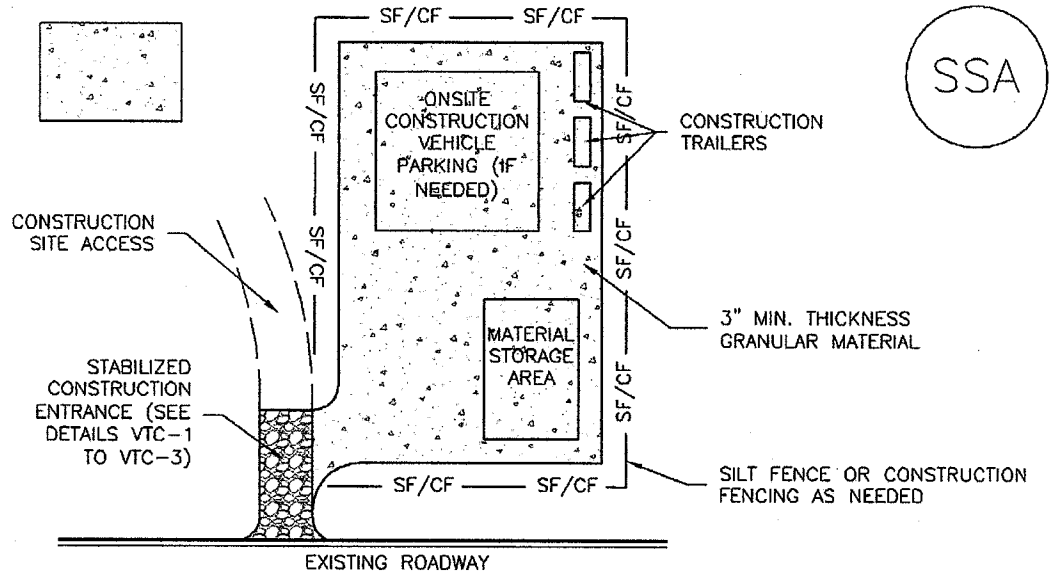
- Utilize off-site parking and restrict vehicle access to the site.
- Use construction mats in lieu of rock when staging is provided in an area that will not be disturbed otherwise.
- Consider use of a bermed contained area for materials and equipment that do not require a stabilized surface.
- Consider phasing of staging areas to avoid disturbance in an area that will not be otherwise disturbed.

See Detail SSA-1 for a typical stabilized staging area and SSA-2 for a stabilized staging area when materials staging in roadways is required.

Maintenance and Removal

Maintenance of stabilized staging areas includes maintaining a stable surface cover of gravel, repairing perimeter controls, and following good housekeeping practices.

When construction is complete, debris, unused stockpiles and materials should be recycled or properly disposed. In some cases, this will require disposal of contaminated soil from equipment leaks in an appropriate landfill. Staging areas should then be permanently stabilized with vegetation or other surface cover planned for the development.



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF STAGING AREA(S).
   -CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

Attachment 2. Erosion Control Security Calculations

Table 1. Erosion and Sediment Control Escrow/Security Calculation for The City of Fort Collins

Project: **Cherry Street Cottages** **Disturbed Acres:** 1.00

BMP Amount

EROSION CONTROL BMPs	Units	Estimated Quantity	Unit Price	Total Price
Silt Fence (SF)	L.F.	960	$2.00	$1,920.00
Inlet Protection (IP)	EA	0		
Concrete Washout (CW)	EA	1	$500.00	$500.00
Vehicle Tracking Control (VTC)	EA	1	$1,500.00	$1,500.00
Stockpile Management (SP)	CY	300	$3.00	$900.00
Rock Sock (RS)	EA	1	$200.00	$200.00
Mulching (MU)	AC	1	$500.00	$500.00
...etc...				$0.00
(add all other BMPs for the site in this list)			Sub-Total:	$5,520.00
			1.5 x Sub-Total:	$8,280.00
			Amount of security:	***$8,280.00***

Reseeding Amount

	Total Acres x Price/acre:	$5,000.00
Unit Price of Seeding per acre: $5,000.00	Sub-Total:	$5,000.00
	1.5 x Sub-Total:	$7,500.00
	Amount to Re-seed:	***$7,500.00***

Miniumum Escrow Amount

	Minimum escrow amount:	***$3,000.00***

Final Escrow Amount

	Erosion Control Escrow:	***$8,280.00***

Fields in yellow should be amended for this project.

"The amount of the security must be based on one and one-half times the estimate of the cost to install the approved measures, or one and one-half times the cost to re-vegetate the disturbed land to dry land grasses based upon unit cost determined by the City's Annual Revegetation and Stabilization Bid, whichever is greater. In no instance, will the amount of security be less than one thousand five hundred dollars ($1,500) for residential development or three thousand dollars ($3,000) for commercial development"