INTERSTATE 25 / CIMARRON INTERCHANGE PROJECT

AESTHETICS PLANS AND DETAILS

ADDENDUM 1
AUGUST 22, 2014

COVER

CHAPTER 1 INTRODUCTION, COLORS AND FINISHES
CHAPTER 2 BRIDGE LOCATIONS
CHAPTER 3 BRIDGES
CHAPTER 4 LIGHTING
CHAPTER 5 RETAINING WALLS
CHAPTER 6 NOT USED
CHAPTER 7 NOT USED
CHAPTER 8 LANDSCAPE DEMOLITION PLANS AND SPECIFICATIONS
CHAPTER 9 SEEDING/ROCK MULCH PLANS AND SPECIFICATIONS
CHAPTER 10 PLANTING PLANS AND SPECIFICATIONS
CHAPTER 11 IRRIGATION PLANS AND SPECIFICATIONS

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Colorado Department of Transportation
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TABLE OF CONTENTS
AESTHETICS PLANS & DETAILS

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number

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ITEM	COLOR
I-25 OVER CIMARRON	
ABUTMENT PANELS	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
DECORATIVE PANELS	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
PANEL CAP/DECORATIVE BANDS	'BROWN' CONCRETE STAIN TO MATCH FEDERAL COLOR 30227
GIRDERS (CONCRETE)	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
GIRDERS (STEEL)	'BEIGE' CONCRETE PAINT TO MATCH FEDERAL COLOR 33522
BRIDGE RAIL - CONCRETE	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
BRIDGE RAIL - TYPE 10M	GALVANIZED STEEL
BRIDGE DECORATIVE RAIL	POWDER COATED STEEL FEDERAL COLOR 37038
STREET LIGHT POLE BASES	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
BRIDGE PIERS	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
BRIDGE DECK	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
I-25 RAMP BRIDGES	
PIERS	'TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448
GIRDERS (CONCRETE)	'TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448
GIRDERS (STEEL)	'TAN' PAINT TO MATCH FEDERAL COLOR 33448
BRIDGE RAIL - TYPE 10M	GALVANIZED STEEL
BRIDGE DECK	'GOLDEN TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33711
CIMARRON OVER FOUNTAIN CREEK	
DECORATIVE CREEK PANELS	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
PANEL CAPS AND BANDS	'BROWN' CONCRETE STAIN TO MATCH FEDERAL COLOR 30227
HAND-STAINED STONE FORMLINER	50 % 'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522, 30% ' TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448, AND 20% 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
DECORATIVE BANDS	'BROWN' CONCRETE STAIN TO MATCH FEDERAL COLOR 30227
DECORATIVE COLUMNS	'GOLDEN TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33711
HAND-STAINED STONE PIER CAP	50 % 'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522, 30% ' TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448, AND 20% 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
PIERS	'TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448
GIRDERS (CONCRETE)	'TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448
GIRDERS (STEEL)	'TAN' PAINT TO MATCH FEDERAL COLOR 33448
BRIDGE RAIL - CONCRETE	'GOLDEN TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33711
BRIDGE RAIL - TYPE 10M	GALVANIZED STEEL
BRIDGE DECK	'GOLDEN TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33711

ITEM	COLOR
RETAINING WALLS	
CAST-IN-PLACE CONCRETE	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 OR 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
PRECAST CONCRETE FACING	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 OR 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
DECORATIVE PANELS	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
CONCRETE BLOCK FACING	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 OR 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
FRACTURED FIN W/VERTICAL STRIPE (I-25)	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 OR 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
RANDOM ASHLAR WALLS (I-25)	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 OR 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
HAND-STAINED STONE WALLS	50 % 'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522, 30% ' TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448, AND 20% 'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313

**SEE SHEETS 5.0 AND 5.1 FOR RETAINING WALL FINISH TYPE AND COLORS BY LOCATION

HIGHWAY GUARDRAIL	
TYPE 10 GUARDRAIL	GALVANIZED STEEL
TYPE 3 (W-BEAM) GUARDRAIL	GALVANIZED STEEL
MEDIAN BARRIER (TYPE 7)	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
HIGHWAY LIGHTING	
CURVED TAPERED DAVIT LIGHT POLES	TO MATCH FEDERAL COLOR 10075
BREAKAWAY LIGHT POLE BASES	TO MATCH FEDERAL COLOR 10075
COBRA LUMINARIES	TO MATCH FEDERAL COLOR 10075
I-25 ACORN LIGHTS	TO MATCH AESTHETIC STYLE AND COLOR OF CIMARRON BRIDGE OVER RR/CONEJOS ST. PAINT TO MATCH FEDERAL COLOR 34108
HIGHWAY SIGNAGE	
SIGN STRUCTURES	TO MATCH FEDERAL COLOR 10075
GROUND SIGN SUPPORTS	TO MATCH FEDERAL COLOR 10075
BACK OF SIGNS	TO MATCH FEDERAL COLOR 10075
FRONT OF SIGNS	PER CDOT STANDARD
CATWALKS/WALKWAY GRATE (IF ANY)	TO MATCH FEDERAL COLOR 10075

*NOTE: SIGNS SHALL NOT BE MOUNTED ON ANY BRIDGE STRUCTURES.

TRAFFIC SIGNALS	
TRAFFIC SIGNAL POLES	'DARK GREY' TO MATCH FEDERAL COLOR 26122
TRAFFIC SIGNAL POLE BASES	'DARK GREY' TO MATCH FEDERAL COLOR 26122
SIGNAL HOUSING	'DARK GREY' TO MATCH FEDERAL COLOR 26122
ILLUMINATED SIGNS (IF USED)	'DARK GREY' TO MATCH FEDERAL COLOR 26122

NOTES:

1. ALL COLORS SHALL HAVE A MOCK UP 10' X 10' PANEL APPROVED BEFORE COLORS ARE APPLIED TO ANY STRUCTURE.
2. COLOR SELECTION BASED OFF THE I-25 THROUGH COLORADO SPRINGS AESTHETIC GUIDELINES.
3. STRUCTURAL CONCRETE COATING AND SILICONE ACRYLIC SEALER SHALL BE USED ON THE STRUCTURE AND WALL COPINGS.

COLOR SWATCHES

- GOLDEN TAN FEDERAL #33711
- BEIGE FEDERAL #33522
- TAN FEDERAL #33448
- FLESH FEDERAL #30313
- BROWN FEDERAL #30227
- FEDERAL #37038
- FEDERAL #34108
- FEDERAL #10075
- DARK GREY FEDERAL #26122

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Colorado Department of Transportation
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Region 2 DW

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COLORS AND FINISHES
STANDARD COLORS THROUGHOUT THE PROJECT

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number 1.1

CONCRETE STAINING SPECIFICATIONS

DESCRIPTION
This work consists of staining all concrete on the project, including hand staining of rock formliners.

MATERIALS
The stain shall consist of a base and as many as 6 accent stains. The base stain shall be an organic based non-toxic iron oxide derivative that provides a spectrum of earth tones (brown, light browns, reddish browns). Color hardeners shall be used to achieve a wider variety of earth tones. Colors shall be such that alteration of the color and further color development after initial application can be accomplished.

CONSTRUCTION REQUIREMENTS
Prior to application of stain on the structures, stain shall be applied to a 10'x10' test panel for approval as specified on sheet 1.1. Parties involved in the approval of the staining shall be notified 5 days prior to applying the stain to the test area. For the hand stained rock formliners, test staining will ensure color compatibility with the characteristic rock. Stain shall be applied to a minimum of (2) 10-foot X 10-foot test locations. The accent stain shall be used to provide further accent and highlighting of the wall to blend it into the adjacent surrounding landscape. The stain colors shall be applied in a random fashion in order to create the appearance of real rock and to avoid blocks of adjacent rock 'faces' being stained the same color. Rock 'faces' shall be stained to avoid the appearance of sudden color changes within a single rock 'face', although the gradual change of hues/tones within rock 'faces' is encouraged. Grout lines shall be left unstained.

The accent stain shall be in accordance with the approved color samples. The stain shall be applied in accordance with the printed instructions of the stain material manufacturer. Caution shall be exercised to provide all necessary protection to the body during application as recommended by the manufacturer. A copy of such printed material shall be furnished to the Engineer prior to application of the material. Stain shall be applied darkest color first to lightest color last.

After application of the test stain, sites shall remain undisturbed and allowed to set color for a period of 30 days. After 30 days a determination shall be made to the concentrations of stain required on the project and for individual areas within the project. Concentrations of stain may need to be adjusted within the ranges approved to adjust to specific on site conditions. Written approval from the Engineer and CDOT is required.

Prior to applying the stain, all concrete surfaces shall be cleaned by high pressure washing with water. Staining shall be performed once the cleaning is complete and freed of soil or debris. The solution should be applied directly to a surface of the item being stained.

Do not apply stain if winds exceed 15 mph or stronger, with no anticipated precipitation in the forecast for 12 hours. Best results occur if stain is applied when temperatures are 70 degrees Fahrenheit or higher and if temperatures remain with a 10 degree margin for 30 days. If applying in cooler temperatures, allow stain to dry completely before surface becomes moist. Material shall be stored in an air tight container, in a cool dry space.

EXAMPLE OF DESIRED HAND-STAINED ROCK COLORATION

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File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:			IM0252-423
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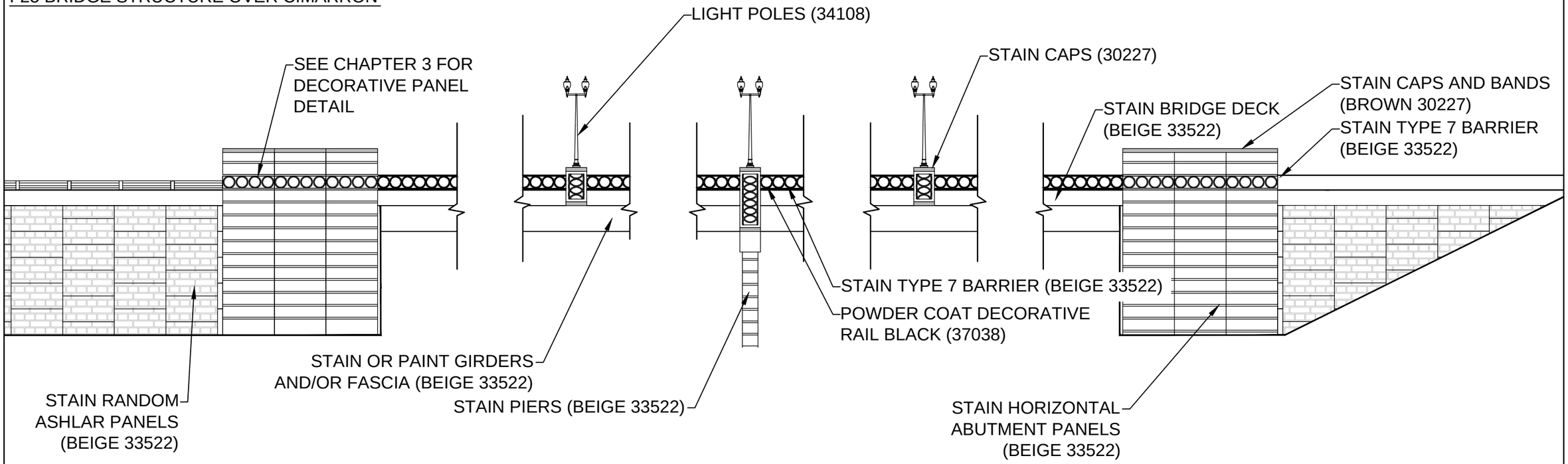
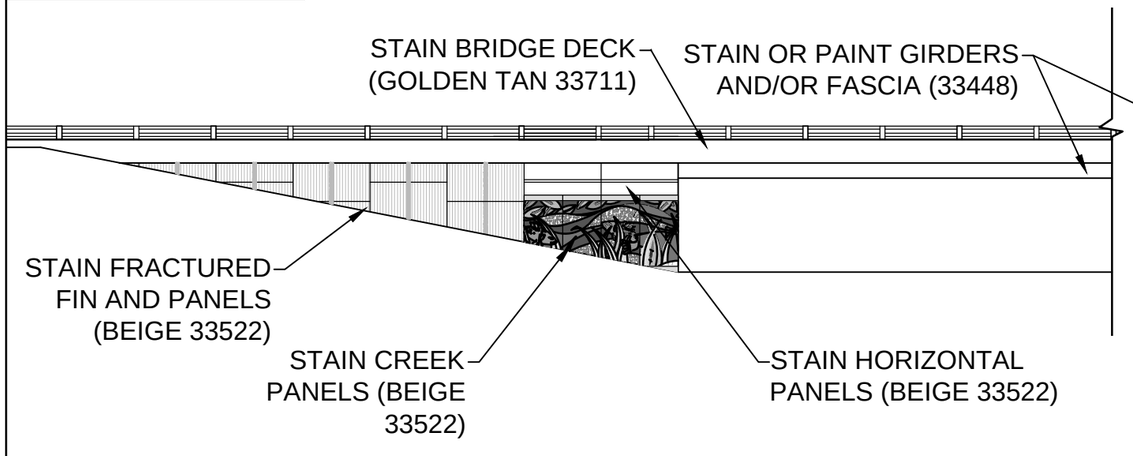
Unit Information Unit Leader Initials					Region 2 DW	Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number 1.2
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132									

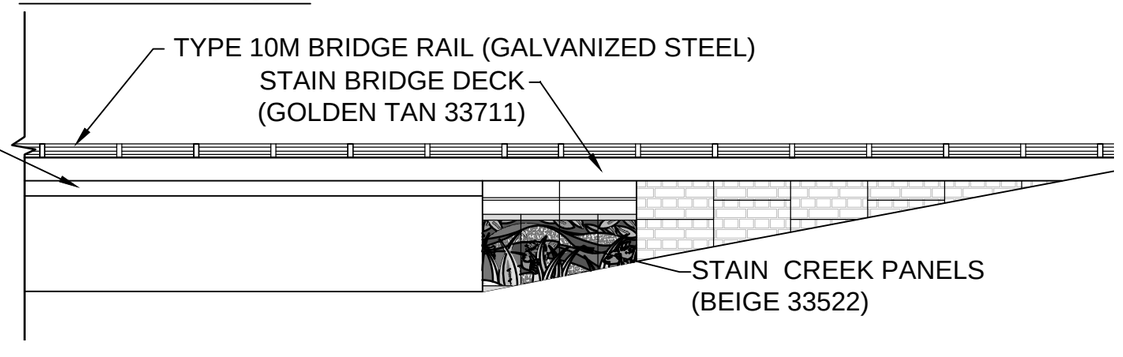
I-25 BRIDGE STRUCTURE OVER CIMARRON



I-25 RAMP - WEST SIDE



I-25 RAMP - EAST SIDE



NOTES:

1. STAIN OR PAINT ENTIRE GIRDER SPECIFIED COLOR
2. SEE SHEET 5.0 FOR LOCATION MAP OF ABUTMENT AND RETAINING WALLS

Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	COLORS AND FINISHES STANDARD COLORS/TYPICAL BRIDGE SECTION AESTHETICS	Project No./Code
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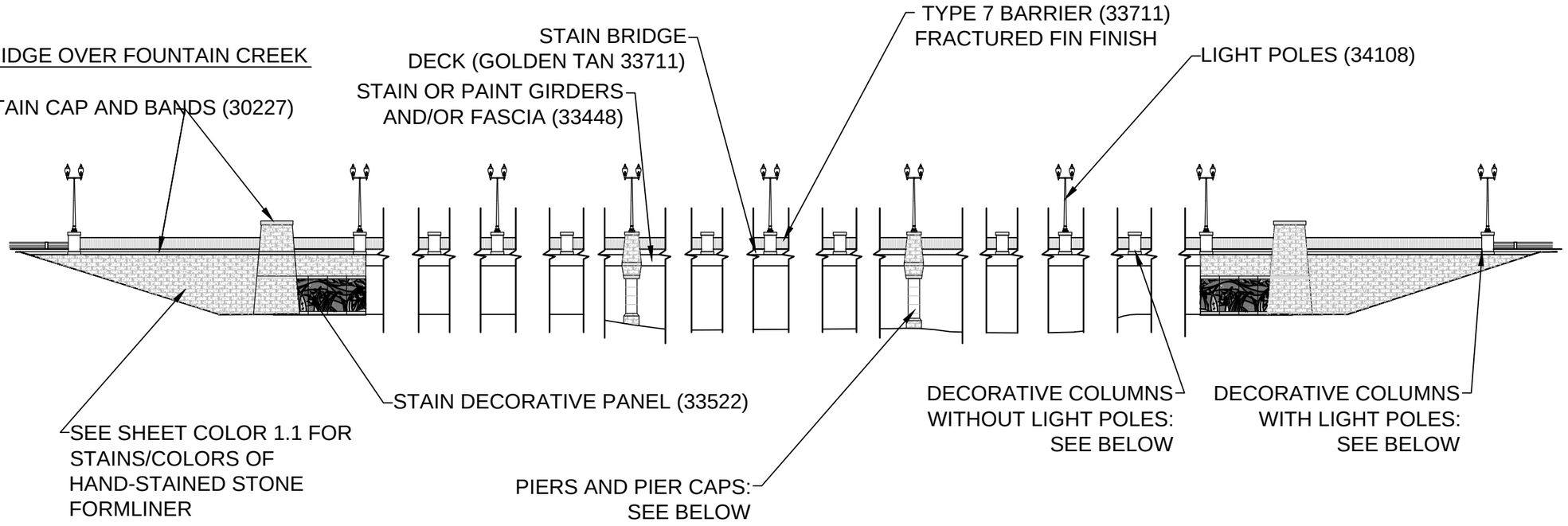
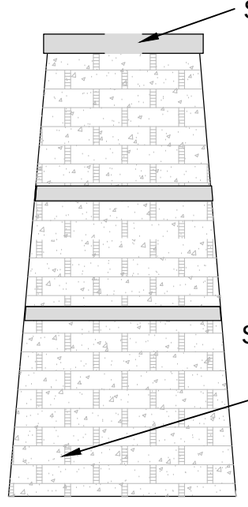
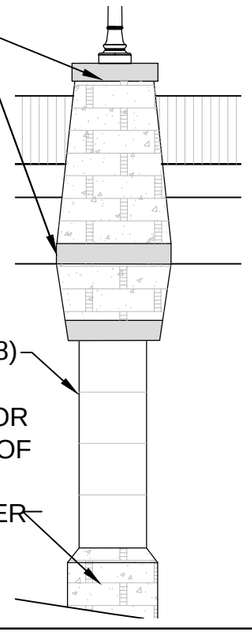
CIMARRON BRIDGE OVER FOUNTAIN CREEK



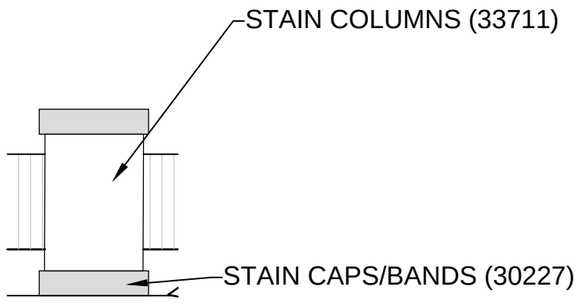
ABUTMENT MONUMENTS



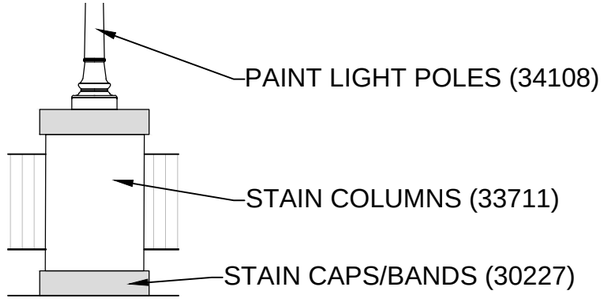
PIER AND PIER CAPS



DECORATIVE COLUMNS WITHOUT LIGHT POLES



DECORATIVE COLUMNS WITH LIGHT POLES



NOTES:

1. STAIN OR PAINT ENTIRE GIRDER 30227
2. COLOR THEME IS BASED ON INTERSTATE 25 IN COLORADO SPRINGS CORRIDOR IMPROVEMENTS ARCHITECTURAL DESIGN REQUIREMENTS

Print Date: 07-24-2014	Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	COLORS AND FINISHES STANDARD COLORS/TYPICAL BRIDGE SECTION AESTHETICS	Project No./Code
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associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132							

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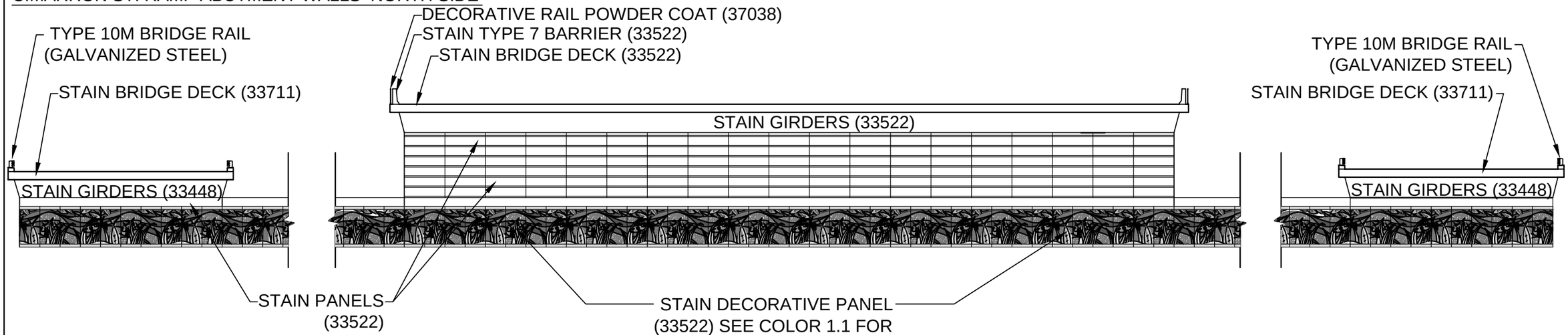
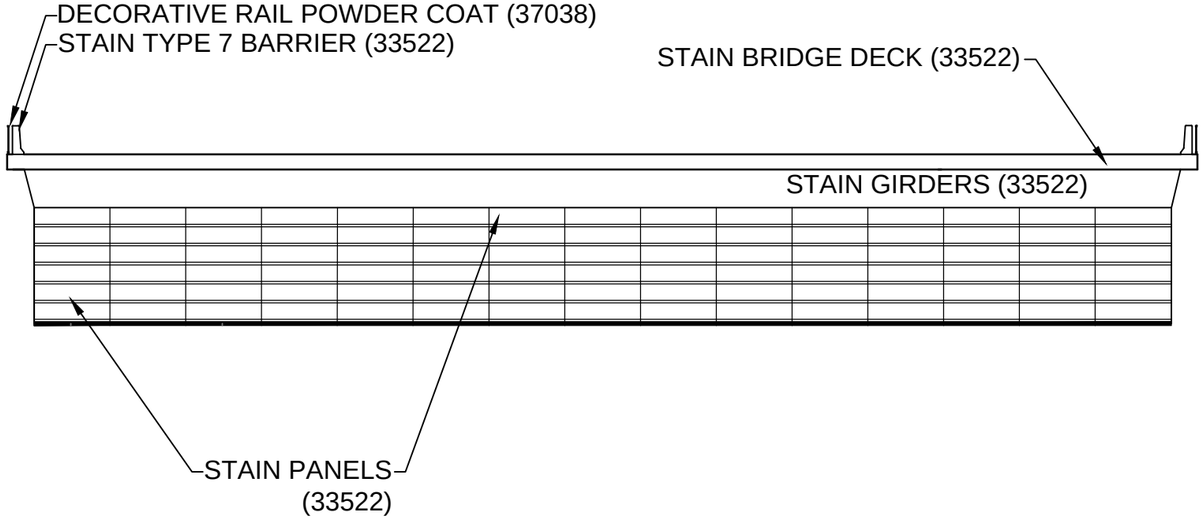
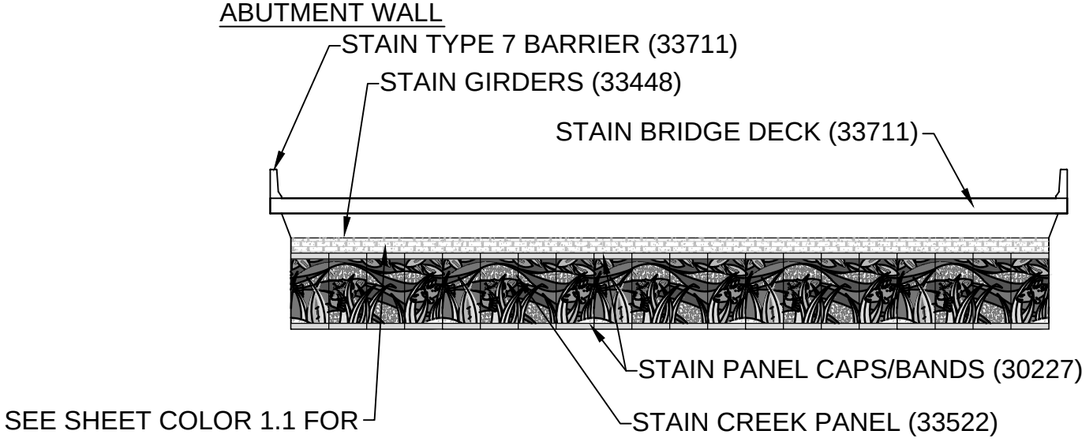
I-25 BRIDGE STRUCTURE OVER CIMARRON
CIMARRON ST. RAMP ABUTMENT WALLS NORTH SIDE



I-25 BRIDGE STRUCTURE OVER CIMARRON - SOUTH SIDE
ABUTMENT WALL



CIMARRON BRIDGE STRUCTURE
ABUTMENT WALL



NOTES:
1. STAIN OR PAINT ENTIRE GIRDER WITH SPECIFIED COLOR
2. COLOR THEME IS BASED ON I-25 IN COLORADO SPRINGS CORRIDOR IMPROVEMENTS ARCHITECTURAL DESIGN REQUIREMENTS

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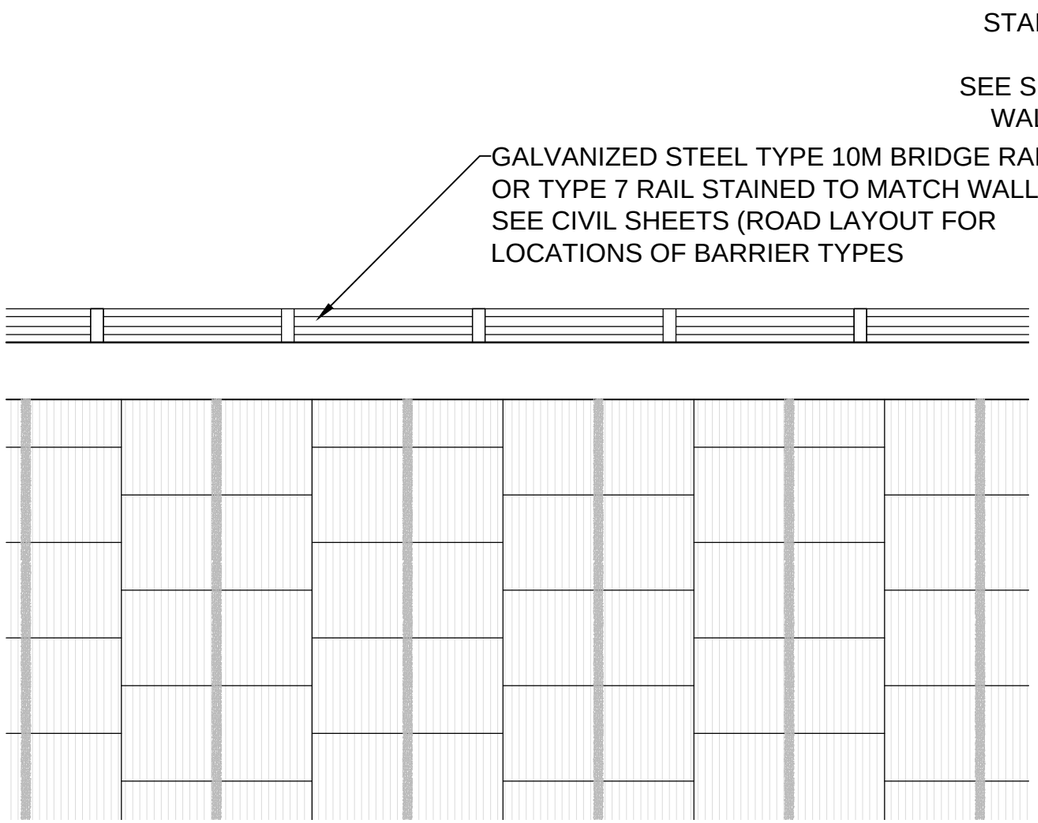
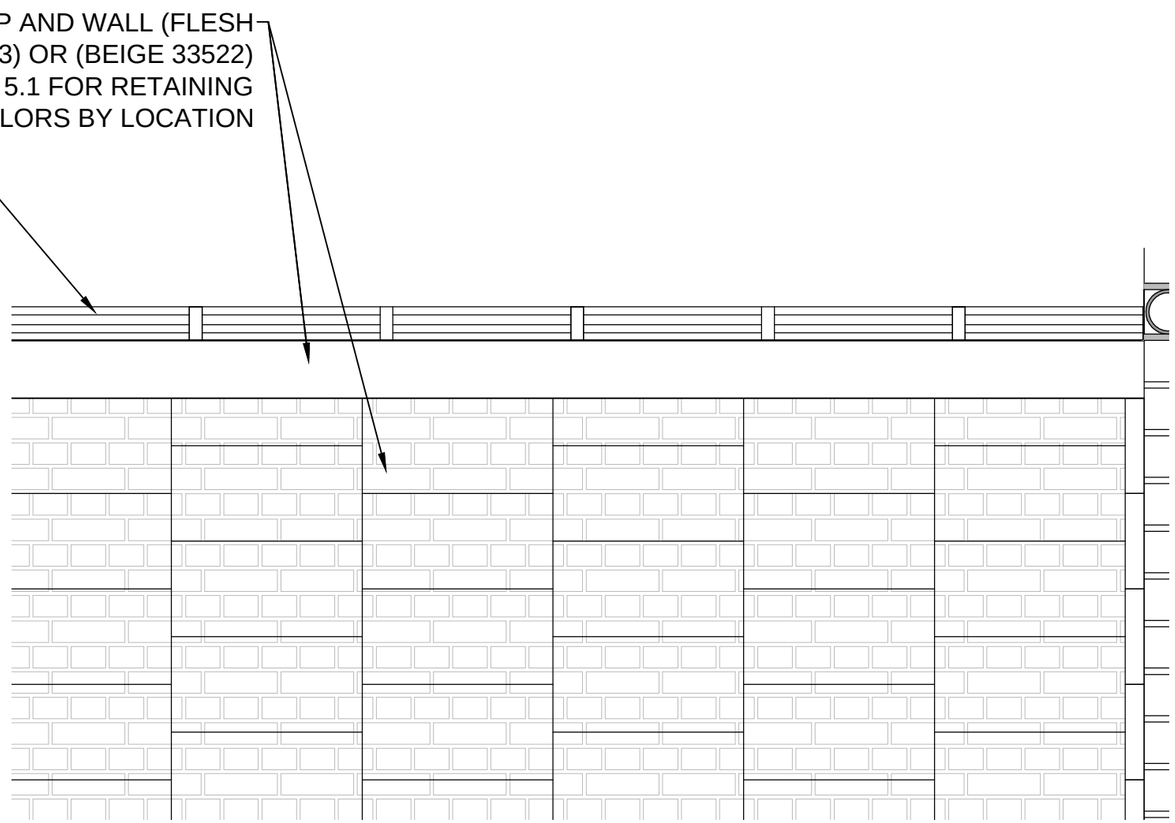
I-25 RETAINING WALLS



RETAINING WALL - WEST ELEVATION



RETAINING WALL- EAST ELEVATION

NOTES:

1. ENTIRE RETAINING WALL REGARDLESS OF PANEL TYPE SHALL BE STAINED (FLESH 30313) OR (BEIGE 33522). SEE SHEET 5.1 FOR RETAINING WALL COLORS BY LOCATION.

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Unit Information	Unit Leader Initials				Region 2 DW	Void:	Detailer: JDA/AM	Sheet Number 1.6
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ITEM	COLOR
ARE 2A AND 2B BRIDGE	
ABUTMENT PANELS	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
PIERS	'TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448
GIRDERS (CONCRETE)	'TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33448
GIRDERS (STEEL)	'TAN' PAINT TO MATCH FEDERAL COLOR 33448
BRIDGE RAIL - CONCRETE	'GOLDEN TAN' CONCRETE STAIN TO MATCH FEDERAL COLOR 33711
BRIDGE RAIL - TYPE 10M	GALVANIZED STEEL

COLOR SWATCHES

- GOLDEN TAN FEDERAL #33711
- BEIGE FEDERAL #33522
- TAN FEDERAL #33448
- FLESH FEDERAL #30313
- BROWN FEDERAL #30227
- FEDERAL #37038
- FEDERAL #34108
- FEDERAL #10075
- FEDERAL #26122

NOTES:
1. ALL COLORS SHALL HAVE A MOCK UP 10' X 10' PANEL APPROVED BEFORE COLORS ARE APPLIED TO ANY STRUCTURE
2. COLOR SELECTION BASED OFF THE I-25 THROUGH COLORADO SPRINGS AESTHETIC GUIDELINES.
3. STRUCTURAL CONCRETE COATING SHALL BE USED ON THE STRUCTURE AND WALL COPINGS
4. SILICONE ACRYLIC CONCRETE SEALER SHALL BE USED ON WALLS

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COLOR REQUIREMENTS
ARE 2A AND 2B BRIDGE

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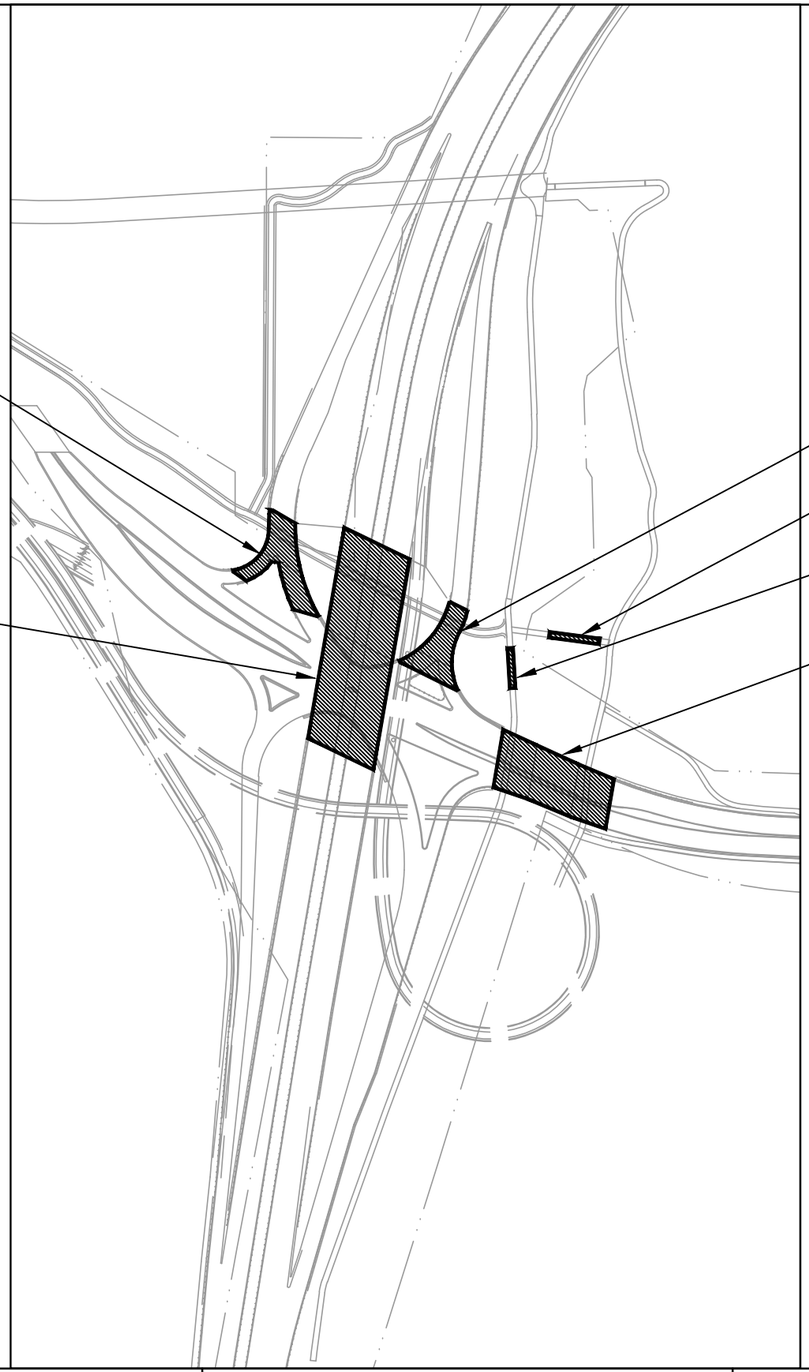
USE THIS BRIDGE LOCATIONS PLAN
IN CONJUNCTION WITH THE ATTACHED
PLAN SHEETS

I-25 RAMP OVER FOUNTAIN CREEK

I-25 BRIDGE OVER CIMARRON



I-25 RAMP OVER FOUNTAIN CREEK

PEDESTRIAN BRIDGE OVER MONUMENT CREEK

PEDESTRIAN BRIDGE OVER FOUNTAIN CREEK;
RE-USE EXISTING BRIDGE OR REPLACE

CIMARRON BRIDGE OVER FOUNTAIN CREEK

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BRIDGE LOCATIONS

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number 2.0

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I-25 OVER CIMARRON BRIDGE ABUTMENTS

ABUTMENTS SHALL BE CONSTRUCTED OF CAST-IN-PLACE OR PRE-CAST CONCRETE WITH CUSTOM FORMLINER PANELS AS SHOWN IN THE ATTACHED PLANS, AND COVERED WITH PIGMENTED STAIN COATING. NON-CUSTOM FORMLINER PANELS SHALL ADHERE TO THE TYPES AND FINISHES SHOWN IN THE ATTACHED PLANS.

ALL WING WALLS AND ALL ABUTMENT WALLS SHALL BE VERTICAL.

THE CONTRACTOR MAY CHOOSE TO CONSTRUCT THE ABUTMENT WALL AND WING WALLS AS A FACING FOR STRUCTURAL SUPPORT BEYOND. UNDER THIS OPTION THE APPEARANCE OF THESE WALLS SHALL NOT VARY FROM THESE REQUIREMENTS.

AESTHETIC PANELS MAY BE INSTALLED AFTER ABUTMENT AND WING WALL CONSTRUCTION IS COMPLETE.

DECORATIVE ABUTMENT AND WING WALL PANELS SHALL BE CONSTRUCTED AS DETAILED. SEE BRIDGES - ABUTMENT WALL PANELS. INSTALLATION METHODS MAY VARY. APPEARANCE OF THESE WALLS SHALL NOT VARY FROM THESE REQUIREMENTS.

I-25 OVER CIMARRON BRIDGE RAIL

BRIDGE RAIL SHALL CONSIST OF A TYPE 7 BARRIER WITH A DECORATIVE STEEL RAILING ON THE OUTSIDE OF THE TYPE 7 BARRIER. THE TYPE 7 BARRIER SHALL EXTEND BEYOND THE BRIDGE TO THE ENDS OF THE MONUMENT STRUCTURE. THE DECORATIVE RAILING SHALL EXTEND THE LENGTH OF THE BRIDGE. THE DECORATIVE RAIL IS DETAILED IN THE ATTACHED PLANS. THE DECORATIVE RAIL SHALL ONLY BE INSTALLED ON THE WEST SIDE OF THE SOUTHBOUND BRIDGE AND THE EAST SIDE OF THE NORTHBOUND BRIDGE.

PIERS AND PIER CAPS (APPLIES TO ALL BRIDGES)

PIERS SHALL BE CONSTRUCTED OF SMOOTH, CAST-IN-PLACE OR PRE-CAST CONCRETE COVERED WITH PIGMENTED STAIN COATING. PIERS SHOULD BE FINISHED SMOOTH AND ALL VOIDS FILLED BEFORE APPLYING STAIN. PIERS SHALL BE CONSISTENT WITH THE I-25 THROUGH COLORADO SPRINGS AESTHETIC GUIDELINES.

DROP PIER CAPS, BELOW THE BOTTOM SOFFIT OF THE GIRDERS WILL ONLY BE REQUIRED FOR THE I-25 OVER CIMARRON BRIDGE, BUT ARE PREFERRED AT ALL BRIDGES.

GIRDER (APPLIES TO ALL BRIDGES)

GIRDER TYPES AT BRIDGE(S) SHALL BE DETERMINED BY THE CONTRACTOR (CONCRETE OR STEEL). OUTSIDE EDGE OF GIRDERS SHALL BE A MINIMUM OF 12" INSIDE OF THE OUTSIDE EDGE OF THE BRIDGE DECK.

ENTIRE GIRDER SHALL BE STAINED OR PAINTED WITH COLORS SPECIFIED ON SHEETS 1.1-1.6

CIMARRON OVER FOUNTAIN CREEK BRIDGE

ABUTMENTS SHALL BE CONSTRUCTED OF CAST-IN-PLACE OR PRE-CAST CONCRETE WITH CUSTOM FORMLINER PANELS AS SHOWN IN THE ATTACHED PLANS, AND COVERED WITH PIGMENTED STAIN COATING. NON-CUSTOM FORMLINER PANELS SHALL ADHERE TO THE TYPES AND FINISHES SHOWN IN THE ATTACHED PLANS.

HAND-STAINED STONE FORMLINER SHALL BE A RANDOM ASHLAR STYLE STONE TO MATCH THE CIMARRON BRIDGE OVER THE RAILROAD/CONEJOS STREET AS CLOSELY AS POSSIBLE. THE COLORS/STAINING OF THE CONCRETE SHALL NOT MATCH THE BRIDGE OVER THE RAILROAD. COLOR/STAINING SHALL BE DONE ACCORDING TO THE DETAILS AND NOTES IN THESE PLANS.

ALL WING WALLS AND ALL ABUTMENT WALLS SHALL BE VERTICAL.

THE CONTRACTOR MAY CHOOSE TO CONSTRUCT THE ABUTMENT WALL AND WING WALLS AS A FACING FOR STRUCTURAL SUPPORT BEYOND. UNDER THIS OPTION THE APPEARANCE OF THESE WALLS SHALL NOT VARY FROM THESE REQUIREMENTS.

AESTHETIC PANELS MAY BE INSTALLED AFTER ABUTMENT AND WING WALL CONSTRUCTION IS COMPLETE.

DECORATIVE ABUTMENT AND WING WALL PANELS SHALL BE CONSTRUCTED AS DETAILED. SEE BRIDGES - ABUTMENT WALL PANELS. INSTALLATION METHODS MAY VARY. APPEARANCE OF THESE WALLS SHALL NOT VARY FROM THESE REQUIREMENTS.

CIMARRON OVER FOUNTAIN CREEK BRIDGE PIERS AND PIER CAPS

CERTAIN ELEMENTS OF THE PIERS AND PIER CAPS SHALL REQUIRE HAND-STAINED STONE FORMLINER (SPECIFIED ABOVE). SEE SHEETS 1.2 AND 3.2 FOR ADDITIONAL INFORMATION.

CIMARRON OVER CREEK BRIDGE RAIL

BRIDGE RAIL SHALL CONSIST OF A TYPE 7 BARRIER WITH FRACTURED FIN FINISH ON THE SIDE FACING AWAY FROM THE ROADWAY, EXTENDING ACROSS THE BRIDGE UNTIL THE FIRST DECORATIVE LIGHT COLUMN AS SHOWN ON SHEET 3.2.

I-25 RAMP BRIDGES RAIL

BRIDGE RAIL SHALL CONSIST OF A TYPE 10M BRIDGE RAIL MOUNTED ON A CONCRETE CURB. THE CONCRETE SHALL BE SMOOTH AND COVERED WITH PIGMENTED STAIN COATING AND THE STEEL SHALL BE GALVANIZED. THE TYPE 10 M BRIDGE RAIL SHALL CONFORM TO CDOT STANDARDS. THE RAILS SHALL EXTEND ACROSS THE BRIDGE AND FOR THE FULL LENGTH OF THE APPROACH SLABS.

Print Date: 07-24-2014
File Name:
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Unit Information Unit Leader Initials

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Aurora, Colorado 80014
303-770-7201 FAX 770-7132

Sheet Revisions

Date:	Comments	Init.

Colorado Department of Transportation
1480 QUAIL LAKE LOOP, SUITE A
COLORADO SPRINGS, CO 80906
Phone: 719-634-2323 FAX: 719-227-3298
Region 2 DW

DESIGN BUILD RFP
No Revisions:
Revised:
Void:

BRIDGES
GENERAL DESCRIPTION

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number 3.0

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I-25 BRIDGE OVER CIMARRON
EAST ELEVATION

CONTINUE TYPE 10M BRIDGE RAIL OVER RETAINING WALL (WHERE APPLICABLE TRANSITION TO TYPE 7 (FLESH 30313)

MONUMENT STRUCTURE SHALL BE 3'-0" THICK FROM THE BRIDGE DECK UP. CAP SHALL BE 9" TALL.

10'-0", TYP.

8' ABOVE DECK

4'-0" MIN.

SEE SHEET 3.4 FOR CUSTOM FORMLINER DETAILS

3'-0" MIN.

ALIGN LIGHTS WITH PIERS WHERE PIERS ARE REQUIRED

3:1 MAXIMUM SLOPE ALONG ABUTMENT WALLS WHERE SLOPE OCCURS

I-25 BRIDGE OVER CIMARRON
WEST ELEVATION

SEE SHEET 3.4 FOR CUSTOM FORMLINER DETAILS

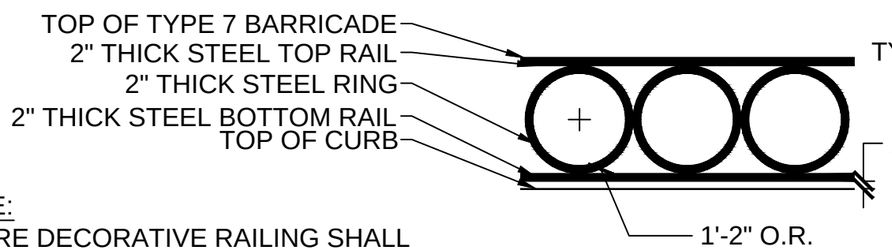
9" CAP, TYP.

BOTTOM OF DECORATIVE LIGHT COLUMNS OVER PIERS TO LINE UP WITH BOTTOM OF GIRDER

BOTTOM OF DECORATIVE LIGHT COLUMNS (NOT OVER PIERS) TO LINE UP WITH BOTTOM OF BRIDGE DECK

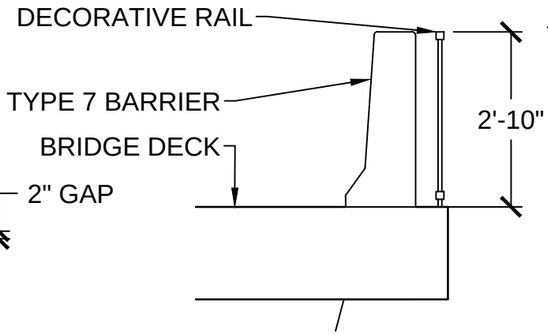
▲ EQUALLY SPACE DECORATIVE LIGHTS AND DECORATIVE COLUMNS

DECORATIVE RAIL DETAIL

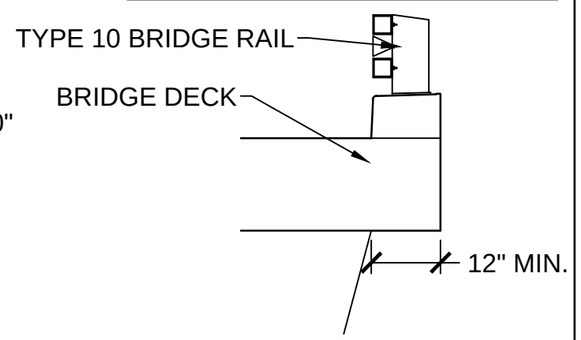


NOTE:
ENTIRE DECORATIVE RAILING SHALL BE POWDER COATED FEDERAL COLOR 37038

BRIDGE DECK AND CURB DETAIL



RAMP BRIDGE AND CURB DETAIL



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File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
Unit Information Unit Leader Initials		Phone: 719-634-2323 FAX: 719-227-3298	Void:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132		Region 2 DW	

BRIDGES I-25 OVER CIMARRON		Project No./Code
		IM0252-423
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM		Sheet Number 3.1
	Subset Sheets:	

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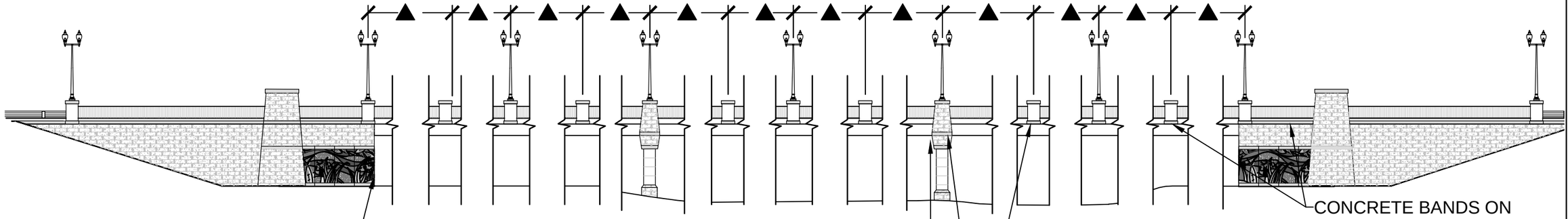
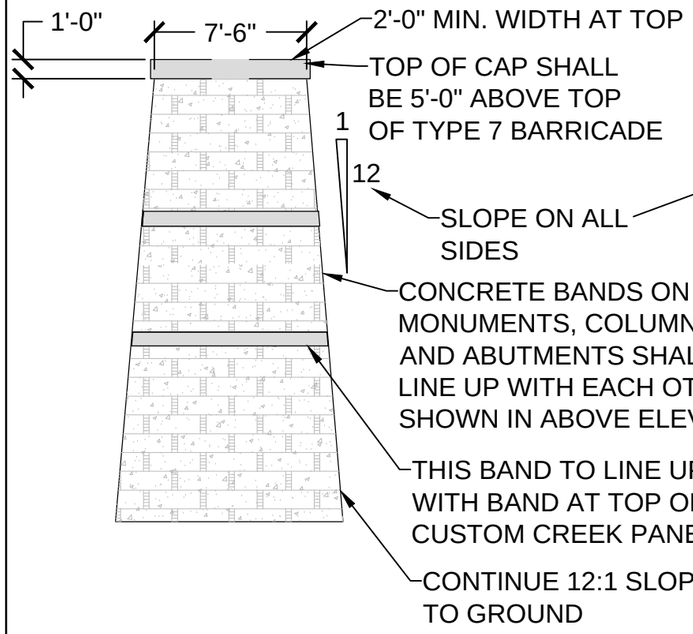
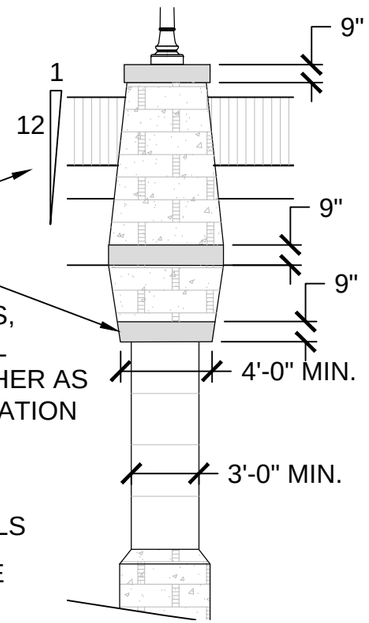


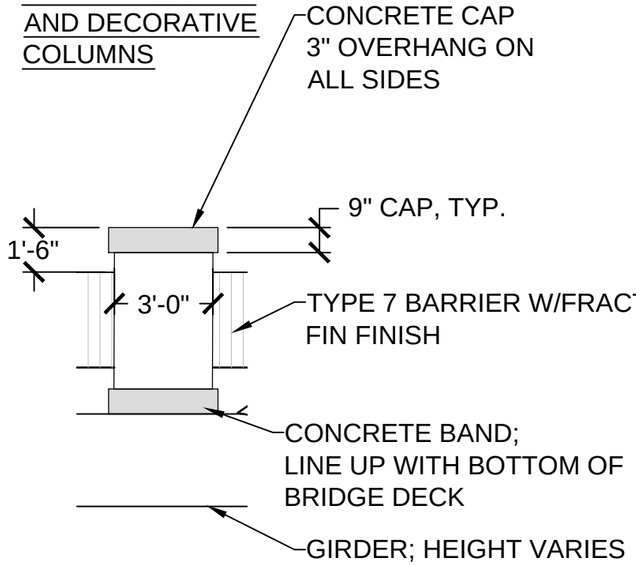
ABUTMENT MONUMENTS



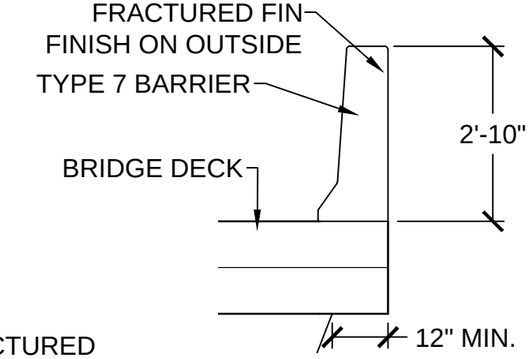
PIER AND PIER CAPS (WHERE REQUIRED)



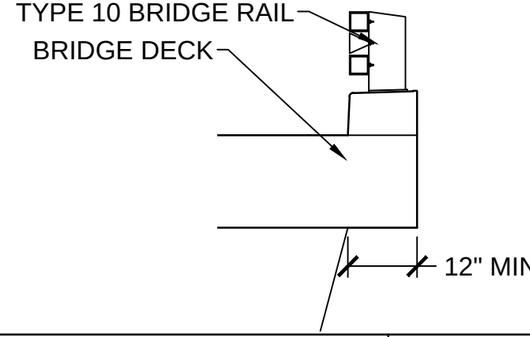
LIGHT POLE BASE AND DECORATIVE COLUMNS



BRIDGE DECK AND BARRIER DETAIL



TYPE 10M BRIDGE RAIL DETAIL



Print Date: 07-24-2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
Unit Information Unit Leader Initials		Phone: 719-634-2323 FAX: 719-227-3298	Void:
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BRIDGES CIMARRON OVER FOUNTAIN CREEK		Project No./Code
Designer: KRS	Structure Numbers	IM0252-423
Detailer: JDA/AM		19039
	Subset Sheets:	Sheet Number 3.2

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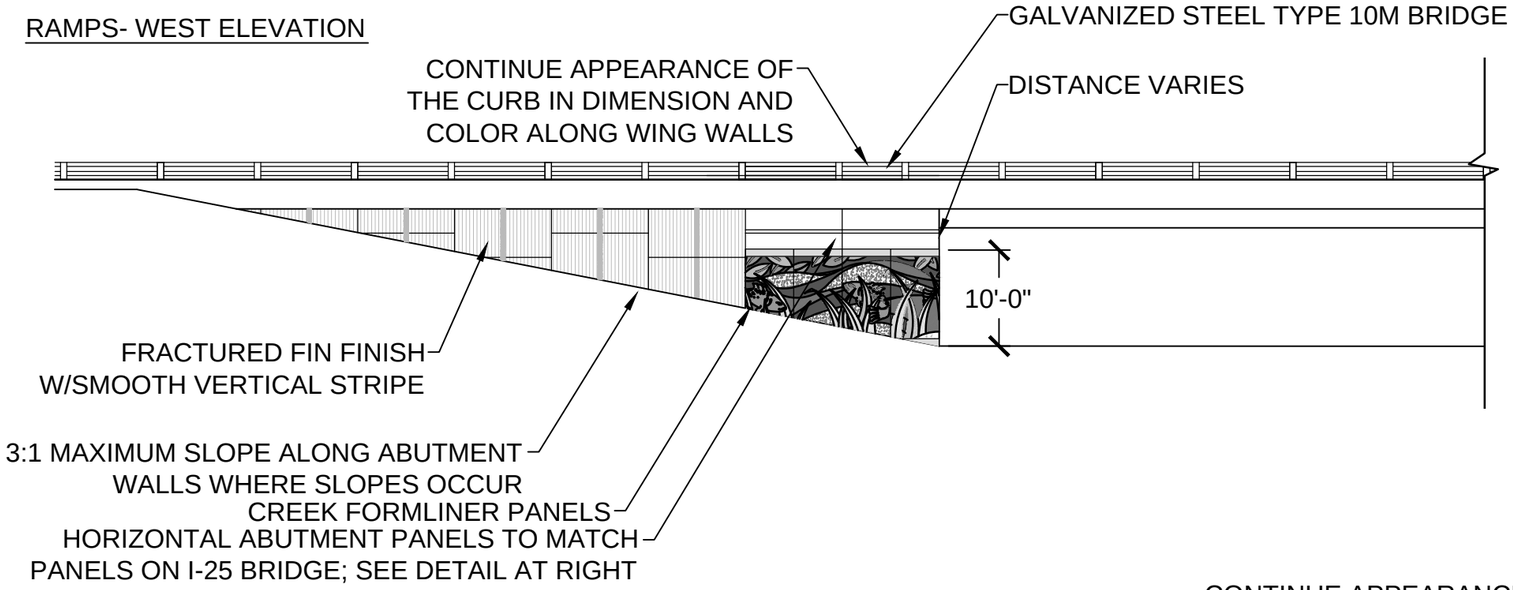
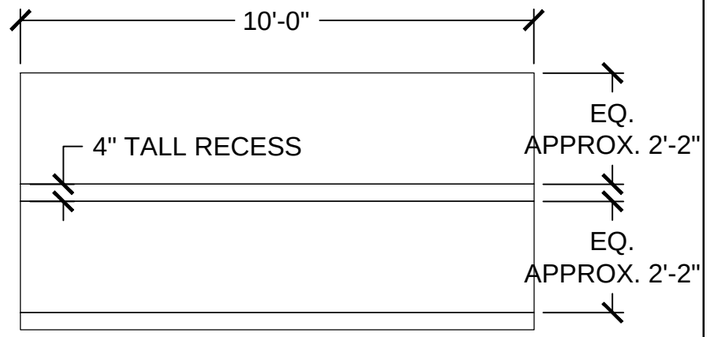
RAMPS- WEST ELEVATION

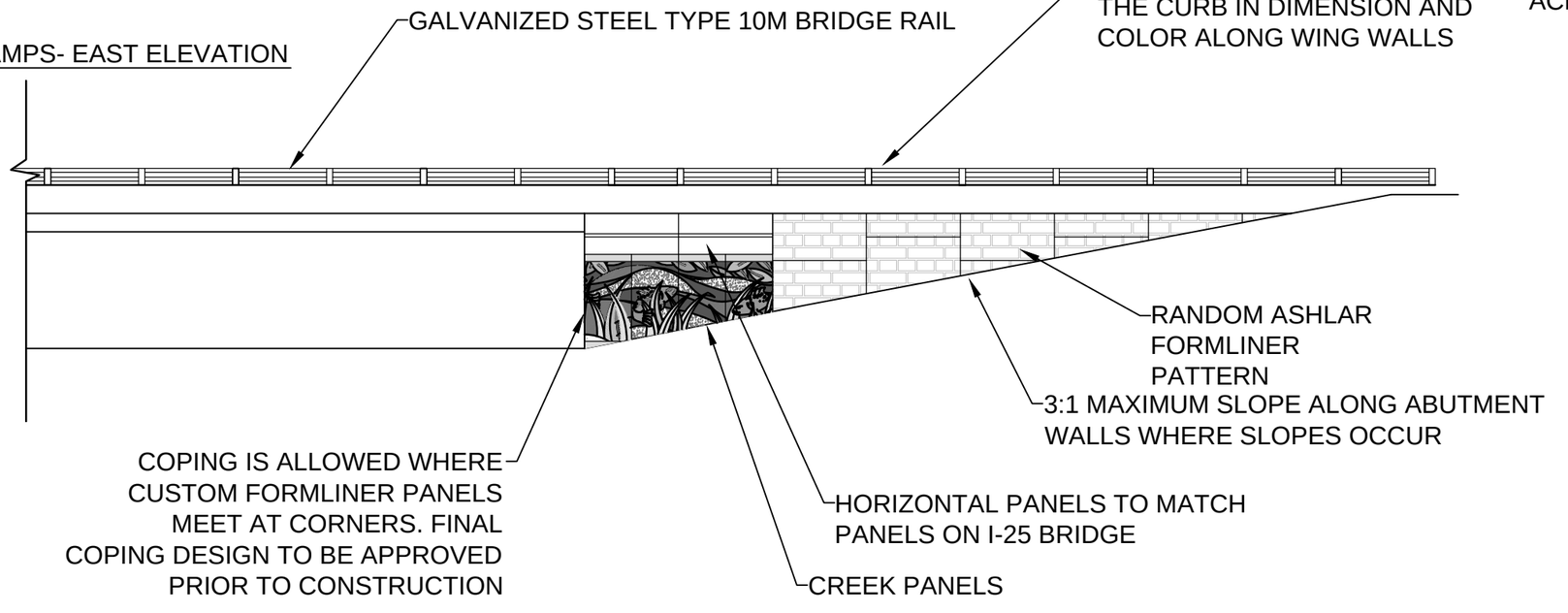


HORIZONTAL ABUTMENT PANELS ENLARGEMENT

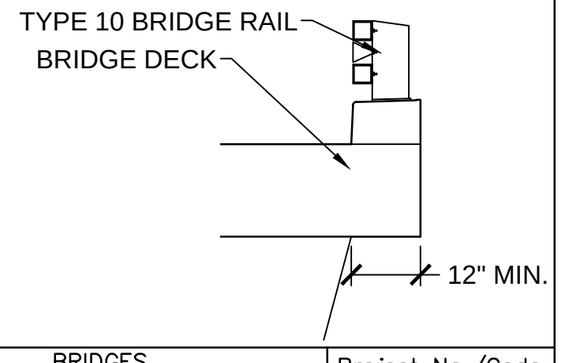


NOTE: HORIZONTAL ABUTMENT PANELS SHALL MATCH I-25 DESIGN/BUILD ARCHITECTURAL REQUIREMENTS (COSMIX). USE AS MANY PANELS AS NEEDED TO ACHIEVE VERTICAL HEIGHT.

RAMPS- EAST ELEVATION



RAMP BRIDGE AND CURB DETAIL



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Horiz. Scale: As Noted Vert. Scale: As Noted				COLORADO SPRINGS, CO 80906	Revised:	Designer: KRS / Detailer: JDA/AM	19039
Unit Information Unit Leader Initials				Phone: 719–634–2323 FAX: 719–227–3298	Void:	Structure Numbers / Subset Sheets:	Sheet Number 3.3
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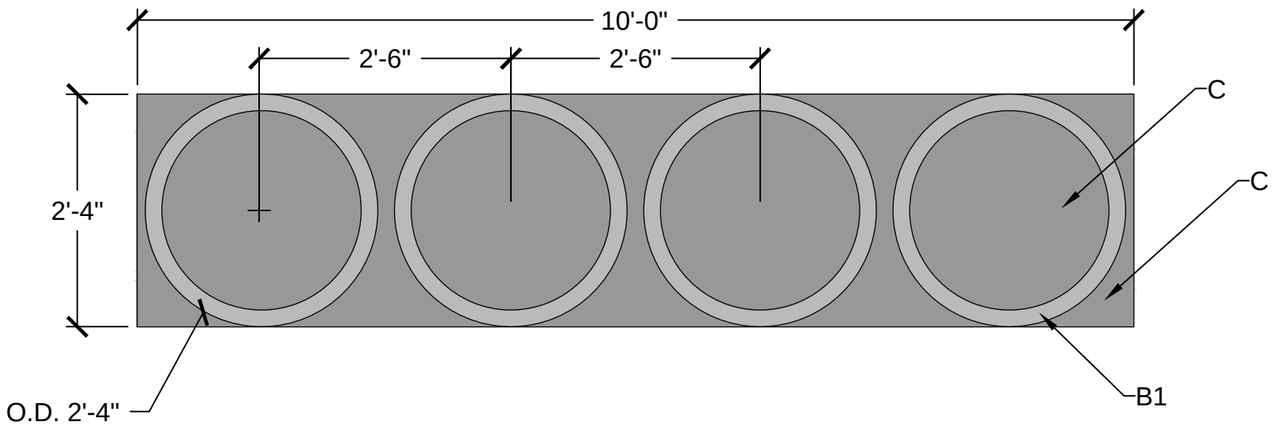
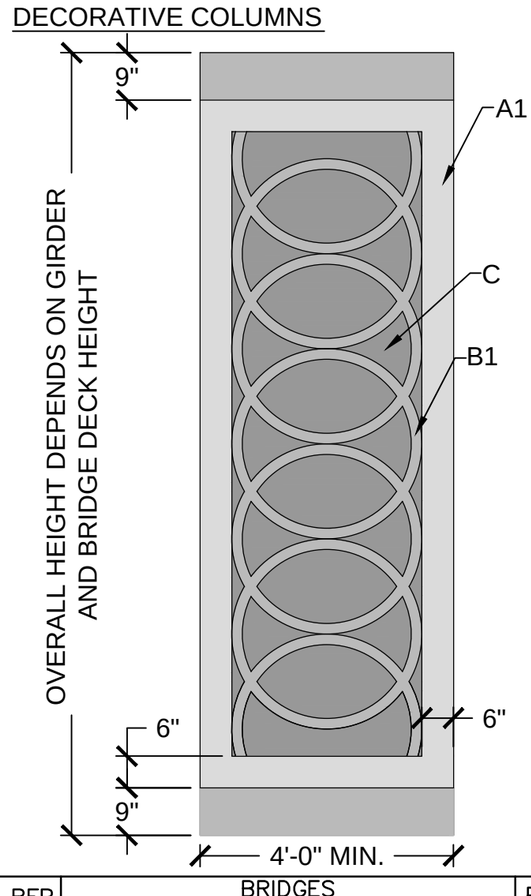
ABUTMENT MONUMENT PANEL

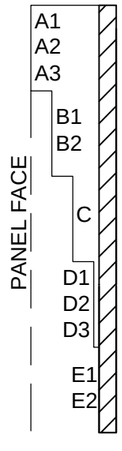


NOTES:

1. CIRCLE PATTERNS SHOWN SHALL BE USED ON BOTH INSIDE AND OUTSIDE WALLS OF THE ABUTMENT MONUMENTS (ABOVE THE BRIDGE/ROADWAY DECK OF I-25).
2. CIRCLE PATTERNS SHOWN FOR DECORATIVE COLUMNS SHALL BE USED ON ALL FOUR (4) SIDES OF EVERY COLUMN ON THE I-25 OVER CIMARRON BRIDGE STRUCTURE.
3. CONCRETE BANDS/CAPS SHALL EXTEND AROUND ALL FOUR (4) SIDES OF THE ABUTMENT MONUMENTS AND THE DECORATIVE COLUMNS

DECORATIVE COLUMNS





HATCH	SYM	RECESSED DEPTH	FINISH
	A1	0"/FLUSH	SMOOTH
	A2	0"/FLUSH	45° BROOM
	A3	0"/FLUSH	EXPOSED AGGREGATE
	B1	1"	SMOOTH
	B2	1"	45° BROOM
	C	2"	LIGHT SAND BLAST
	D1	3"	SMOOTH
	D2	3"	45° BROOM
	D3	3"	EXPOSED AGGREGATE
	E1	3 ¼"	MEDIUM SAND BLAST
	E2	3 ¼"	BROOM

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BRIDGES
FORMLINER DESIGN/LAYOUT:
CIRCLE PANELS; I–25 OVER CIMARRON

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252–423
19039
Sheet Number 3.4

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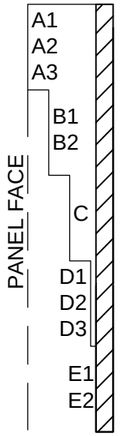
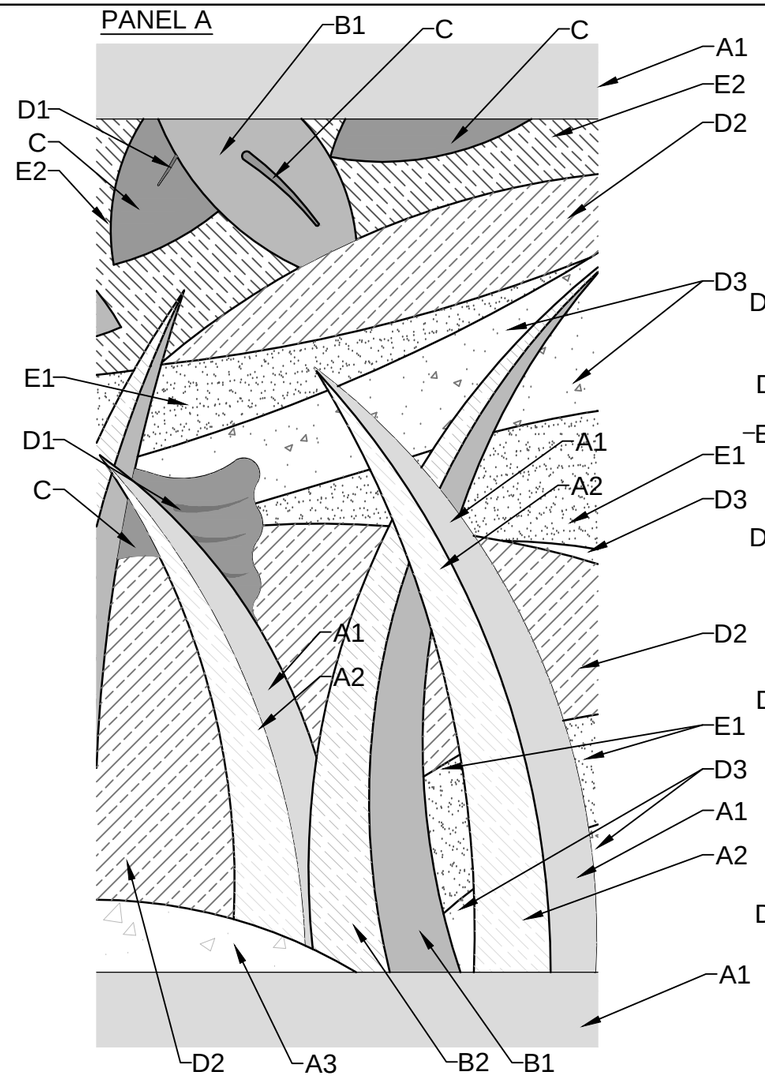
CREEK PANEL DETAIL

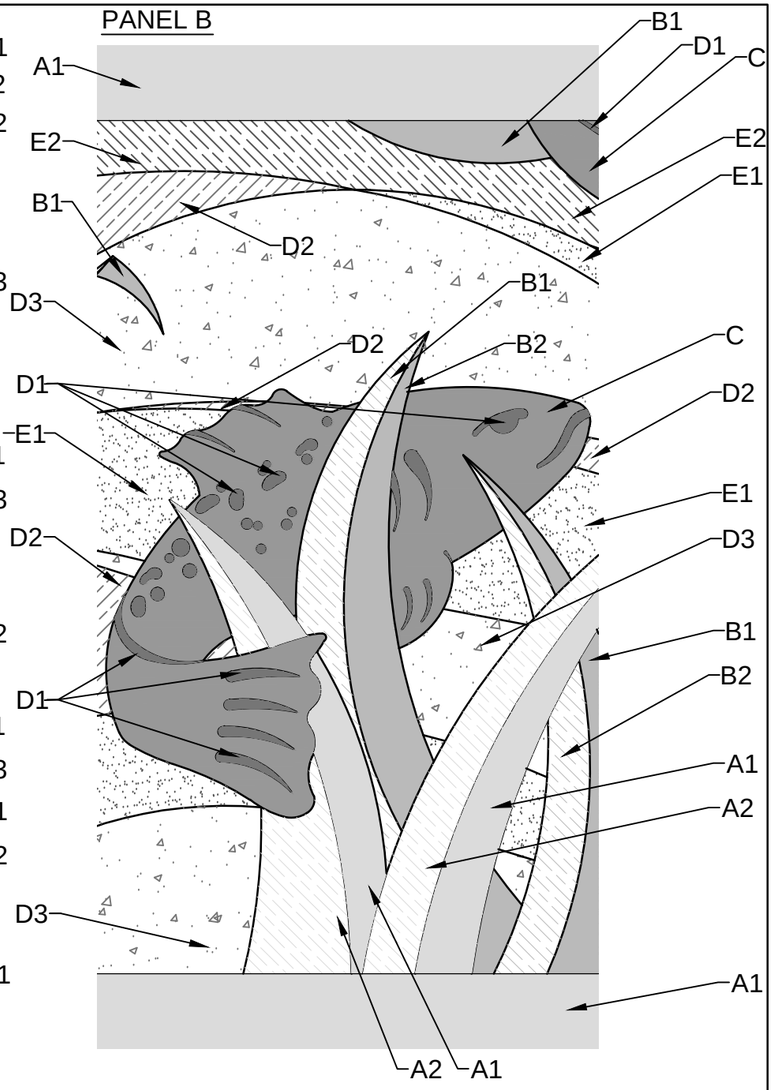


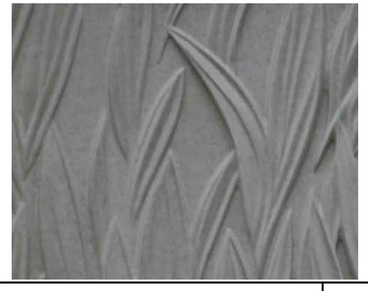
HATCH	SYM	RECESSED DEPTH	FINISH
	A1	0"/FLUSH	SMOOTH
	A2	0"/FLUSH	45° BROOM
	A3	0"/FLUSH	EXPOSED AGGREGATE
	B1	1"	SMOOTH
	B2	1"	45° BROOM
	C	2"	LIGHT SAND BLAST
	D1	3"	SMOOTH
	D2	3"	45° BROOM
	D3	3"	EXPOSED AGGREGATE
	E1	3 ¼"	MEDIUM SAND BLAST
	E2	3 ¼"	BROOM

PANEL A



PANEL B





NOTE: WALL PANEL FORMS SHALL HAVE SMOOTH, ROUNDED EDGES TO CREATE A HAND TOOLED SOFT APPEARANCE

EACH PANEL SHALL BE 10'-0"x5'-0"

Print Date: 07–24–2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	BRIDGES	Project No./Code
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719–634–2323 FAX: 719–227–3298	No Revisions:	ABUTMENT WALL DESIGN/LAYOUT: PEDESTRIAN; CIMARRON OVER CREEK	IM0252–423
Horiz. Scale: As Noted	Vert. Scale: As Noted				Region 2 DW	Revised:	Designer: KRS / Detailer: JDA/AM	19039
Unit Information	Unit Leader Initials					Void:	Structure Numbers / Subset Sheets:	Sheet Number 3.5
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132								

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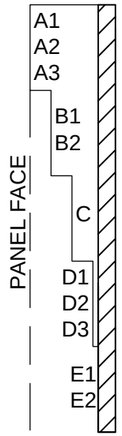
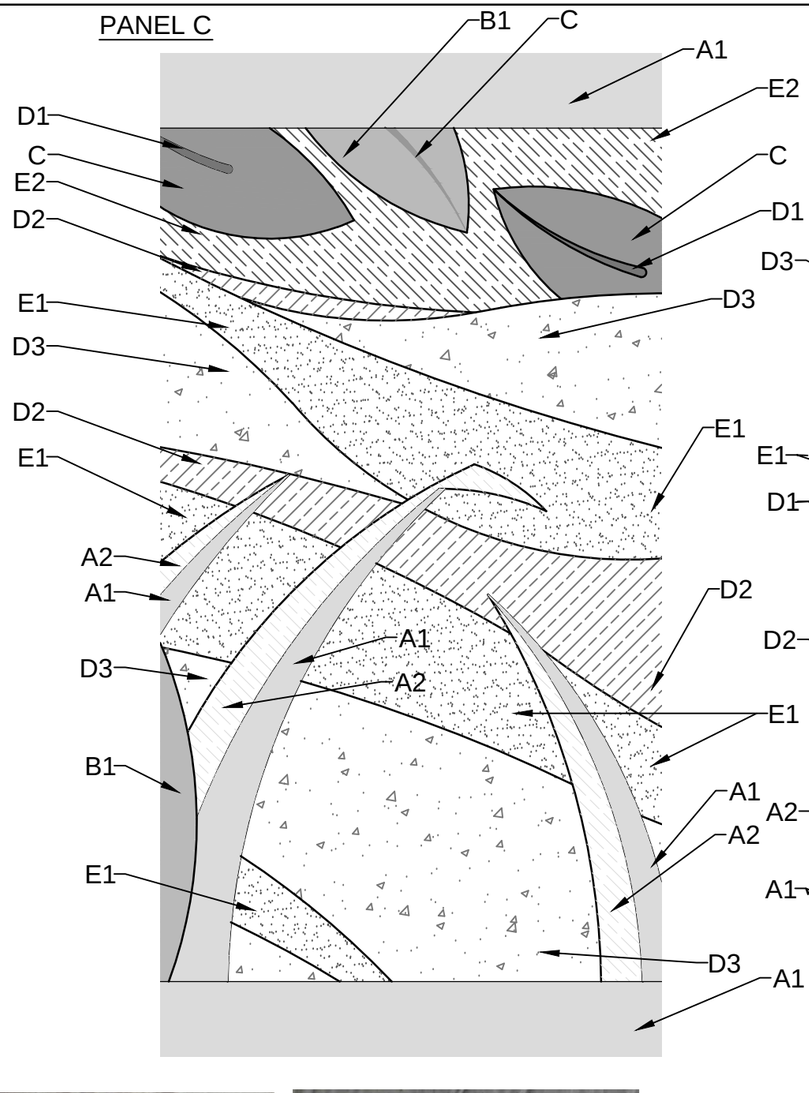
CREEK PANEL DETAIL

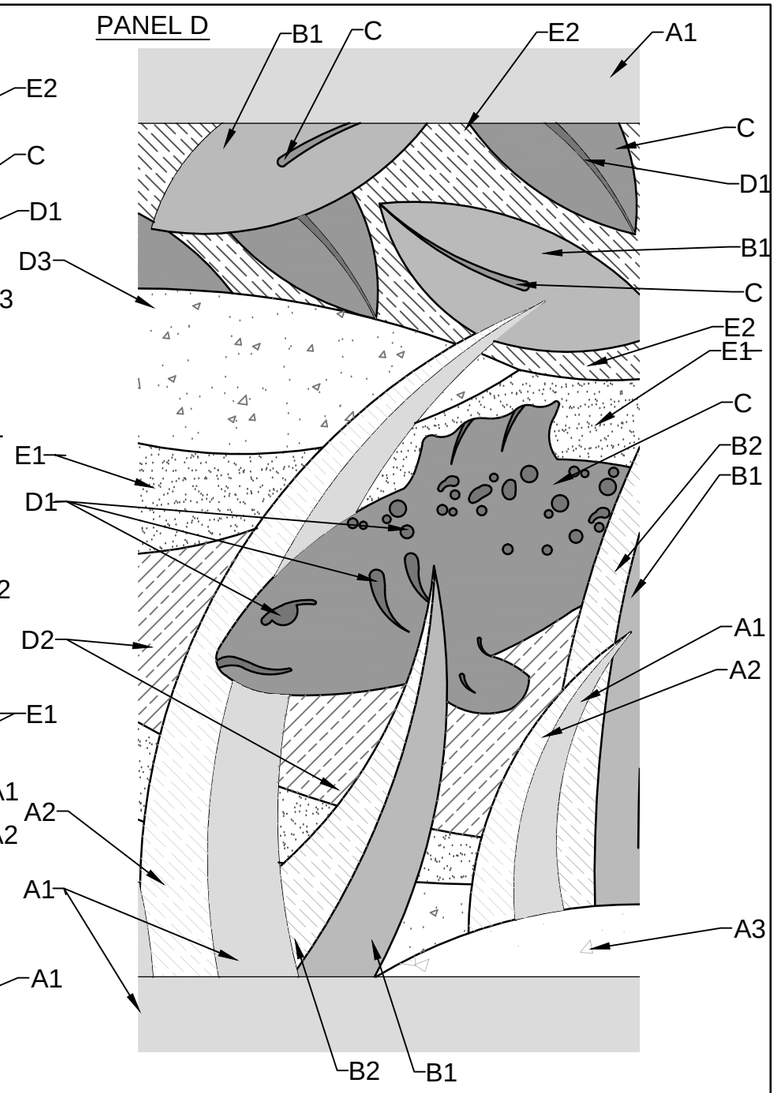


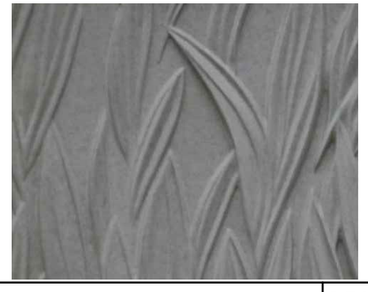
HATCH	SYM	RECESSED DEPTH	FINISH
	A1	0"/FLUSH	SMOOTH
	A2	0"/FLUSH	45° BROOM
	A3	0"/FLUSH	EXPOSED AGGREGATE
	B1	1"	SMOOTH
	B2	1"	45° BROOM
	C	2"	LIGHT SAND BLAST
	D1	3"	SMOOTH
	D2	3"	45° BROOM
	D3	3"	EXPOSED AGGREGATE
	E1	3 ¼"	MEDIUM SAND BLAST
	E2	3 ¼"	BROOM

PANEL C



PANEL D





NOTE: WALL PANEL FORMS SHALL HAVE SMOOTH, ROUNDED EDGES TO CREATE A HAND TOOLED SOFT APPEARANCE

EACH PANEL SHALL BE 10'-0"x5'-0"

Print Date: 07–24–2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719–634–2323 FAX: 719–227–3298	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		Region 2 DW	Revised:
Unit Information Unit Leader Initials			Void:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132			

BRIDGES	Project No./Code
ABUTMENT WALL DESIGN/LAYOUT: PEDESTRIAN; CIMARRON OVER CREEK	IM0252–423
Designer: KRS / Detailer: JDA/AM / Structure Numbers / Subset Sheets:	19039
	Sheet Number 3.6

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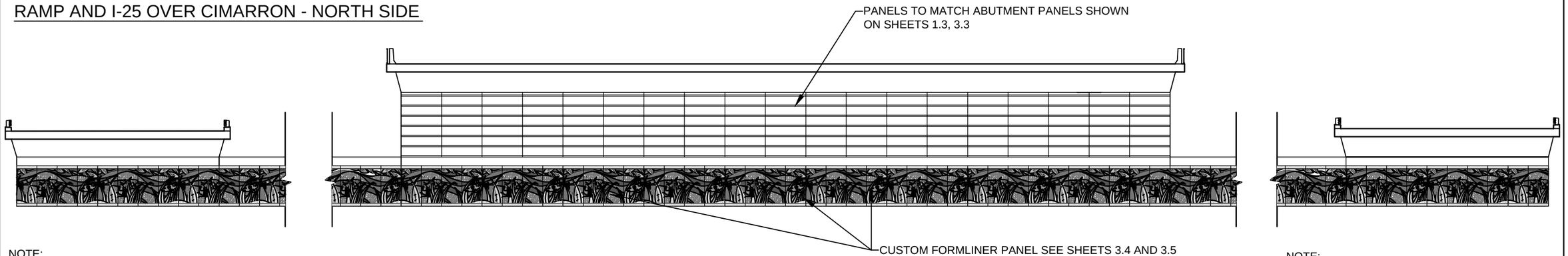
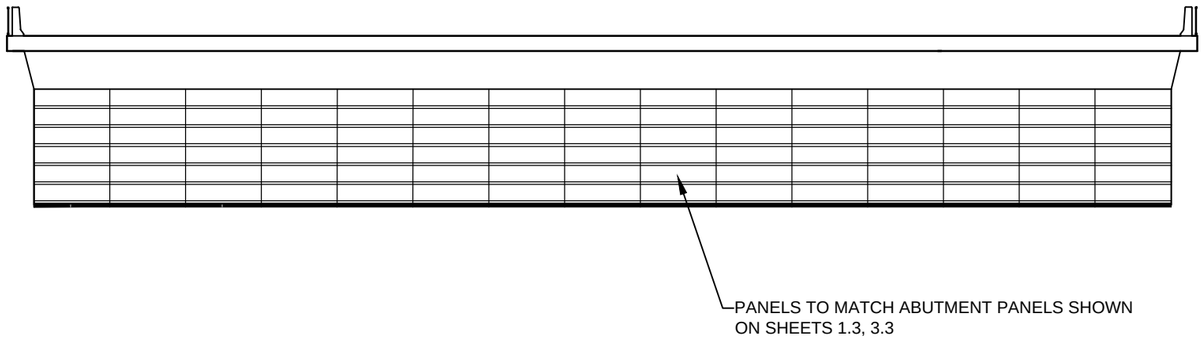
RAMP AND I-25 OVER CIMARRON - NORTH SIDE



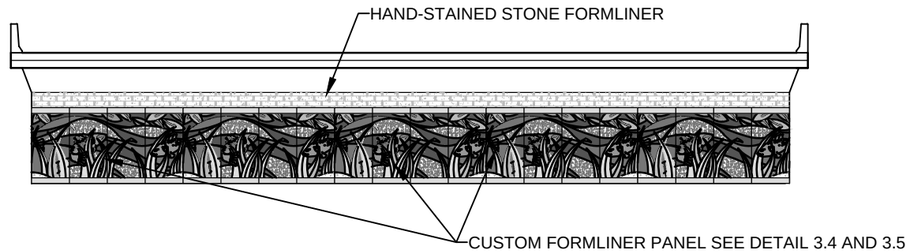
NOTE:
DISTANCE ABOVE 10' CREEK CUSTOM PANELS VARIES WITH GIRDER DEPTH. CUSTOM PANELS BASE TO BE FLUSH WITH GRADE UNDER ABUTMENTS.

NOTE:
1. BASE OF 10' CREEK PANEL SHALL BE FLUSH WITH GRADE UNDER ABUTMENT.

I-25 OVER CIMARRON - SOUTH SIDE



CIMARRON OVER FOUNTAIN CREEK



NOTE:
DISTANCE ABOVE 10' CREEK CUSTOM PANELS VARIES WITH GIRDER DEPTH. CUSTOM PANELS BASE TO BE FLUSH WITH GRADE UNDER ABUTMENTS.

Print Date: 07–24–2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
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BRIDGES
ABUTMENT WALL ELEVATIONS

Designer: KRS	Structure Numbers	
Detailer: JDA/AM		
	Subset Sheets:	

Project No./Code: IM0252–423
19039
Sheet Number 3.7

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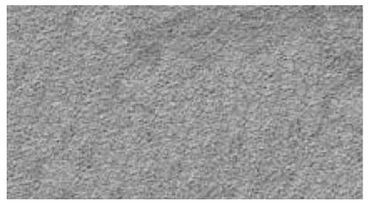
NOTES:

1. CREEK PANEL: SHALL HAVE A FINISHED SIZE OF 10' HIGH BY 5' WIDE. BASE OF PANELS SHALL BE LOCATED AT GROUND LEVEL, HEIGHT ABOVE MAY VARY. GRAPHIC FORM LINER DEPTHS ARE MEASURED FROM PANEL/REVEAL FACE (TYP.).
2. CIRCLES MONUMENT PANEL: .SHALL HAVE A FINISHED SIZE OF 2'-4" HIGH BY 10' WIDE OR AS MARKED. PANELS SHALL BE LOCATED TO LINE UP HORIZONTALLY WITH THE CIRCLE PATTERN DECORATIVE RAILING. GRAPHIC FORM LINER DEPTHS ARE MEASURED FROM PANEL/REVEAL FACE (TYP.)
3. CIRCLES DECORATIVE COLUMN PANELS: THERE SHALL BE TWO (2) SIZES OF PANEL; ONE SIZE FOR INTERMEDIATE COLUMNS WHICH EXTEND ONLY TO THE BOTTOM OF THE BRIDGE DECK, AND ANOTHER SIZE FOR COLUMNS THAT ARE LOCATED ON TOP OF THE PIERS. FINISHED SIZES SHALL DEPEND ON HEIGHT OF GIRDER AS MARKED. GRAPHIC FORM LINER DEPTHS ARE MEASURED FROM PANEL/REVEAL FACE (TYP.)
4. ALL FORMLINER EDGES ARE TO BE TAPERED 10-15 DEGREES MINIMUM AND SHALL HAVE A SMOOTH HAND-TOOLED APPEARANCE.
5. DIGITAL CAD MODEL OF PANELS SHALL BE SUBMITTED FOR APPROVAL, PRIOR TO CREATING THE CNC CUT MOLD.
6. A FULL SIZE SAMPLE TEST PANEL SHALL BE CREATED AND IS SUBJECT TO APPROVAL.
7. PANELS ARE TO BE STAINED AS DESCRIBED IN CHAPTER 1 OF THIS DOCUMENT.
8. FORM LINER MANUFACTURER SHALL HAVE A MINIMUM OF 5 YEARS IN BUSINESS AND PROVIDE EXAMPLES OF SIMILAR WORK.

LIGHT SAND-BLAST FINISH



BROOM FINISH

MEDIUM SAND-BLAST

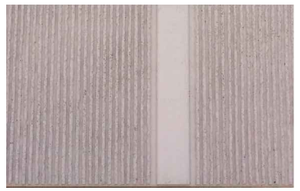
HAND-STAINED STONE FORMLINER

ASHLAR PATTERN TO MATCH EXISTING ON CIMARRON BRIDGE OVER RR. COLORS SPECIFIED SHEET 1.1

ASHLAR PATTERN

ASHLAR PATTERN TO MATCH EXISTING MSE PANELS AT COLORADO AVE.

FRACTURED FIN



FRACTURED FIN TO MATCH EXISTING AT COLORADO AVE.

TOOLING EXAMPLES AND NOTES:

FORM PANELS SHALL HAVE A ROUNDED APPEARANCE. DETAILS SHOWN ON THESE DRAWINGS ARE FOR INFORMATIONAL PURPOSES ONLY TO CONVEY THE DESIRED DEPTH AND FINISHES OF THE PANEL.

A CRAFTSMAN SHALL BE INVOLVED WITH THE CREATION OF THE FORMLINER. ANY 'BOXY' SHAPES WILL NOT BE ACCEPTED. SAMPLE TEST PANELS SHALL BE CREATED AS DESCRIBED ABOVE TO DEMONSTRATE THE QUALITY OF THE PROCESS AND BE SUBJECT TO APPROVAL.

CUSTOM FORMLINER DESIGN FINISHES

SMOOTH, ROUNDED EDGES SHALL DEFINE THE STYLE OF THE CUSTOM PANELS

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BRIDGES ABUTMENT WALL FORMLINER NOTES AND DETAILS		Project No./Code
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Detailer: JDA/AM		19039
	Subset Sheets:	Sheet Number 3.8

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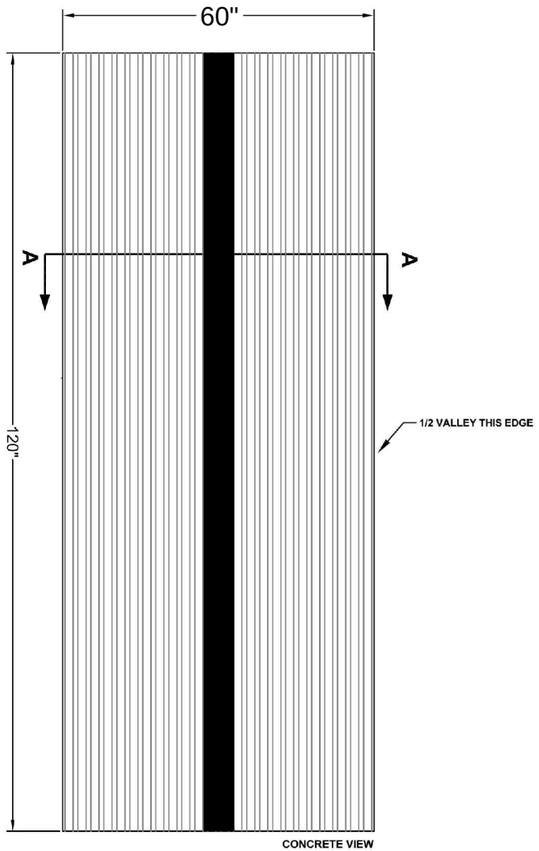

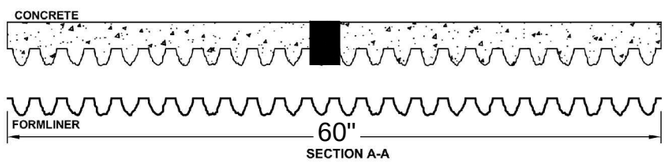

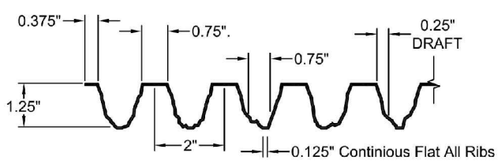

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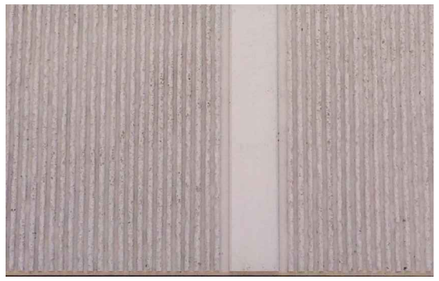
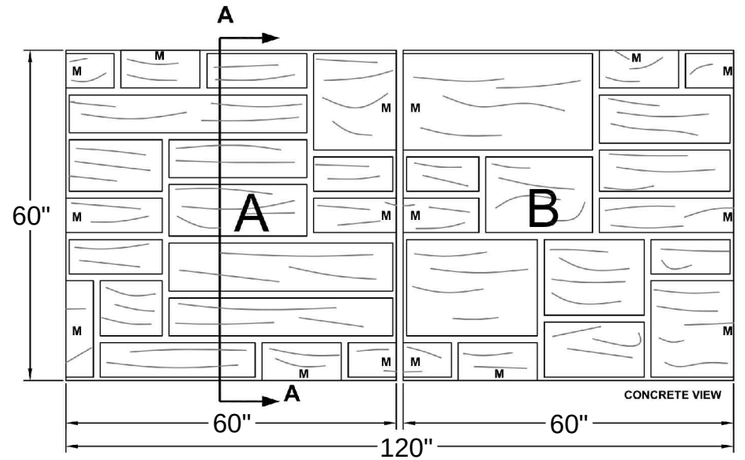
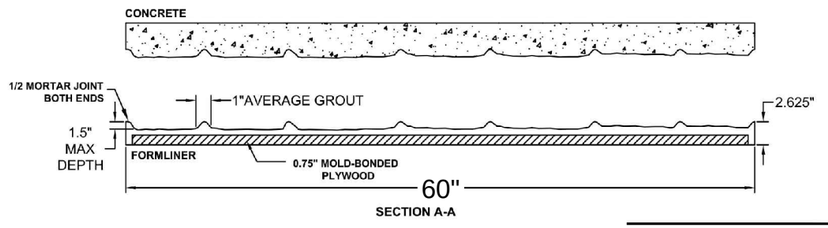


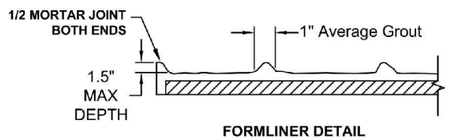
RANDOM ASHLAR FINISH

RANDOM ASHLAR TO MATCH COLORADO AVE. AND ADHERE TO I-25 THROUGH COLORADO SPRINGS DESIGN GUIDELINES

RANDOM ASHLAR FINISH







Stone & Rock

Part Size: **(A)** 60" W x 60" H
(B) 60" W x 60" H

Max Depth: 1.50"

Stone Sizes: 7"- 34.5" W
5"- 14" H

M= Match point
Part "A" aligns with part "B" at a single match point on opposite sides

NOTE;

1. RANDOM ASHLAR SHALL BE ON EAST SIDE OF I-25 RETAINING WALLS TO MATCH COLORADO AVE. AND ADHERE TO I-25 THROUGH COLORADO SPRINGS DESIGN GUIDELINES.

2. FRACTURED FIN FINISH WITH SOLID VERTICAL STRIPE DETAIL SHALL BE ON WEST SIDE OF I-25 RETAINING WALLS TO MATCH COLORADO AVE. AND ADHERE TO I-25 THROUGH COLORADO SPRINGS DESIGN GUIDELINES.

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BRIDGES ABUTMENT WALL FORMLINER NOTES AND DETAILS			Project No./Code
Designer: KRS	Structure Numbers		IM0252-423
Detailer: JDA/AM			19039
	Subset Sheets:		Sheet Number 3.9

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PEDESTRIAN BRIDGES:

1. PEDESTRIAN BRIDGES SHALL BE PRE-MANUFACTURED STRUCTURES.
2. PEDESTRIAN BRIDGES SHALL HAVE A MINIMUM CLEAR WIDTH OF 12'-0"
3. PEDESTRIAN BRIDGES SHALL HAVE METAL RUB RAILS.
4. PEDESTRIAN BRIDGES SHALL INCLUDE APPROACH RAILS.
   - 4.1. APPROACH RAILS SHALL BE MOUNTED IN/ON BRIDGE ABUTMENTS.
   - 4.2. APPROACH RAILS SHALL BE METAL TO MATCH BRIDGE RAILS.
5. THERE SHALL BE NO WOOD ON THE PEDESTRIAN BRIDGES OTHER THAN THE DECK BOARDS.
6. THE EXISTING BRIDGE OVER FOUNTAIN CREEK MAY BE RE-SET AND RE-USED AS LONG AS IT MEETS ALL NECESSARY SAFETY AND ENGINEERING REQUIREMENTS (THE EXISTING BRIDGE WOULD LIKELY REQUIRE LENGTHENING). THIS BRIDGE MAY ALSO BE REPLACED WITH A NEW BRIDGE THAT MEETS THE REQUIREMENTS IN THESE PLANS AND THE TECHNICAL REQUIREMENTS.
7. SEE PHOTOS ON THIS SHEET FOR EXAMPLES OF EXISTING BRIDGES; NEW BRIDGES SHALL AESTHETICALLY MATCH THESE BRIDGES AND MUST ADHERE TO ALL REQUIREMENTS LISTED HERE.

APPROVAL:

ALL PEDESTRIAN BRIDGE ELEMENTS ARE SUBJECT TO APPROVAL.

EXAMPLE OF ACCEPTABLE APPROACH RAILS

EXAMPLES OF EXISTING BRIDGES ON PROJECT SITE

Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	BRIDGES PEDESTRIAN BRIDGES NOTES AND DETAILS	Project No./Code
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
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I-25 LIGHTING:

THE POLES SHALL BE CONSTRUCTED OF METAL AND BE OF A CARVED ONE-PIECE TAPERED DAVIT STYLE. POLES SHALL BE 35' TALL. THE ARMS SHALL BE INTEGRAL WITH THE POLE. THE POLE SHALL HAVE A FULL BASE COVER. ALL LIGHTING AND LIGHT POLES SHALL BE THE SAME STYLE AND MANUFACTURE THROUGHOUT THE PROJECT.

ALL HIGHWAY LIGHTING SHALL BE IN COMPLIANCE WITH COLORADO SPRINGS UTILITIES AND CITY OF COLORADO SPRINGS STANDARDS.

THE LUMINARIES SHALL BE COBRA STYLE, WITH HOUSING CONSTRUCTED OF ALUMINUM.

THE POLES, ARMS AND LUMINARIES SHALL BE ANODIZED IN ACCORDANCE WITH COLOR SELECTIONS IN CHAPTER 1. THE APPLICATION SHALL BE DURABLE AND SUITABLE FOR APPLICATION ON METAL.

AESTHETIC I-25 LIGHTING SHALL BE ACORN STYLE LIGHTS TO MATCH LIGHTS ON THE EXISTING CIMARRON BRIDGE OVER THE RAILROAD/CONEJOS ST.

ALL AESTHETIC I-25 LIGHTING SHALL BE IN COMPLIANCE WITH COLORADO SPRINGS UTILITIES AND CITY OF COLORADO SPRINGS STANDARDS.

CIMARRON BRIDGE LIGHTING SHALL BE ACORN STYLE LIGHTS TO MATCH LIGHTS ON THE EXISTING CIMARRON BRIDGE OVER THE RAILROAD/CONEJOS ST.

ALL CIMARRON BRIDGE LIGHTING SHALL BE IN COMPLIANCE WITH COLORADO SPRINGS UTILITIES AND CITY OF COLORADO SPRINGS STANDARDS.

LIGHTING UNDER BRIDGES

DOWNLIGHTS SHALL BE INSTALLED UNDER THE CIMARRON BRIDGE OVER FOUNTAIN CREEK AND UNDER ALL RAMP BRIDGES.

THESE LIGHTS SHALL ADEQUATELY LIGHT TRAILS AND CUSTOM FORMLINER PANELS.

LIGHTING UNDER BRIDGES, CONT.

ALL LIGHTING UNDER BRIDGES SHALL BE IN COMPLIANCE WITH COLORADO SPRINGS UTILITIES AND CITY OF COLORADO SPRINGS STANDARDS.

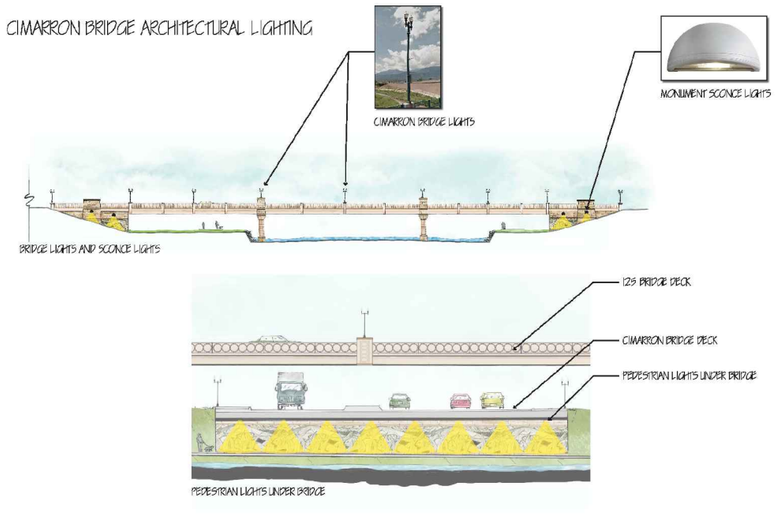
ARCHITECTURAL LIGHTING

I-25 BRIDGE MONUMENTS ON ALL FOUR CORNERS OF THE BRIDGE SHALL BE UP LIGHTED WITH LIGHTS HIDDEN IN THE LANDSCAPE.

THE CIMARRON BRIDGE OVER FOUNTAIN CREEK SHALL RECEIVE EIGHT (8) SCONCE LIGHTS. THESE SHALL BE ROUND IN SHAPE AND SHALL BE MOUNTED ON THE BRIDGE MONUMENTS AND BRIDGE ABUTMENTS AS SHOWN IN THE ILLUSTRATION BELOW.

ALL ARCHITECTURAL LIGHTING SHALL BE IN COMPLIANCE WITH COLORADO SPRINGS UTILITIES AND CITY OF COLORADO SPRINGS STANDARDS.

SEE BOOK 2 TECHNICAL REQUIREMENTS FOR ADDITIONAL REQUIREMENTS AND INFORMATION ON LIGHTING.



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NOTE: WALL LOCATIONS AND GEOMETRY SHALL BE DETERMINED BY THE CONTRACTOR IN COMPLIANCE WITH THE TECHNICAL REQUIREMENTS. FOR WALLS REQUIRED AT THE APPROXIMATE LOCATIONS SHOWN, THE FOLLOWING FACING TYPES SHALL BE REQUIRED.

RETAINING WALLS FACING:

SEE THE FOLLOWING TABLE FOR RETAINING WALL FACING TYPES:

WALL	FACING TYPE
W1-A	FRACTURED FIN W/VERTICAL STRIPE
W1-B	FRACTURED FIN W/VERTICAL STRIPE
W2	FRACTURED FIN W/VERTICAL STRIPE
W4	FRACTURED FIN W/VERTICAL STRIPE
W5	FRACTURED FIN W/VERTICAL STRIPE
E1-A	RANDOM ASHLAR FORMLINER
E1-B	RANDOM ASHLAR FORMLINER
E2	RANDOM ASHLAR FORMLINER
E3-A	RANDOM ASHLAR FORMLINER
E3-B	RANDOM ASHLAR FORMLINER
E4	RANDOM ASHLAR FORMLINER
W5-A	CREEK PANELS BELOW WITH HORIZONTAL PANELS ABOVE
E3-C	CREEK PANELS BELOW WITH HORIZONTAL PANELS ABOVE
E1-C	CREEK PANELS BELOW WITH HAND-STAINED STONE FORMLINER ABOVE
N1	CREEK PANELS BELOW WITH HAND-STAINED STONE FORMLINER ABOVE
S1	HAND-STAINED STONE FORMLINER TO MATCH CIMARRON BRIDGE
S2	HAND-STAINED STONE FORMLINER TO MATCH CIMARRON BRIDGE

SEE THE FOLLOWING PLAN SHEETS FOR DETAILS OF EACH FACING TYPE.

RETAINING WALL SUPPORT STRUCTURE

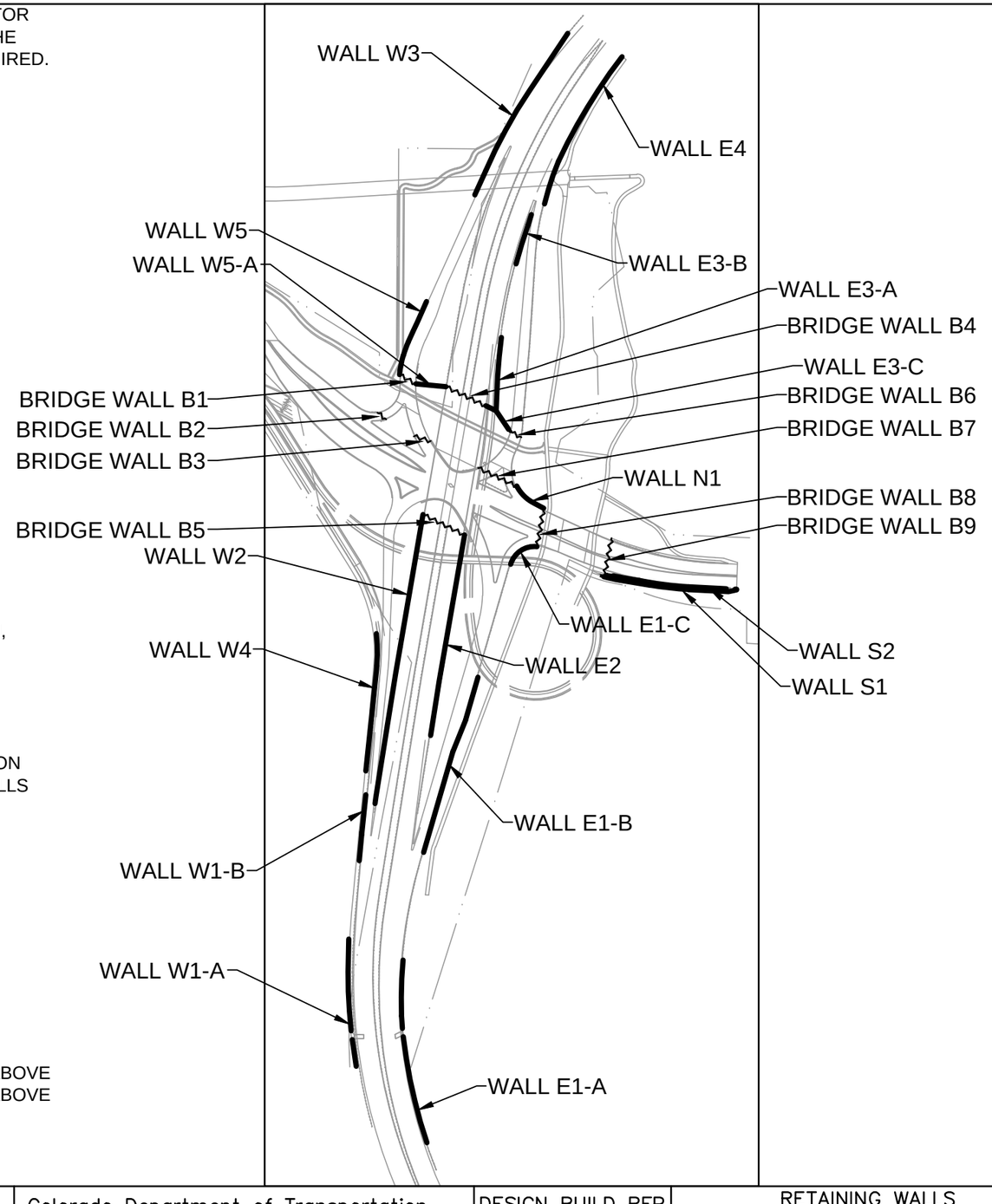
THE SUPPORT STRUCTURE (RETAINING THE EARTH) CAN BE ANY STANDARD CONVENTIONAL TYPE WALL, CAST-IN-PLACE WALL, MECHANICAL STABILIZED EARTH, SHEET PILING, CONCRETE CAISSON, H-PILES, ETC.

BRIDGE ABUTMENTS AND BRIDGE WING WALLS

ADDITIONAL INFORMATION ON COLORS AND FINISHES, PARTICULARLY FOR BRIDGE ABUTMENT WALLS CAN BE FOUND IN THE BRIDGE SECTION AND COLORS SECTION. WHERE RETAINING WALLS MEET BRIDGE ABUTMENTS AND/OR WING WALLS, COMMON FACING TYPES SHALL FLOW IN AN UNINTERRUPTED PATTERN FROM RETAINING WALLS TO BRIDGE STRUCTURAL FEATURES.

SEE THE FOLLOWING TABLE FOR BRIDGE ABUTMENT WALL FACING TYPES:

BRIDGE WALL	FACING TYPE
B1	CREEK PANELS BELOW WITH HORIZONTAL PANELS ABOVE
B2	HORIZONTAL PANELS
B3	HORIZONTAL PANELS
B4	CREEK PANELS BELOW WITH HORIZONTAL PANELS ABOVE
B5	HORIZONTAL PANELS
B6	CREEK PANELS BELOW WITH HORIZONTAL PANELS ABOVE
B7	HORIZONTAL PANELS
B8	CREEK PANELS BELOW WITH HAND-STAINED STONE FORMLINER ABOVE
B9	CREEK PANELS BELOW WITH HAND-STAINED STONE FORMLINER ABOVE



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RETAINING WALLS LOCATIONS AND NOTES

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NOTE: WALL LOCATIONS AND GEOMETRY SHALL BE DETERMINED BY THE CONTRACTOR IN COMPLIANCE WITH THE TECHNICAL REQUIREMENTS. FOR WALLS REQUIRED AT THE APPROXIMATE LOCATIONS SHOWN, THE FOLLOWING COLORS SHALL BE REQUIRED.

RETAINING WALLS COLORS:

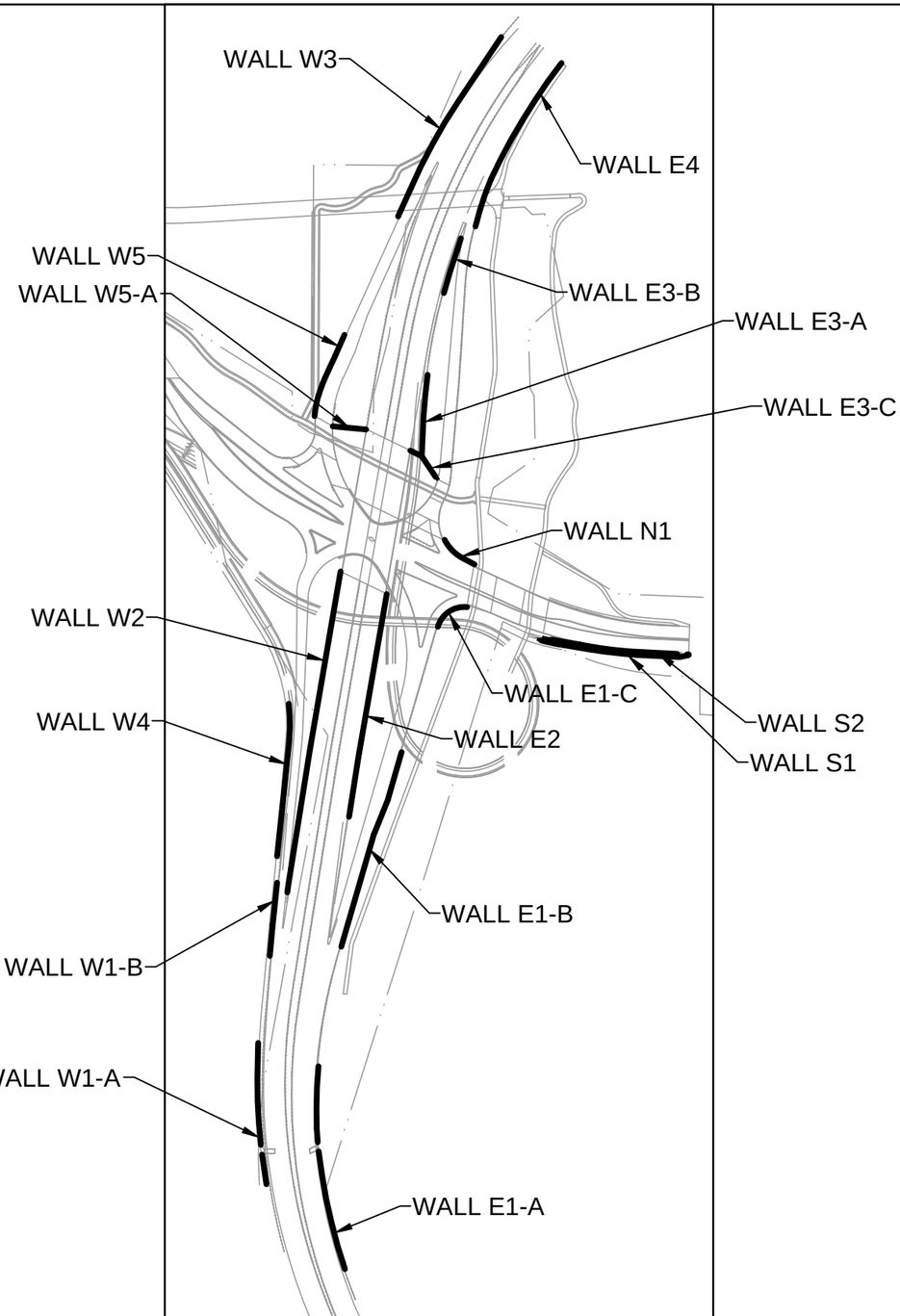
SEE THE FOLLOWING TABLE FOR RETAINING WALL COLORS:

WALL	FACING TYPE
W1-A	'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
W1-B	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
W2	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
W4	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
W5	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E1-A	'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
E1-B	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E2	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E3-A	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E3-B	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E4	'FLESH' CONCRETE STAIN TO MATCH FEDERAL COLOR 30313
W5-A	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E3-C	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522
E1-C	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 ON CREEK PANELS;SEE SHEETS 1.1 AND 1.2 FOR DETAILS AND COLORS ON HAND-STAINED STONE FORMLINER
N1	'BEIGE' CONCRETE STAIN TO MATCH FEDERAL COLOR 33522 ON CREEK PANELS;SEE SHEETS 1.1 AND 1.2 FOR DETAILS AND COLORS ON HAND-STAINED STONE FORMLINER
S1	SEE SHEETS 1.1 AND 1.2 FOR DETAILS AND COLORS ON HAND-STAINED STONE FORMLINER
S2	SEE SHEETS 1.1 AND 1.2 FOR DETAILS AND COLORS ON HAND-STAINED STONE FORMLINER

SEE COLORS SECTION FOR ADDITIONAL INFORMATION ON COLOR PALETTES AND REQUIREMENTS

BRIDGE ABUTMENTS AND BRIDGE WING WALLS

COLORS FOR BRIDGE ABUTMENT WALLS CAN BE FOUND IN THE COLORS SECTION.



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RETAINING WALLS LOCATIONS AND NOTES

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Project No./Code
IM0252-423
19039
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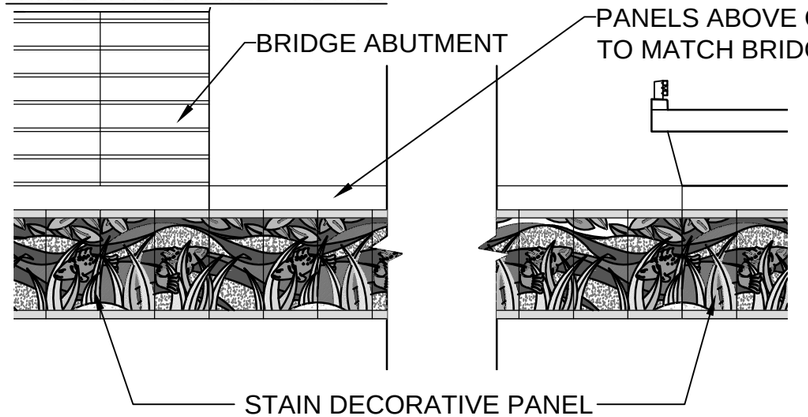
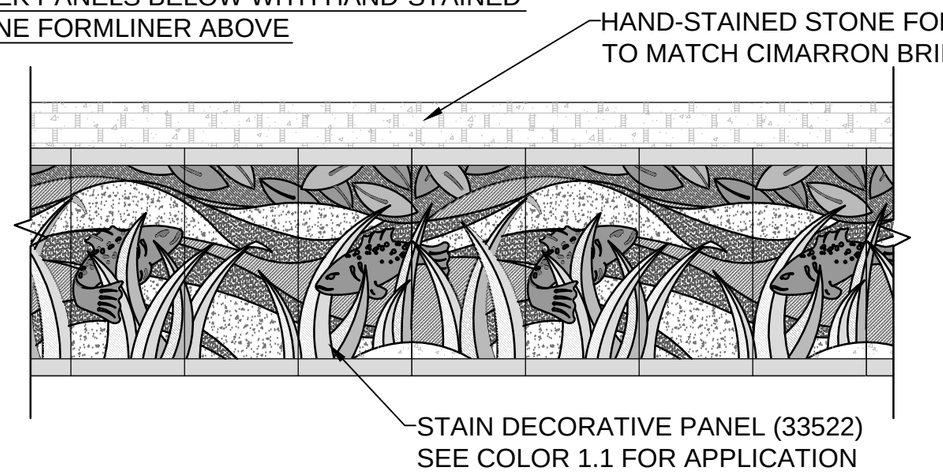
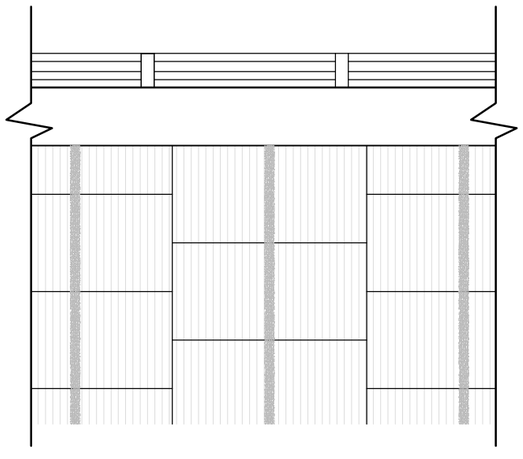
CREEK PANELS BELOW WITH
HORIZONTAL PANELS ABOVE



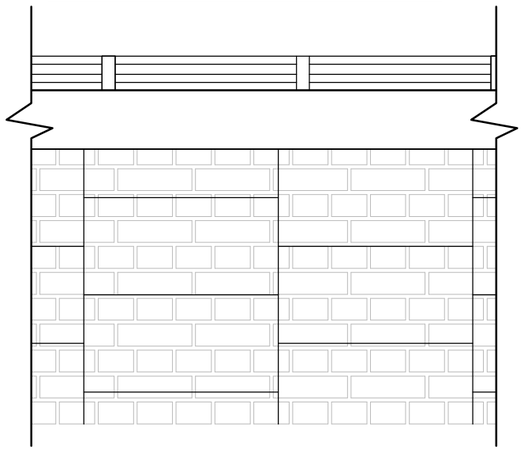
CREEK PANELS BELOW WITH HAND-STAINED
STONE FORMLINER ABOVE



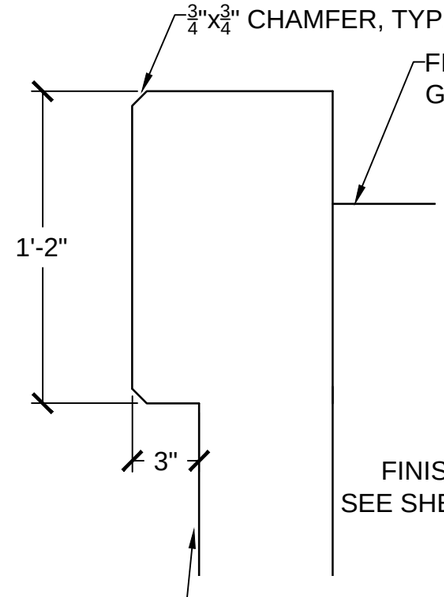
FRACTURED FIN W/VERTICAL STRIPE



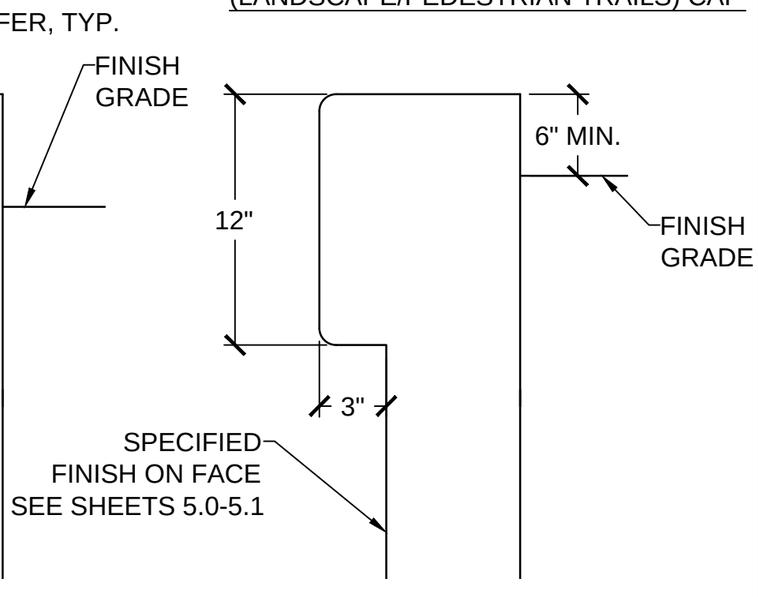
RANDOM ASHLAR FORMLINER



RETAINING WALL CAP



RETAINING WALL
(LANDSCAPE/PEDESTRIAN TRAILS) CAP



NOTES:

1. FRACTURED FIN W/VERTICAL STRIPE FINISH AND RANDOM ASHLAR FORMLINER FINISH SHALL MATCH EXISTING RETAINING WALL PANELS ON I-25 NORTH OF CIMARRON.
2. SEE SHEETS 3.9, 3.10 FOR ADDITIONAL INFORMATION AND DETAILS ON WALL FINISHES AND WALL CAPS FOR WALLS THAT TIE INTO MSE WALLS SUPPORTING ROADWAYS

NOTE: THIS DETAIL ONLY APPLIES TO WALLS THAT ARE ADJACENT TO PEDESTRIAN TRAILS

Print Date: 07–24–2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
Unit Information Unit Leader Initials		Phone: 719–634–2323 FAX: 719–227–3298	Void:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132		Region 2 DW	

RETAINING WALLS DETAILS		Project No./Code
		IM0252–423
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM	Subset Sheets:	Sheet Number 5.2

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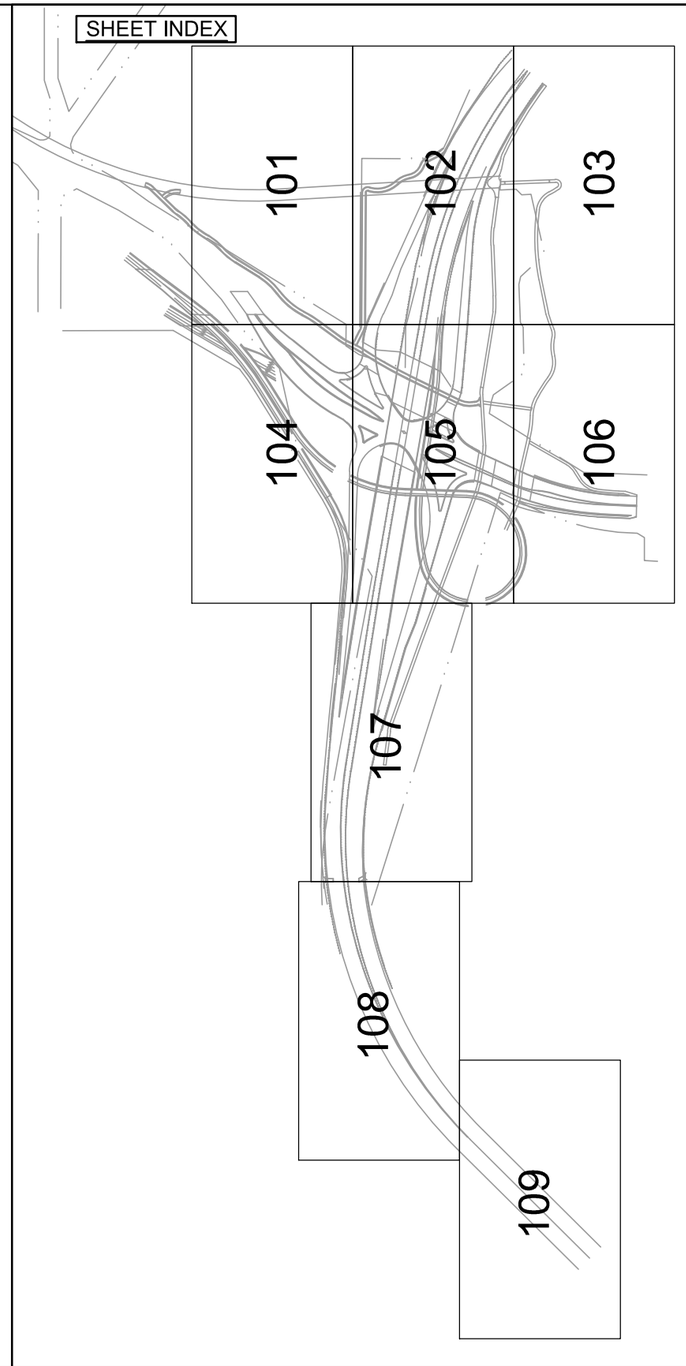
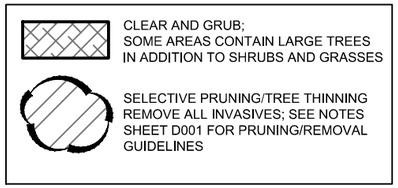
SHEET INDEX



CHAPTER 8 - LANDSCAPE DEMOLITION PLANS AND SPECIFICATIONS



NOTES:

1. AREAS SHOWN AS CLEAR AND GRUB ARE ANTICIPATED TO BE IMPACTED HEAVILY BY CONSTRUCTION AND SHALL THEREFORE BE COMPLETELY CLEARED OF ALL VEGETATION. THIS INCLUDES GRINDING/REMOVAL OF STUMPS OF ALL REMOVED TREES.
2. IF THE CONTRACTOR FEELS THAT ANY AREAS SHOWN AS CLEAR AND GRUB WILL NOT BE HEAVILY IMPACTED BY CONSTRUCTION, CONTRACTOR SHALL GIVE NOTIFICATION TO CDOT AND THE ENGINEER FOR REVIEW/APPROVAL. UPON APPROVAL, CONTRACTOR SHALL LEAVE EXISTING VEGETATION STANDING AND IN GOOD HEALTH.
3. EAST OF INTERSTATE 25, THE LIMITS OF CLEARING/GRUBBING SHALL BE DELINEATED BY THE WEST EDGE OF THE PEDESTRIAN TRAIL, EXCEPT AS SHOWN DIFFERENTLY IN THESE PLANS.
4. SOME OF THE CLEAR AND GRUB AREAS CONTAIN LARGE TREES. IT IS THE CONTRACTORS RESPONSIBILITY TO COMPLETELY REMOVE THESE TREES AND GRIND/REMOVE THE STUMPS.
5. ANY COTTONWOODS THAT ARE IN GOOD HEALTH AND THAT CAN BE PRESERVED SHALL REMAIN. IF THEY ARE WITHIN THE PROPOSED 80' TRAPEZOIDAL CHANNEL ALONG FOUNTAIN CREEK, AN ISLAND MUST BE FORMED TO PRESERVE THE TREE AND ROOT MASS, AND HYDRAULIC MODELING MUST BE COMPLETED TO SHOW ANY HYDRAULIC CHANGES CAUSED BY THE ISLAND. FINAL HYDRAULIC MODEL SHALL BE APPROVED BY THE ENGINEER.
6. AREAS ALONG FOUNTAIN/MONUMENT CREEKS THAT ARE SHOWN AS SELECTIVE PRUNING/THINNING SHALL BE TREATED AS FOLLOWS:
   - 6.1. ALL TREES TO BE REMOVED SHALL BE FLAGGED. CDOT AND THE ENGINEER SHALL APPROVE ALL FLAGGED TREES PRIOR TO REMOVAL.
   - 6.2. ALL SIBERIAN ELM (*Ulmus pumila*) TREES SHALL BE FLAGGED FOR REMOVAL.
   - 6.3. ALL CRACK WILLOW (*Salix fragilis*) TREES SHALL BE FLAGGED FOR REMOVAL.
   - 6.4. ALL INVASIVE AND NOXIOUS WEED PLANT SPECIES SHALL BE FLAGGED FOR REMOVAL.
   - 6.5. AREAS WITH EXCESSIVE UNDERGROWTH MAY REQUIRE REMOVAL/THINNING IN ORDER TO ACHIEVE THE DESIRED AESTHETIC SHOWN IN THE LANDSCAPE PLANTING PLANS. THESE AREAS SHALL BE FLAGGED AND APPROVED BY CDOT AND THE ENGINEER.
   - 6.6. ALL TREES TO REMAIN SHALL BE PRUNED TO REMOVE ANY DEAD OR DYING BRANCHES, AS WELL AS ANY BRANCHES THAT POSE A THREAT TO PEDESTRIANS OR VEHICLES.
7. ANY AREAS THAT ARE CLEARED AND GRUBBED (INCLUDING ANY ADDITIONAL AREAS NOT SHOWN ON THESE PLANS) SHALL BE REVEGETATED WITH NATIVE SEED. SEE LANDSCAPE PLANTING PLANS (CHAPTER 10) FOR SEED MIX.

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Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 8 LANDSCAPE DEMOLITION	Project No./Code
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
Horiz. Scale: As Noted	Vert. Scale: As Noted				Region 2 DW	Revised:	Designer: KRS / Detailer: JDA/AM / Structure Numbers / Subset Sheets:	19039
Unit Information	Unit Leader Initials					Void:		Sheet Number D001
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132								

SECTION 02230 SITE CLEARING

PART 1 - GENERAL

1.1 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than ¾ inches in diameter; and free of weeds, roots and other deleterious materials.

1.2 MATERIALS OWNERSHIP

A. Except for materials to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.3 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.4 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

PART 2-NOT USED

PART 3-EXECUTION

3.1 TREE PROTECTION

A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
   2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Refer to the related plans as indicated, and/or consult with the City Forester or the Designee assigned to the project.

D. Furnish all labor, material, tools, land equipment necessary to complete the work indicated on drawings and as required herein.

E. Existing trees to remain shall be protected at all times during the Contract period, by using fencing (i.e., snow fencing, or chain link fencing with metal staking). Tree protection fencing shall be maintained by the Contractor during construction. The Protection area to be fenced (2') outside the dripline of the tree unless otherwise required by the Owner's Representative. No equipment shall be parked, driven or material stockpiled within the dripline area of the existing trees to remain. No gasoline, oil, chemicals, concrete or other material shall be dumped anywhere on site. Where vehicle or equipment traffic if necessary in the protection area of a tree, the soil shall be protected from compaction by (6"-10") layer of wood chip mulch.

F. Any trees damaged during construction shall be promptly reported to the Owner's Representative, who shall contact the City Forester or the Designee for an assessment of damages. The contractor will be responsible for repair or replacement to the satisfaction of the City Forester or the Designee.

G. Tree roots are to be clean cut when necessary using proper equipment, i.e. loppers or concrete saw. The Contractor shall submit with the Bid the cost to implement proper boring under roots.

H. The City Forester or the Designee will be informed of all construction projects, especially when trees are involved.

I. The City Forester or the Designee will survey the site to set and determine what the contractor needs to do before construction begins. The Contractor shall set up tree protection devices.

J. The City Forester or the Designee shall be informed of:
   1. Soil grade changes adjacent to trees.
   2. Probable trenching through roots.
   3. Location of stored heavy equipment.
   4. Paths heavy equipment will take during construction project, to avoid root compaction and root breakage.

K. The City Forester or the Designee shall be notified during the project design phase, to aid in tree protection during the primary phase.
   1. When equipment must be used in close proximity of the trunk, the entire tree trunk shall be protected by banding large 2"x4" wooden boards to avoid direct contact. The soil shall be protected from compaction with a 6-10" layer of wood chip mulch.
   2. The Forestry Division will conduct all pruning if limb elevation is needed to avoid equipment contact.

L. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
   1. Cover exposed roots with burlap and water regularly.
   2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
   3. Cover exposed roots with wet burlap to prevent roots form drying out. Backfill with soil as soon as possible.

M. Rehabilitate or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
   1. Employ a qualified arborist, as approved by the City Forester or the Designee, to submit details of proposed rehabilitation for the damage to trees and shrubs.
   2. The Contractor will replace trees that cannot be rehabilitated and restored to full-growth status, as determined by the qualified arborist and the City Forester or the Designee

3.2 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
   3. Completely remove or grind stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
   4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.3 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Comply with fugitive dust permit.
   1. Do not stockpile topsoil within drip line of remaining trees.
   2. Dispose of excess topsoil as specified for waste material disposal.
   3.

END OF SECTION 02230 - SITE CLEARING (REVISED 2013)

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Print Date: 07-24-2014	Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 8 LANDSCAPE DEMOLITION	Project No./Code
File Name:	Date:	Comments	Init.	DOT DEPARTMENT OF TRANSPORTATION 1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted					Revised:	Designer: KRS / Detailer: JDA/AM	Structure Numbers: 19039
Unit Information Unit Leader Initials				Region 2 DW	Void:		Subset Sheets:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132							Sheet Number D002

SECTION 02231 TREE PROTECTION AND PRUNING

PART 1-GENERAL

1.1 SUBMITTALS

A. Maintenance Recommendations: From a qualified arborist for acre and protection of trees affected by construction during and after completing the Work.

1.2 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site.
   1. Before starting tree protection and pruning, meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities. Review tree protection and pruning procedures and responsibilities. Notify participants at least three working days before convening conference. Record discussions and agreements and furnish a copy to each participant.

PART 2-PRODUCTS

2.1 MATERIALS

A. Topsoil: Fertile, friable, surface soil, containing natural loam and complying with ASTM D 5268. Provide topsoil, that is free of stones larger than 1 inch in any dimension and free of other extraneous or toxic matter harmful to plant growth. Obtain topsoil only from well-drained sites where soil occurs in depth of 4 inches or more; do not obtain from bogs or marshes.

B. Filter Fabric: Manufacturer's standard, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

PART 3-EXECUTION

3.1 EXCAVATION

A. Where utility trenches are required within drip line of trees, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
   1. Root Pruning: Prior approval is needed from the City Forester or Designee to cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; i.e. chain saw, reciprocating saw or pruning saw. Stump grinding equipment allowed so long as the final cut is clean, not ragged. Do not break, chop, rip or otherwise mangle roots.

3.3 RE-GRADING

A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond drip line of trees. Maintain existing grades within drip line of trees.

3.4 TREE PRUNING

A. The Forestry Division will conduct all pruning if limb elevation is needed to avoid equipment contact.

3.5 TREE REPAIR AND REPLACEMENT

A. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand. Aeration of the surface soil may be required due to compaction during construction.

B. Any trees damaged during construction shall be promptly reported to the Owner's Representative, who shall contact the City Forester or designee for an assessment of damages. The Contractor will be responsible for repair or replacement to the satisfaction of the City Forester or designee.

END OF SECTION 02231 - TREE PROTECTION AND PRUNING (REVISED 2013)

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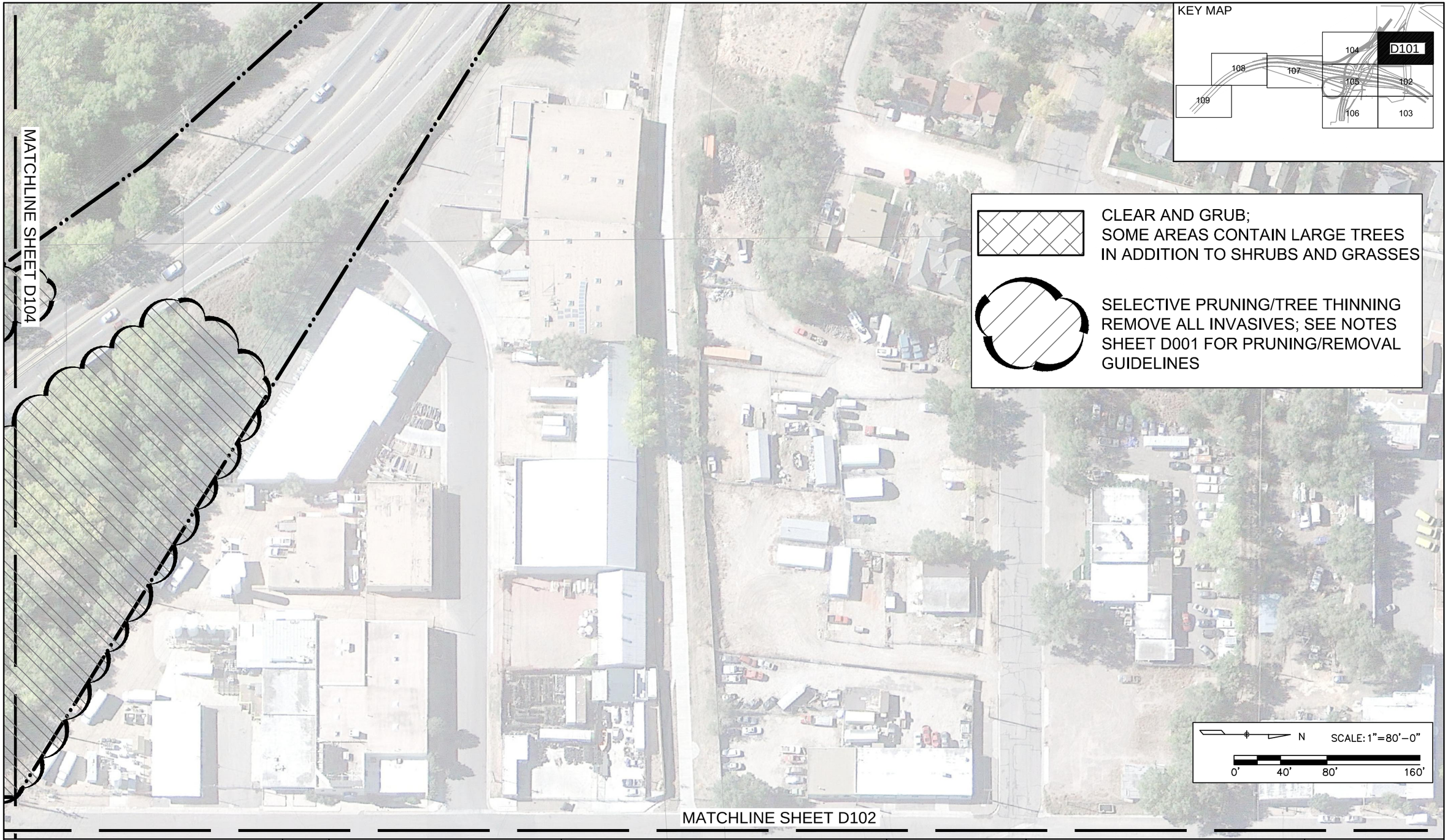
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted						Revised:	Designer: KRS / Detailer: JDA/AM	19039
Unit Information Unit Leader Initials					Region 2 DW	Void:	Structure Numbers / Subset Sheets:	Sheet Number D003
associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132								



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File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
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CHAPTER 8 LANDSCAPE DEMOLITION		Project No./Code
Designer: KRS	Structure Numbers	IM0252-423
Detailer: JDA/AM		19039
	Subset Sheets:	Sheet Number D101

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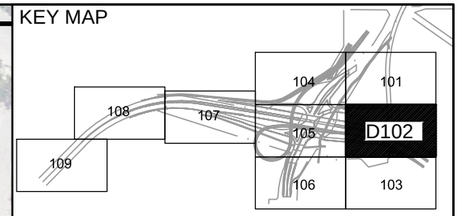
MATCHLINE SHEET D101

MATCHLINE SHEET D105

LEAVE MIDLAND TRAIL IN PLACE
UNTIL THE I-25 BRIDGE OVER THE
TRAIL HAS BEEN DEMOLISHED

KEY MAP



CLEAR AND GRUB;
SOME AREAS CONTAIN LARGE TREES
IN ADDITION TO SHRUBS AND GRASSES

SELECTIVE PRUNING/TREE THINNING
REMOVE ALL INVASIVES; SEE NOTES
SHEET D001 FOR PRUNING/REMOVAL
GUIDELINES

N SCALE: 1"=80'-0"

0' 40' 80' 160'

MATCHLINE SHEET D102

Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation
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Horiz. Scale: As Noted	Vert. Scale: As Noted				Region 2 DW
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No Revisions:			IM0252-423
Revised:	Designer: KRS	Structure Numbers	19039
Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number D102

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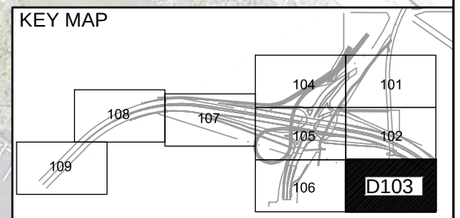
MATCHLINE SHEET D102

MATCHLINE SHEET D106

KEY MAP



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0' 40' 80' 160'

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CHAPTER 8 LANDSCAPE DEMOLITION		Project No./Code
		IM0252-423
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM		Sheet Number D103
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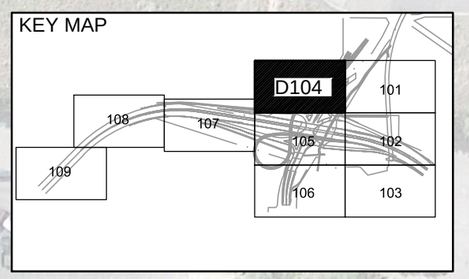

CLEAR AND GRUB;
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SELECTIVE PRUNING/TREE THINNING
REMOVE ALL INVASIVES; SEE NOTES
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GUIDELINES

N SCALE: 1"=80'-0"

0' 40' 80' 160'

MATCHLINE SHEET D101

MATCHLINE SHEET D105

Print Date: 07-24-2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
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Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
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CHAPTER 8 LANDSCAPE DEMOLITION		Project No./Code
		IM0252-423
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM		
	Subset Sheets:	Sheet Number D104

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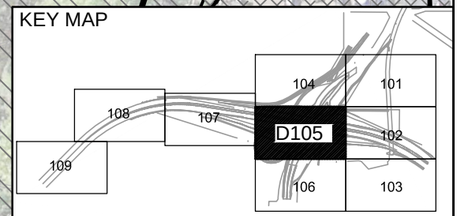
MATCHLINE SHEET D104

MATCHLINE SHEET D107

MATCHLINE SHEET D102

MATCHLINE SHEET D106

KEY MAP



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COLORADO SPRINGS, CO 80906
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Region 2 DW

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CHAPTER 8
LANDSCAPE DEMOLITION

Designer: KRS
Detailer: JDA/AM

Structure Numbers

Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number D105

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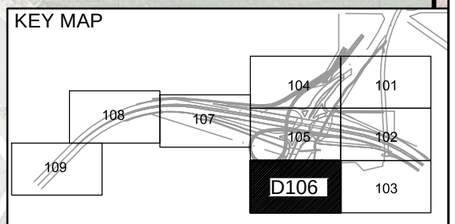
MATCHLINE SHEET D105

MATCHLINE SHEET D103

CLEAR AND GRUB;
SOME AREAS CONTAIN LARGE TREES
IN ADDITION TO SHRUBS AND GRASSES

SELECTIVE PRUNING/TREE THINNING
REMOVE ALL INVASIVES; SEE NOTES
SHEET D001 FOR PRUNING/REMOVAL
GUIDELINES

KEY MAP



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CHAPTER 8
LANDSCAPE DEMOLITION

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number D106

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MATCHLINE SHEET D105

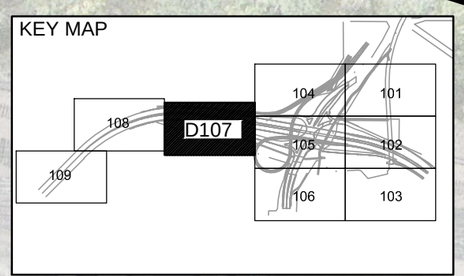
CLEAR AND GRUB;
SOME AREAS CONTAIN LARGE TREES
IN ADDITION TO SHRUBS AND GRASSES

SELECTIVE PRUNING/TREE THINNING
REMOVE ALL INVASIVES; SEE NOTES
SHEET D001 FOR PRUNING/REMOVAL
GUIDELINES

N SCALE: 1"=80'-0"

0' 40' 80' 160'

KEY MAP



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CHAPTER 8 LANDSCAPE DEMOLITION		Project No./Code
		IM0252-423
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Detailer: JDA/AM		Sheet Number D107
	Subset Sheets:	

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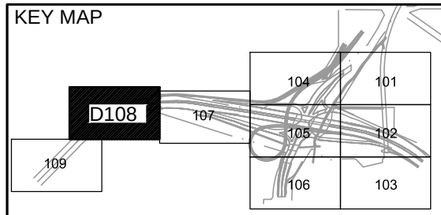
KEY MAP



NOTE: DEMO/CLEARING AREAS SHOWN ON THIS SHEET ARE APPROX. ACTUAL DEMO/CLEARING IN THESE AREAS SHALL BE LIMITED TO WHAT IS REQUIRED FOR CONSTRUCTION.

CLEAR AND GRUB;
SOME AREAS CONTAIN LARGE TREES IN ADDITION TO SHRUBS AND GRASSES

SELECTIVE PRUNING/TREE THINNING
REMOVE ALL INVASIVES; SEE NOTES SHEET D001 FOR PRUNING/REMOVAL GUIDELINES

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MATCHLINE SHEET D107

MATCHLINE SHEET D109

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CHAPTER 8
LANDSCAPE DEMOLITION

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number D108

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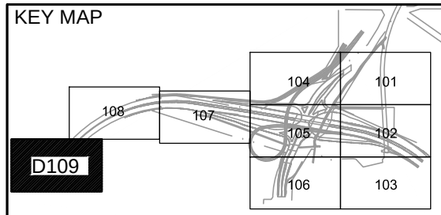
KEY MAP



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MATCHLINE SHEET D108

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SOME AREAS CONTAIN LARGE TREES IN ADDITION TO SHRUBS AND GRASSES

SELECTIVE PRUNING/TREE THINNING
REMOVE ALL INVASIVES; SEE NOTES SHEET D001 FOR PRUNING/REMOVAL GUIDELINES

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Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number D109

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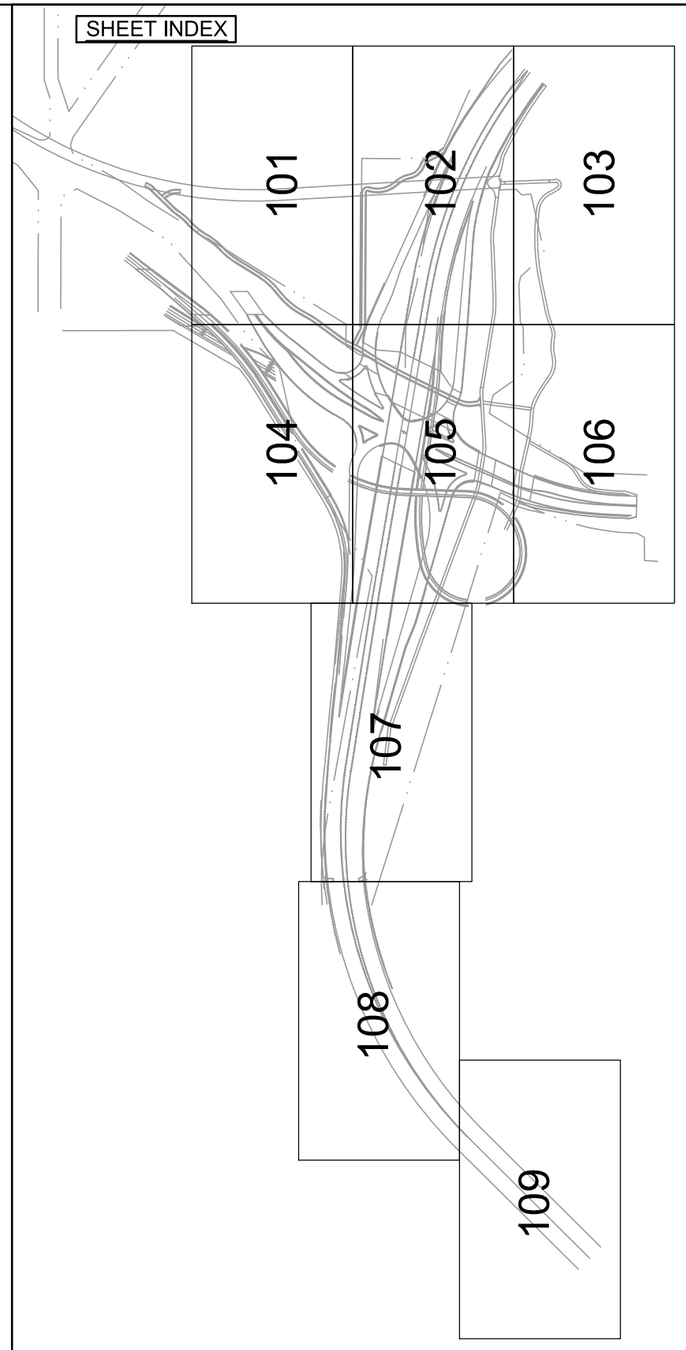
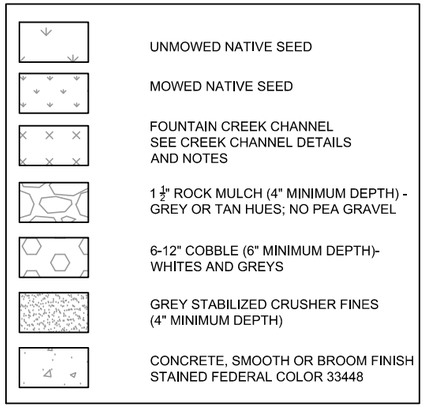
SHEET INDEX



CHAPTER 9 - SEEDING/ROCK MULCH/SITEWORK PLANS AND SPECIFICATIONS

NOTES:

1. ALL AREAS DISTURBED WITHIN THE CONSTRUCTION LIMITS SHALL BE SEEDED.
2. ALL AREAS DISTURBED AS A RESULT OF DEMOLITION SHALL BE RESEEDED. THESE AREAS MAY OR MAY NOT BE INCLUDED IN THE CONSTRUCTION LIMITS.
3. ALL SEEDING EFFORTS INCLUDING EQUIPMENT SHALL REMAIN OUTSIDE OF THE RAILROAD RIGHT-OF-WAY.
4. 1 QUART BAG SAMPLES OF ROCK MULCHES SHALL BE SUBMITTED FOR APPROVAL TO CDOT PRIOR TO MATERIALS ARRIVING ON SITE.
5. POTENTIAL WATER QUALITY POND AREAS ARE SHOWN; FINAL LOCATION AND SIZE OF WATER QUALITY PONDS SHALL DEPEND ON FINAL GRADING AND SITE PLANS.



NATIVE SEED

BOTANICAL NAME*	COMMON NAME	LBS. PLS. PER ACRE
Dalea purpureum	Purple Prairie Clover	0.90
Penstemon strictus	Rocky Mountain Penstemon	0.90
Achnaterum hymenoides	Indian Ricegrass	1.8
Bouteloua curtipendula	Sideoats Grama	3.6
Bouteloua gracilis	Blue Grama	1.8
Buchloe dactyloides	Buffalograss	1.8
Calamovilfa longifolia	Prairie Sandreed	3.6
Elymus lanceolatus lanceolatus 'Critana'	Thickspike Wheatgrass	5.4
Nassella viridula	Green Needlegrass	3.6
Pascopyrum smithii 'Arriba'	Western Wheatgrass	9.0
Sporobolus airoides	Alkali Sacaton	3.6
		36**

RIPARIAN SEED (USED WITHIN FOUNTAIN CREEK CHANNEL)

BOTANICAL NAME*	COMMON NAME	LBS. PLS. PER ACRE
Andropogon gerardii	Big Bluestem Grass	0.90
Becmannia syzigachne	American Sloughgrass	2.52
Bouteloua curtipendula	Sideoats Grama	1.8
Calamovilfa longifolia	Prairie Sandreed	3.6
Elymus lanceolatus lanceolatus 'Critana'	Thickspike Wheatgrass	1.8
Elymus lanceolatus Psammophijilus 'Sodar'	Streambank Wheatgrass	5.4
Glyceria striata	Fowl Mannagrass	2.57
Juncus arcticus	Arctic/Baltic Rush	1.8
Nassella viridula 'Lodorm'	Green Needlegrass	0.90
Panicum virgatum	Switchgrass	2.16
Pascopyron smithii 'Arriba'	Western Wheatgrass	5.4
Poa palustris	Fowl Bluegrass	3.6
Spartina pectinata	Prairie Cordgrass	1.8
Sporobolus airoides	Alkali Sacaton	1.8
		36**

*NOMENCLATURE FOLLOWS CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL
**RATES ARE FOR DRILLED; DOUBLE IF HAND-BROADCASTED

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CHAPTER 9
SEEDING/ROCK MULCH

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Detailer: JDA/AM
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Sheet Number LS001

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SECTION 02920 - SEEDING AND SODDING SPECIFICATIONS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
   1. Certification of each seed mixture for turf grass sod, identifying source, including name and telephone number of supplier.
C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.
D. Qualification Data: For landscape installer.
E. Material Test Reports: For existing surface soil and imported topsoil
F. Maintenance Instructions: Upon completion of all sodding operations, the Contractor shall notify the Owner's Representative to inspect the work. Upon inspection, if all work is acceptable, the Owner's Representative shall record that date and shall issue a "Conditional Acceptance" letter which shall state that the Contractor shall maintain all sodded areas as specified according to the following length of time. As indicated in section 1.8.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: All work specified herein shall be performed under the direct supervision of a Superintendent thoroughly familiar with the work of this section who shall be at the project site for the duration of the work in this section.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
B. Installer Qualifications: All work specified herein shall be performed under the direct supervision of a Superintendent thoroughly familiar with the work of this section who shall be at the project site for the duration of the work in this section.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
C. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
D. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
   1. Report suitability of topsoil for Sod growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.3 DELIVER, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.4 SCHEDULING

A. Planting Restrictions: Plant during one of the following periods unless otherwise approved by Owner's Representative. Coordinate plating periods with maintenance periods to provide required maintenance from date of Substantial Completion.
   1. Sodding: April 15th-October 15th.
   2. Seeding: March 1st-September 15th.
   3. Irrigated Native Seeding: March 1st-September 15th.
   4. Non Irrigated Native Seeding: November 1st-May 15th.
B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit. No sodding shall take place when the site is wet or during freezing temperatures.

1.5 NATIVE SEEDING MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than 60 days from date of Substantial Completion. The maintenance period for this work shall begin immediately after all areas are seeded and shall continue in accordance with the following requirements:
   1. All seeded areas shall have suitable signs erected at important points, notifying the public to keep off.
B. Minor vandalism or other damage to the seeded areas shall be the responsibility of the Contractor until all work receives Final Acceptance by the Owner's Representative. Major vandalism or damage caused by others through no fault of the Contractor or his subcontractor shall be brought to the attention of the Owner's Representative who will be the sole judge as to the extent of such damage. If such damage is deemed to be major by the Owner's Representative, any work necessary to repair the seeded area to an acceptable condition shall be paid for by the Owner under the provision of "extra work" stated in the General Conditions, if such work is authorized by the Owner's Representative.
C. Acts of God: Minor damage to the seeded areas shall be the responsibility of the Contractor until all work receives Final Acceptance by the Owner's Representative. Major damage caused by flood, hail storm, wind or large rain storm, and through no fault of the Contractor to protect his work, shall immediately be brought to the attention of the Owner's Representative who will be the
   site judge as to the extent of such damage. Major damage shall be repaired by the Contractor and paid for by the Owner under the provisions of City of Colorado Springs Engineering Division Standard Specifications Section 100.23 "Changed Conditions", if such work is authorized by the Owner's Representative.
D. The Contractor shall be responsible for watering and mowing the seeded areas only until final Acceptance. Mowing shall be conducted at a maximum of six inches (6"), and mowed down to four inches (4").
E. Upon completion of all seeding operations, the Contractor will notify the Owner's Representative to inspect the work. Upon inspection, if all work is acceptable, the Owner's Representative shall record that date and shall issue a "Conditional Acceptance" letter which shall state that the Contractor shall maintain all seeded areas for the duration of the Landscape Establishment Period.
F. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, and other operations. Roll, regrade and replant bare or eroded areas and remulch.
G. Watering: Provide and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep meadow uniformly moist.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water meadow at a minimum rate of 1/2 inch per week for **8** weeks after planting

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
B. Seed Species: As specified on drawings.

2.2 NATIVE GRASSES AND WILDFLOWERS

A. Wildflower Seed: Fresh, clean, dry, new seed, mixed species as follows:
B. Native Grass Seed: Fresh, clean, dry, new seed, mixed species as follows:
C. Wildflower and Native Grass Seed: Fresh, clean, dry, new seed, mixed species as follows:
D. Seed Carrier: Inert material, sharp clean sand or perlite, mixed with seed at a ratio of not less than two parts seed carrier to one part seed.

2.3 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4-percent organic material content; free of stones 3/4 inch or larger in any dimension and other extraneous materials harmful to plant growth.
   1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
   2. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.
   3. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

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SECTION 02920 - SEEDING AND SODDING SPECIFICATIONS, CONT.

2.5 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **1-inch** sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated compostable mixed solid waste.

B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb. of ammonium nitrate or 0.25 lb. of ammonium sulfate per cubic foot of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.6 PLANTING ACCESSORIES

A. Selective herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.7 FERTILIZER

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of unreaformaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 30 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 25 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.8 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew-and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Peat Mulch: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Peat Mulch: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not to exceeding 0.5 percent inert contaminants an free of substances toxic to plantings; and as follows:

1. Organic Matter Content: **50** percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plat-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.9 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 lb./sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

2.10 PLANTING SOIL MIX

A. Planting Soil Mix: As specified on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive Turf and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations. Reference tree planting schematic for exclusion of sod within tree planting well.

1. Protect adjacent and adjoining areas from hydroseeding overspray.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Stop all sod at the edge of the tree well.

3.2 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

B. Sow seed at the rate: As specified on drawings.

C. Drill seed according to specifications in Technical Requirements Chapter 17.2.10.

D. Protect seeded areas with slopes exceeding 3:1 or greater with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 3:1 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into topsoil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at the rate of 10 to 13 gal. /1000 sq. ft.

Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or strained areas.

3.3 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with non-asphaltic tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry application at a minimum rate of 500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb. /acre.

3.4 SOD RENOVATION

A. Renovate existing sod damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Re-establish sod where settlement or washouts occur or where minor regrading is required.

B. Remove sod and vegetation from diseased or unsatisfactory sod areas: do not bury in soil.

C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till ripped, bare and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply soil amendments and initial fertilizers required for establishing new Turf and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.

I. Apply sod as required for new Turf.

J. Water newly planted areas and keep moist until new sod is established.

3.5 NATIVE SEEDING

A. Method of Application: Refer to Technical Requirements for additional information.

B. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

C. Sowing rates vary with mix of species but are usually much lighter than turfgrass seed application rates. Revise to suit Project.

C. Drill seed according to specifications in Technical Requirements Chapter 17.2.10. Use application rate provided in these plans.

D. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak and scatter uniformly to a depth of 3/16 inch and roll to a smooth surface.

E. Water newly planted areas and keep moist until meadow is established.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by Sod work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after Sod is established. Remove Erosion-control measures after grass establishment period.

END OF SECTION 02920 - SEEDING AND SODDING (REVISED 2013)

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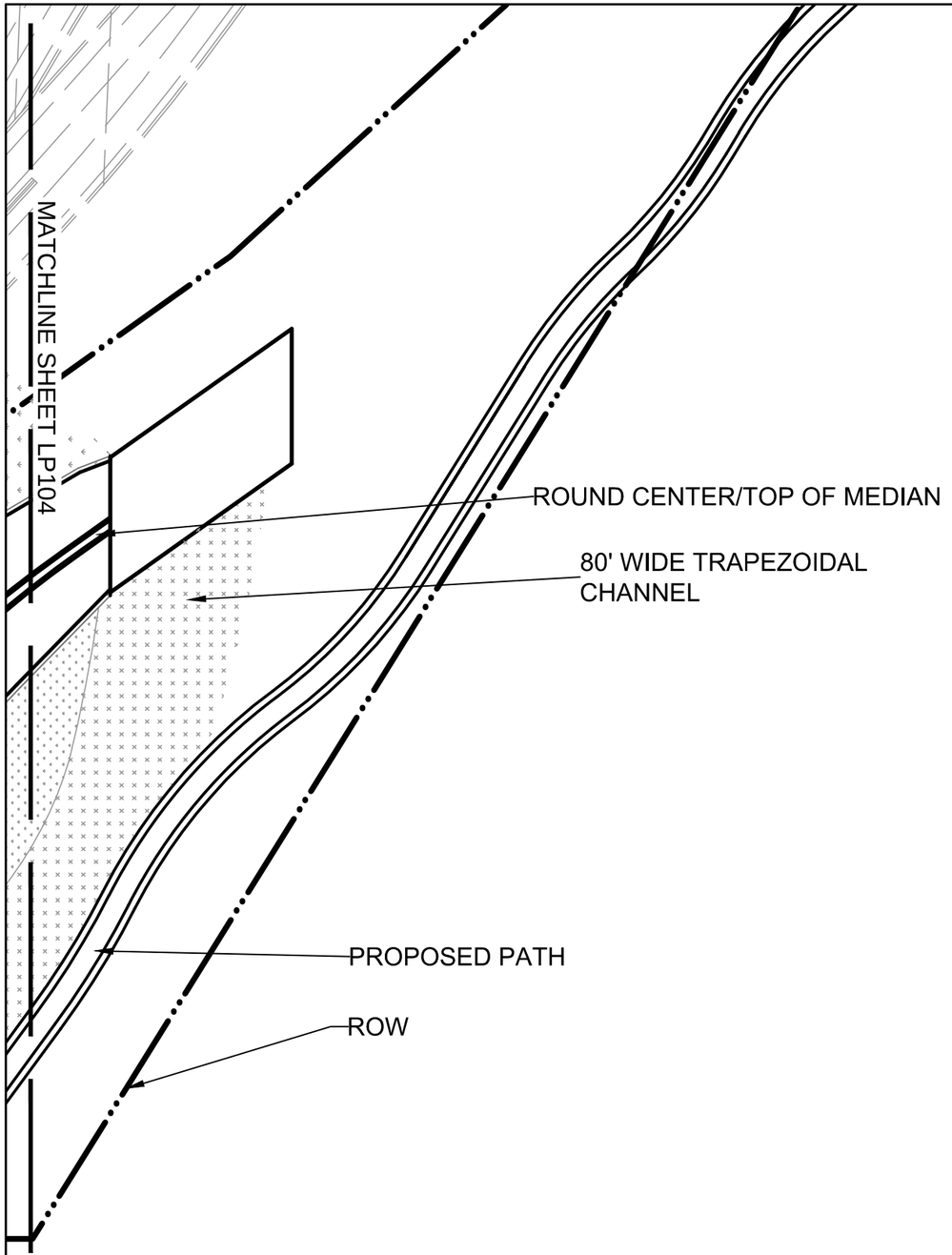

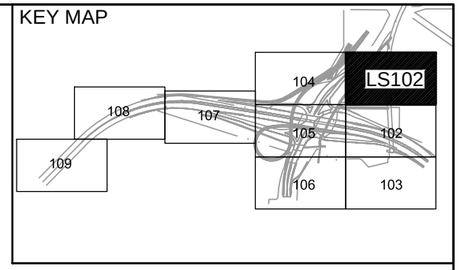

UNMOWED NATIVE SEED

MOWED NATIVE SEED

FOUNTAIN CREEK CHANNEL
SEE CREEK CHANNEL DETAILS
AND NOTES

1 ½" ROCK MULCH (4" MINIMUM DEPTH) -
GREY OR TAN HUES; NO PEA GRAVEL

6-12" COBBLE (6" MINIMUM DEPTH)-
WHITES AND GREYS

GREY STABILIZED CRUSHER FINES
(4" MINIMUM DEPTH)

CONCRETE, SMOOTH OR BROOM FINISH
STAINED FEDERAL COLOR 33448

N SCALE: 1"=80'-0"

0' 40' 80' 160'

MATCHLINE SHEET LS102

STREET LAWN TO ACCOMODATE

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CHAPTER 9
SEEDING/ROCK MULCH

Designer: KRS
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Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LS101

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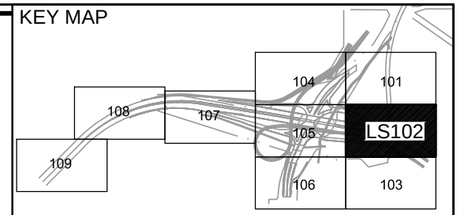
PROPOSED PATH

STREET LAWN TO ACCOMODATE
POWER POLES (MIN. 5'-0" WIDTH)

MATCHLINE SHEET LS101

KEY MAP



POTENTIAL WATER QUALITY
POND LOCATION

PROPOSED PATH

MATCHLINE SHEET LS105

EXISTING ROW

PROPOSED ROW

EXISTING PATH

EXISTING PATH

EXISTING BRIDGE

MATCHLINE SHEET LS103

N

SCALE: 1"=80'-0"

0' 40' 80' 160'

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File Name:		Date: / Comments / Init.	
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DESIGN BUILD RFP	CHAPTER 9 SEEDING/ROCK MULCH		Project No./Code
No Revisions:			IM0252-423
Revised:	Designer: KRS	Structure Numbers	19039
Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LS102

I:\7326-000 wilson I-25-cimarron\cad\ps\19039land_envi_site plans.dwg

MATCHLINE SHEET LS102

APPROX. LOCATION OF EXISTING LOW FLOW CHANNEL

APPROX. EXTENTS OF EXISTING STREAM BED

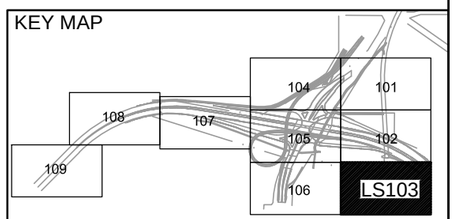
EXISTING ROW

EXISTING BRIDGE

EXISTING PATH

MATCHLINE SHEET LS106

KEY MAP



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0' 40' 80' 160'

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Date:	Comments	Init.

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SEEDING/ROCK MULCH

Designer: KRS
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Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LS103

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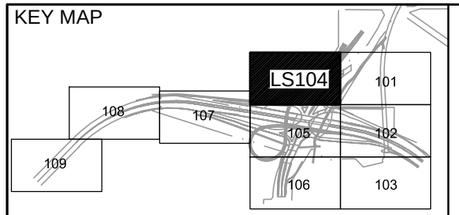
KEY MAP



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SCALE: 1"=80'-0"

0' 40' 80' 160'

PROPOSED ROW

ROUND CENTER/TOP OF MEDIAN

80' WIDE TRAPEZOIDAL CHANNEL

3'-0" WIDE CONCRETE APRON
3:1 SLOPE UP TO MEDIAN

ALL CONCRETE SCORELINES/JOINTS:
SPACE APPROX. EVERY 10'-0" AS SHOWN
JOINTS/LINES SHALL BE PERPENDICULAR TO CURVES

POTENTIAL WATER QUALITY POND LOCATION

MATCHLINE SHEET LS101

MATCHLINE SHEET LS105

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CHAPTER 9
SEEDING/ROCK MULCH

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Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LS104

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MATCHLINE SHEET LS104

ALL CONCRETE SCORELINES/JOINTS:
SPACE APPROX. EVERY 10'-0" AS SHOWN
JOINTS/LINES SHALL BE PERPENDICULAR
TO CURVES

3'-0" WIDE CONCRETE APRON
3:1 SLOPE UP TO MEDIAN

3'-0" WIDE CONCRETE APRON
3:1 SLOPE UP TO PLANTING AREA

80' WIDE TRAPEZOIDAL
CHANNEL

PROPOSED PATH

APPROX. EXTENTS OF
EXISTING STREAM BED

POTENTIAL WATER QUALITY
POND LOCATION

STAMPED CONCRETE MEDIAN
TO MATCH CIMARRON BRIDGE
OVER RR/CONEJOS ST

EXISTING PATH

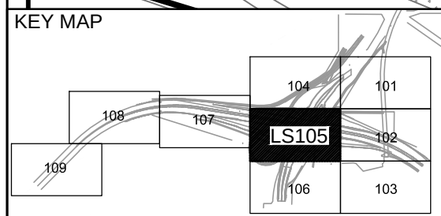
APPROX. LOCATION OF EXISTING
LOW FLOW CHANNEL

MATCHLINE SHEET LS106

MATCHLINE SHEET LS107

MATCHLINE SHEET LS102

KEY MAP



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0' 40' 80' 160'

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DESIGN BUILD RFP	CHAPTER 9 SEEDING/ROCK MULCH		Project No./Code
No Revisions:			IM0252-423
Revised:	Designer: KRS	Structure Numbers	19039
Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LS105

I:\7326-000 wilson i-25-cimarron\cad\ps\19039land_envl_site plans.dwg

MATCHLINE SHEET LS105

PROPOSED PEDESTRIAN CONNECTION

EXISTING PATH

POTENTIAL WATER QUALITY
POND LOCATION

APPROX. LOCATION OF
EXISTING LOW FLOW CHANNEL

APPROX. EXTENTS OF
EXISTING STREAM BED

PROPOSED PEDESTRIAN BRIDGE

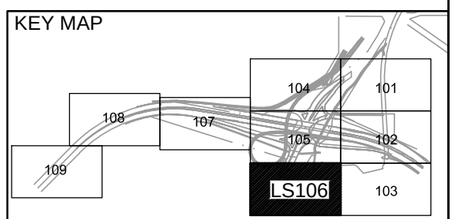
PROPOSED PEDESTRIAN CONNECTION

ROW

STAMPED CONCRETE MEDIAN
TO MATCH CIMARRON BRIDGE
OVER RR/CONEJOS ST

MATCHLINE SHEET LS103

KEY MAP



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Date:	Comments	Init.

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No Revisions:

Revised:

Void:

CHAPTER 9
SEEDING/ROCK MULCH

Designer: KRS
Detailer: JDA/AM

Structure Numbers

Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LS106

I:\7326-000 wilson i-25-cimarron\cad\ps\19039land_envl_site plans.dwg

PROPOSED ROW

EXISTING ROW

MATCHLINE SHEET LS104

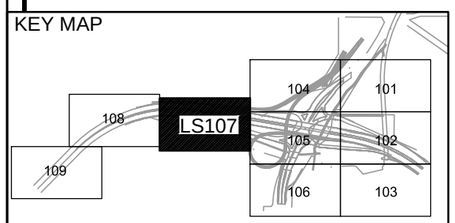
MATCHLINE SHEET LS105

ROW

APPROX. LOCATION OF EXISTING LOW FLOW CHANNEL

APPROX. EXTENTS OF EXISTING STREAM BED

KEY MAP



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0' 40' 80' 160'

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Date:	Comments	Init.

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CHAPTER 9
SEEDING/ROCK MULCH

Designer: KRS
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Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LS107

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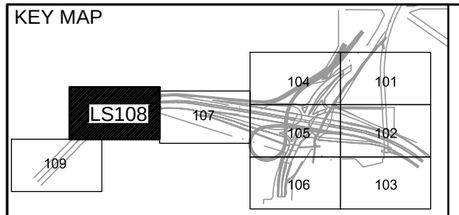
KEY MAP



N SCALE: 1"=80'-0"

0' 40' 80' 160'

APPROX. LIMITS OF REVEGETATION
ALL DISTURBED AREAS MUST BE
REVEGETATED

APPROX. LIMITS OF REVEGETATION
ALL DISTURBED AREAS MUST BE
REVEGETATED

MEDIAN TO BE SEEDED

MATCHLINE SHEET LS107

MATCHLINE SHEET LS109

Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 9 SEEDING/ROCK MULCH	Project No./Code
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted						Revised:	Designer: KRS Structure Numbers	19039
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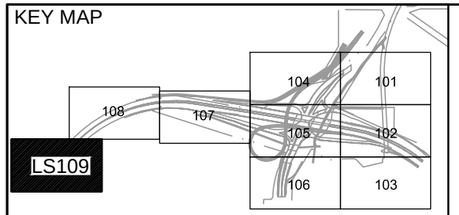
KEY MAP



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0' 40' 80' 160'

MATCHLINE SHEET LS108

APPROX. LIMITS OF REVEGETATION
ALL DISTURBED AREAS MUST BE
REVEGETATED

APPROX. LIMITS OF REVEGETATION
ALL DISTURBED AREAS MUST BE
REVEGETATED

Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:
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			IM0252-423
Designer: KRS	Structure Numbers		19039
Detailer: JDA/AM			
	Subset Sheets:		Sheet Number LS109

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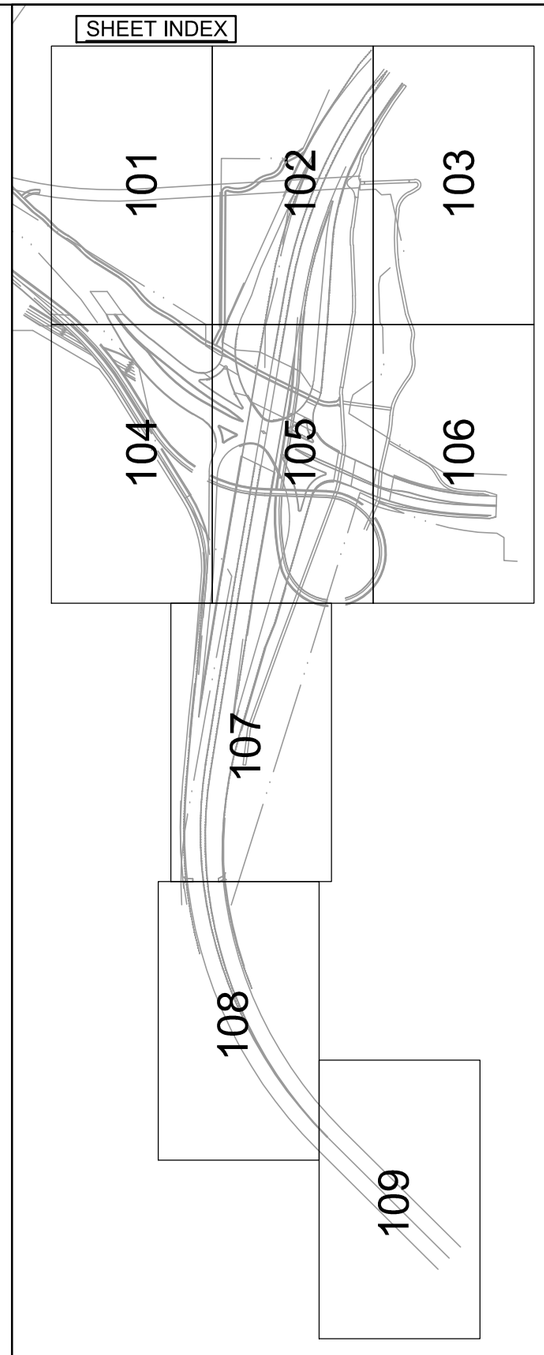
SHEET INDEX



CHAPTER 10 - PLANTING PLANS AND SPECIFICATIONS

NOTES:
1. THE RIPARIAN AREAS SHOWN ON THESE PLANS SHOW THE APPROXIMATE LIMITS OF WHERE RIPARIAN PLANTS ARE TO BE PLACED. THESE PLANTS RELY ON WATER FOR THEIR SURVIVAL. THE LIMITS OF THESE AREAS ASSUME THAT THERE IS A WATER TABLE THAT WILL SUPPORT THESE PLANTS.
2. ALL DECIDUOUS TREES SHALL RECEIVE BEAVER PROTECTION AS SHOWN IN THESE PLANS.

Large Shade Trees			
(60) PO SA	Populus sargentii	Plains Cottonwood	2" B&B
(24) CE OC	Celtis Occidentalis	Western Hackberry	2" B&B
Shade/Ornamental Trees			
(66) AL IN	Alnus incana tenufolia	Thinleaf Alder	2" B&B/6' MULTI-STEM*
(48) CR AM	Crataegus ambigua	Russian Hawthorn	2" B&B/6' MULTI-STEM*
(86) PO AN	Populus angustifolia	Narrowleaf Cottonwood	2" B&B
Evergreen Trees			
(72) PI PO	Pinus ponderosa	Ponderosa Pine	8' HT.
(55) PI FL	Pinus flexilis	Limber Pine	8' HT.
Deciduous Shrubs			
(221) PR BE	Prunus besseyii	Western Sandcherry	#5 CONT.
(332) PR AM	Prunus americana	Native Plum	#5 CONT.
(431) CO ST	Cornus stolonifera	Redtwig Dogwood	#5 CONT.
(100) PR VI	Prunus virginiana melanocarpa	Native Chokecherry	#5 CONT.
Grasses			
(2016) SC SC	Calamagrostis acutiflora 'Karl Forester'	K.F. Feather Reed Grass	#1 CONT.

*FOR THESE TREES, 65% SHALL BE MULTI-STEM AND 35% SINGLE STEM

LARGE SHADE TREES

SHADE/ORNAMENTAL TREES

EVERGREEN TREES

DECIDUOUS SHRUBS

RIPARIAN WILLOWS

ORNAMENTAL GRASSES

LANDSCAPE BOULDERS

UNMOWED NATIVE SEED

MOWED NATIVE SEED

FOUNTAIN CREEK CHANNEL
SEE CREEK CHANNEL DETAILS
AND NOTES

1 ½" ROCK MULCH (4" MINIMUM DEPTH) -
GREY OR TAN HUES; NO PEA GRAVEL

6-12" COBBLE (6" MINIMUM DEPTH)-
WHITES AND GREYS

GREY STABILIZED CRUSHER FINES
(4" MINIMUM DEPTH)

CONCRETE, SMOOTH OR BROOM FINISH
STAINED FEDERAL COLOR 33448

NATIVE SEED

BOTANICAL NAME*	COMMON NAME	LBS. PLS. PER ACRE
Dalea purpureum	Purple Prairie Clover	0.90
Penstemon strictus	Rocky Mountain Penstemon	0.90
Achnaterum hymenoides	Indian Ricegrass	1.8
Bouteloua curtipendula	Sideoats Grama	3.6
Bouteloua gracilis	Blue Grama	1.8
Buchloe dactyloides	Buffalograss	1.8
Calamovilfa longifolia	Prairie Sandreed	3.6
Elymus lanceolatus lanceolatus 'Critana'	Thickspike Wheatgrass	5.4
Nassella viridula	Green Needlegrass	3.6
Pascopyrum smithii 'Arriba'	Western Wheatgrass	9.0
Sporobolus airoides	Alkali Sacaton	3.6
		36**

*NOMENCLATURE FOLLOWS CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL
**RATES ARE FOR DRILLED; DOUBLE IF HAND-BROADCASTED

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No Revisions:			IM0252-423
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SECTION 02900 - LANDSCAPE

PART I - GENERAL

1.01 QUALIFICATIONS

A. APPLICABLE STANDARDS:

1. U.S. DEPARTMENT OF AGRICULTURE RULES AND REGULATIONS UNDER THE FEDERAL SEED ACT.
2. AMERICAN ASSOCIATION OF NURSERYMEN, CURRENT EDITION OF "AMERICAN STANDARD FOR NURSERY STOCK." PUBLISHED BY AMERICAN ASSOCIATION OF NURSERYMEN, INC., 635-636 SOUTHERN BUILDING, WASHINGTON D.C. AND/OR COLORADO NURSERY ACT, RULES AND REGULATIONS; WHICHEVER STANDARD IS GREATER.
3. CERTIFICATES OF INSPECTION FOR PLANTS: ALL NECESSARY STATE, FEDERAL AND OTHER INSPECTION CERTIFICATES SHALL ACCOMPANY THE INVOICE FOR EACH SHIPMENT OF PLANT MATERIALS AS MAY BE REQUIRED BY LAW, AND SHOWING SOURCE OF ORIGIN, CERTIFICATES SHALL BE FILED WITH THE LANDSCAPE ARCHITECT PRIOR TO HIS ACCEPTANCE OF THE MATERIAL.
4. ALL OTHER APPLICABLE FEDERAL AND COLORADO LAWS AS THEY APPLY TO PLANT MATERIALS.

B. INSPECTION AND APPROVAL:

1. ALL TREES SHALL BE INSPECTED AND APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO AND UPON DELIVERY. THE CONTRACTOR SHALL GIVE OWNER'S REPRESENTATIVE 36 HOURS PRIOR NOTICE WHEN THE PLANTS ARE READY FOR INSPECTION AT THE SUPPLIER AND UPON ON-SITE DELIVERY.
2. THE OWNER'S REPRESENTATIVE RESERVES THE RIGHT TO REJECT BEFORE DELIVERY, AND PRIOR TO FINAL ACCEPTANCE, ANY AND ALL MATERIALS IN WHICH THE OWNER'S REPRESENTATIVE'S OPINION FAIL TO MEET SPECIFICATIONS. INSPECTION OF MATERIALS IS PRIMARILY FOR QUALITY, SIZE AND VARIETY BUT OTHER REQUIREMENTS ARE NOT WAIVED EVEN THOUGH VISUAL INSPECTION RESULTS IN APPROVAL. PLANTS MAY BE INSPECTED WHERE AVAILABLE. HOWEVER, INSPECTION AT THE PLACES OF SUPPLY SHALL NOT PRECLUDE THE RIGHT OF REJECTION AT THE SITE. REJECTED MATERIALS SHALL BE PROMPTLY REMOVED FROM THE SITE WITHIN 24 HOURS.
3. THE CONTRACTOR SHALL SCHEDULE INSPECTION OF ALL PLANTS AT THE SUPPLIER TO BE COMPLETED IN ONE VISIT.

1.02 SUBMITTALS

A. PROCUREMENT:

1. WITHIN 10 DAYS AFTER THE NOTICE TO PROCEED ISSUED BY THE OWNER, THE CONTRACTOR SHALL FURNISH THE OWNER'S REPRESENTATIVE WITH COPIES OF THE SUPPLYING NURSERIES' CONFIRMATION FOR THE CONTRACTOR'S ORDERS FOR ALL PLANT MATERIAL REQUIRED BY THE PLANS AND SPECIFICATIONS. THE ENTERING OF A PROPOSAL AND EXECUTION OF A CONTACT SHALL BE EVIDENCE THAT THE MATERIAL IS AS SPECIFIED IN THE PLANS.

B. THE CONTRACTOR SHALL SUBMIT TO THE OWNER'S REPRESENTATIVE THEIR SUPPLIER SPECIFICATIONS FOR THE FOLLOWING PRODUCTS (3 WEEKS TO DELIVER):

1. COMMERCIAL FERTILIZER
2. INSECTICIDE, SYSTEMIC PRODUCT FOR TREES
3. TOPSOIL
4. ORGANIC AMENDMENT MATERIAL
5. TREE WRAPPING
6. TREE STAKES AND ACCESSORIES
7. SEED
8. LANDSCAPE EDGER
9. GRAVEL MULCH
10. PLANT MATERIAL - INCLUDING LOCATION OF NURSERY IN AND OUTSIDE OF COLORADO

C. THE CONTRACTOR SHALL SUBMIT TO THE OWNER'S REPRESENTATIVE SAMPLES OF THE FOLLOWING MATERIALS TO BE USED ON THE PROJECT (3 WEEKS PRIOR TO DELIVERY):

1. GRAVEL MULCH (ALL VARIETIES)
2. WOOD MULCH
3. ORGANIC AMENDMENT (COMPOST)
4. TOPSOIL

D. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE 24 HOURS IN ADVANCE OF PLANTING ANY MATERIAL TO ALLOW THE OWNER'S REPRESENTATIVE THE OPPORTUNITY TO EXAMINE PLANTING PITS BEFORE INSTALLATION OF MATERIAL.

E. MAINTENANCE INSTRUCTIONS:

1. AT COMPLETION OF THE WORK, FURNISH FOUR (4) COPIES OF WRITTEN MAINTENANCE INSTRUCTIONS TO OWNER FOR MAINTENANCE AND CARE OF ALL PLANTED AREAS THROUGHOUT THE YEAR.

F. CONTRACTOR SHALL HAVE AN AGRICULTURAL SOILS TEST RUN ON ON-SITE TOPSOIL FOR DETERMINATION OF NUTRIENT ADDITIVES AND APPLICATION RATES. SUBMIT TEST RESULTS TO OWNER'S REPRESENTATIVE NOT LATER THAN TWO (2) WEEKS PRIOR TO ITS SCHEDULE USE.

1.03 JOB CONDITIONS AND STANDARDS

A. ALL PLANTING WORK SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF A SUPERINTENDENT AND LABORERS THOROUGHLY EXPERIENCED WITH THE WORK OF THIS SECTION AND WHO SHALL BE AT THE PROJECT SITE FOR THE DURATION OF THE WORK OF THIS SECTION.

B. NO PLANTING WORK SHALL TAKE PLACE DURING INCLEMENT WEATHER OR WHEN THE GROUND CONDITIONS ARE, IN THE OPINION OF THE OWNER'S REPRESENTATIVE, NOT IN A CONDITION TO BE PROPERLY WORKED.

C. NO PLANTING WORK SHALL COMMENCE UNTIL THE ADJACENT SITE IMPROVEMENTS, DRAINAGE IMPROVEMENTS, PAVEMENTS, IRRIGATION INSTALLATION AND FINISH GRADING IS COMPLETED. THE IRRIGATION SYSTEM SHALL HAVE BEEN TESTED IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE, AND BE IN OPERATING ORDER PRIOR TO ANY PLANTING.

D. ERECT BARRICADES, FENCING, HIRE TEMPORARY WATCHMEN OR WHATEVER IS DEEMED NECESSARY BY THE CONTRACTOR TO TOTALLY PROTECT THIS WORK.

E. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS TO PROTECT ALL EXISTING PLANT MATERIAL ON THE SITE, IF ANY, DURING CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL ALSO PROVIDE TEMPORARY MAINTENANCE FOR ALL EXISTING PLANT MATERIAL WITHIN THE CONTRACT LIMIT LINES THROUGHOUT THE CONSTRUCTION PERIOD. PROTECTION OF THE EXISTING PLANT MATERIAL SHALL BE APPROVED BY OWNER'S REPRESENTATIVE BEFORE GRADING OPERATIONS COMMENCE.

PART II - PRODUCTS

2.01 GRAVEL MULCH

A. PROVIDE 1-1/2" GRAY HUED NATURAL GRANITE GRAVEL IN ALL AREAS AS INDICATED ON PLAN.
   1. MULCH SHALL BE FREE OF SEEDS, WEEDS, TWIGS AND BRANCHES.
   2. MINIMUM DEPTH SHALL BE 4".

B. PROVIDE 6-12" ROUNDED COBBLE, WHITE AND GREY HUES, IN ALL AREAS AS INDICATED ON PLAN.
   1. MULCH SHALL BE FREE OF SEEDS, WEEDS, TWIGS AND BRANCHES.
   2. MINIMUM DEPTH SHALL BE 6".

C. PROVIDE GREY STABILIZED CRUSHER FINES IN ALL AREAS AS INDICATED ON PLAN.
   1. MULCH SHALL BE FREE OF SEEDS, WEEDS, TWIGS AND BRANCHES.
   2. MINIMUM DEPTH SHALL BE 4".

2.03 PRE-EMERGENT HERBICIDE

A. PRE-EMERGENT HERBICIDE SHALL BE USED AND APPLIED AS PER MANUFACTURER'S RECOMMENDATIONS FOR WEED CONTROL IN ALL PLANTING/GRAVEL AREAS. PRE-EMERGENT HERBICIDE SHALL BE APPROVED BY OWNER'S REPRESENTATIVE.

2.04 POST-EMERGENT HERBICIDE

1. FOR ALL TURF PLANTING BEDS, PROVIDE A POST-EMERGENT HERBICIDE.
2. POST-EMERGENT HERBICIDE SHALL BE APPROVED BY OWNER'S REPRESENTATIVE.

2.05 INSECTICIDE AND FUNGICIDE

A. FOR ALL TREE PLANTINGS, PROVIDE SYSTEMIC INSECTICIDE.

1. SYSTEMIC INSECTICIDE SHALL BE APPLIED PER MANUFACTURER'S RECOMMENDATION AT TIME OF PLANTING OF TREES AND SHRUBS.
2. METHOD OF APPLICATION SHALL BE SOIL INJECTION OR SOIL DRENCH AS PER MANUFACTURER'S RECOMMENDATIONS. APPLY TREATMENT WITH WATER AND KEEP MOIST FOR 7 TO 10 DAYS.
3. INSECTICIDE AND FUNGICIDE SHALL BE APPROVED BY OWNER'S REPRESENTATIVE.

2.06 TREE WRAP

A. TREE WRAPPING MATERIAL SHALL BE OF FIRST QUALITY, 4-INCH WIDE, BITUMINOUS IMPREGNATED TAPE, CORRUGATED OR CREPE PAPER, BROWN IN COLOR, SPECIFICALLY MANUFACTURED FOR TREE WRAPPING. THE CONTRACTOR SHALL SUBMIT A SAMPLE FOR OWNER'S APPROVAL A MINIMUM OF 3 WEEKS PRIOR TO DELIVERY ON SITE.

2.07 STAKING AND GUYING MATERIAL

A. WIRE SHALL BE 12 GAUGE, DOUBLE STRAND, PLIABLE GALVANIZED STEEL WIRE.

B. NYLON WEBBING SHALL BE A SOFT, 8 TO 10 CM. WIDE STRIP WITH GROMMETS AT ENDS.

C. STAKES SHALL BE 2" X 2" X 8' WOOD STAKES OR APPROVED EQUAL.

2.08 FERTILIZER

A. FERTILIZER SHALL BE DELIVERED TO THE SITE, MIXED AS SPECIFIED, IN THE ORIGINAL, UNOPENED STANDARD SIZE BAGS SHOWING WEIGHT, ANALYSIS AND NAME OF MANUFACTURER.CONTAINERS SHALL BEAR THE MANUFACTURER'S GUARANTEED STATEMENT OF ANALYSIS AND SHALL BE FURNISHED TO THE OWNER. STORE FERTILIZER IN A WEATHERPROOF PLACE AND IN SUCH A MANNER THAT IT SHALL BE KEPT DRY AND ITS EFFECTIVENESS SHALL NOT BE IMPAIRED.

B. SUPERPHOSPHATE: SOLUBLE MIXTURE OF TREATED MINERALS, 16% TO 20% AVAILABLE PHOSPHORIC ACID.

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C. COMMERCIAL FERTILIZER SHALL CONSIST OF THE FOLLOWING:

1. TABLETS: FOR TREES AND SHRUBS, PROVIDE TIGHTLY COMPRESSED LONG LASTING, SLOW RELEASE TABLETS WEIGHING 21 GRAMS WITH AN ANALYSIS OF 20-10-5, AND A POTENTIAL ACIDITY OF NOT MORE THAN 5% BY WEIGHT.

2. GRANULAR: FOR SEEDED AREAS, PROVIDE A GRANULAR, SLOW RELEASE COMMERCIAL FERTILIZER WITH AN ANALYSIS OF 18-46-0 AT A RATE OF 1.5 LBS OF AVAILABLE NITROGEN PER 1,000 SQUARE FOOT OR APPROVED EQUAL. FERTILIZER SHALL BE APPLIED AT A RATE OF 364 LBS PER ACRE.

2.09 ORGANIC SOIL AMENDMENTS

A. ORGANIC SOIL AMENDMENT SHALL BE A COMPOSTED ORGANIC WOOD AND DECOMPOSED MANURE BASED PRODUCT WITH A CARBON TO NITROGEN RATIO BETWEEN 15:1 AND 30:1, WITH A PH OF 5.0 TO 6.0, AND A SALT CONTENT BELOW 6 MMHOS/CM. OTHER MATERIALS SUCH AS DECOMPOSED MUSHROOM OR VEGETABLE MATTER OF A NATURAL OCCURRENCE MAY BE CONSIDERED FOR APPROVAL.

B. THE ORGANIC SOIL AMENDMENT SHALL BE FREE OF OBJECTIONABLE ODOR, AND FREE FROM ALL VIABLE WEED SEEDS, FINELY SHREDDED TO PASS 70% THROUGH A 1/8 INCH MESH.

C. ORGANIC SOIL AMENDMENT SHALL BE ADDED TO ALL PLANTING AND SOD AREAS AT A RATE OF 3 CY PER 1,000 S.F. ORGANIC SOIL AMENDMENT SHALL BE TILLED TO A DEPTH OF 12".

2.10 PLANT MATERIALS

A. A LIST OF PLANTS TO BE PROVIDED IS SHOWN ON THE DRAWINGS.

B. ALL PLANTS SHALL:

1. BE THE SPECIES DESIGNATED ON THE PLANS. NO SUBSTITUTIONS SHALL BE ACCEPTED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.

2. BE INDIVIDUALLY IDENTIFIED ON LEGIBLE, WEATHER-PROOF LABELS SECURELY ATTACHED TO THE PLANTS. TAGS TO REMAIN UNTIL AFTER PUNCH LIST INSPECTION OR FINAL ACCEPTANCE AND THEN SHALL BE REMOVED BY THE CONTRACTOR. LABELS SHALL INCLUDE THE CORRECT GENUS, SPECIES, VARIETY NAME AND ACCEPTED COMMON NAME OF THE PLANT AS WELL AS THE SIZE OR GRADE OF STOCK.

3. HAVE A WELL DEVELOPED BRANCH STRUCTURE TYPICAL OF THE SIZE AND SPECIES AND AS SPECIFIED ON PLANTING LIST.

4. HAVE A WELL-BRANCHED AND VIGOROUS ROOT SYSTEM TYPICAL OF THE SIZE AND SPECIES AND FREE FROM “J” ROOTS, ROOT GIRDLING THE TRUNK AND OTHER DEFECTS.

5. HAVE HEALTHY BUDS WHICH ARE WITHOUT MECHANICAL, INSECT OR DISEASES.

6. BE HEALTHY AND VIGOROUS PLANTS FREE FROM VISUAL DEFECTS, MECHANICAL INJURIES, PLANT DISEASES AND ALL FORMS OF INSECT INFESTATION UNTIL FINAL ACCEPTANCE.

7. BE NURSERY-GROWN, MEANING PLANTS THAT HAVE BEEN GROWING IN A NURSERY EITHER LINED OUT OR CONTAINERIZED FOR A MINIMUM OF TWO GROWING SEASONS AND HAVING BEEN ROOT PRUNED ACCORDING TO ACCEPTABLE NURSERY PRACTICE.

8. HAVE BEEN GROWN UNDER SIMILAR CLIMATIC CONDITIONS OR SIMILAR ZONE AS THAT OF THE PROJECT'S LOCATION PRIOR TO PLANTING.

9. CONFORM TO REQUIREMENTS OF PLANT LIST AND KEY ON DRAWINGS AND TO “HORTICULTURAL STANDARDS” OF AMERICAN ASSOCIATION OF NURSERYMEN AS TO KIND, SIZE, AGE, ETC.

2.11 LANDSCAPE EDGER

A. LANDSCAPE EDGER SHALL BE A ROLLED TOP, 3/16” X 5 1/2 “ ALUMINUM EDGER WITH ALUMINUM STAKES OR PINS FOR SUPPORTS, FACTORY PAINTED DARK GREEN.

2.12 GEOTEXTILE FABRIC

A. GEOTEXTILE FABRIC (FILTER FABRIC) SHALL BE INSTALLED ONLY BENEATH ROCK MULCH.

2.13 TOPSOIL: SEE SPECIFICATION OF SECTION 02923, TOPSOIL.

2.14 APPROVAL

A. ALL MATERIALS, FERTILIZERS, GUYING AND STAKING MATERIALS, ETC. SHALL BE APPROVED BY THE CITY OF COLORADO SPRINGS PRIOR TO USE ON THE PROJECT. CONTACT THE CITY OF COLORADO SPRINGS FOR SPECIFIC MATERIALS RECOMMENDED OR REQUIRED.

PART III - EXECUTION

3.01 EXAMINATION

A. BEFORE PROCEEDING WITH WORK, CHECK AND VERIFY DIMENSIONS AND QUANTITIES. REPORT VARIATIONS BETWEEN DRAWINGS AND SITE TO OWNER BEFORE PROCEEDING WITH THE WORK OF THIS SECTION.

B. PLANT TOTALS ARE FOR CONVENIENCE OF CONTRACTOR ONLY AND ARE NOT GUARANTEED. VERIFY AMOUNTS SHOWN ON DRAWINGS.

C. ALL PLANTING INDICATED ON DRAWINGS IS REQUIRED UNLESS INDICATED OTHERWISE.

3.02 LAYOUT AND IDENTIFICATION

A. THE CONTRACTOR SHALL LOCATE AND STAKE ALL TREE AND SHRUB LOCATIONS AND SOD LIMITS ACCORDING TO LOCATIONS SHOWN ON PLANS. ALL PLANTING LOCATIONS SHALL BE OBSERVED AND APPROVED BY THE OWNER'S REPRESENTATIVE, PRIOR TO PLANTING OPERATIONS.

B. THE CONTRACTOR SHALL MAKE MINOR MODIFICATIONS IN PLANTING LOCATIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

3.03 PLANT PROTECTION AND DELIVERY

A. ALL PLANT MATERIAL SHALL BE PROTECTED FROM THE TIME OF DIGGING, TO THE TIME OF FINAL ACCEPTANCE FROM INJURY, EXCESSIVE DRYING WINDS, IMPROPER VENTILATION, OVERWATERING, FREEZING, HIGH TEMPERATURES OR ANY OTHER CONDITION DAMAGING TO THE PLANT. ANY PLANTS SHOWING EVIDENCE OF POOR CARE, OR WHICH ARE MOLDED, MILDEWED, WILTED OR DRIED OUT SHALL BE REJECTED.

B. PLANT MATERIAL SHALL BE PLANTED ON THE DAY OF DELIVERY OR SHALL BE PLACED IN A TEMPORARY NURSERY WITH SHADE CANOPY, KEPT MOIST BY AN AUTOMATIC WATERING SYSTEM, SHADED AND PROTECTED FROM SUN AND WIND. IF BALLED AND BURLAP PLANTS ARE NOT PLANTED ON THE DAY OF DELIVERY, THEY SHOULD BE PROTECTED WITH DAMP SOIL, MOSS, OR OTHER ACCEPTABLE MATERIAL TO THE FULL HEIGHT OF THE ROOT BALL.

C. PLANTS SHALL NOT BE BOUND WITH WIRE OR ROPE THAT MAY DAMAGE THE BARK OR BREAK BRANCHES. PLANTS SHALL BE LIFTED AND HANDLED FROM BOTTOM OF BALL OR CONTAINER. PLANTS WITH BALLS LOOSE, CRACKED OR BROKEN, MAN-MADE, OR COMPLETELY DRY PLANTS WITH TRUNKS LOOSE IN THE BALL BEFORE OR DURING PLANTING OPERATIONS SHALL NOT BE ACCEPTED AND SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE WITHIN 24 HOURS.

3.04 EXCAVATION OF PLANTING PIT

A. ALL PLANT PITS SHALL BE CENTERED ON THE LOCATION STAKE, SHALL BE EXCAVATED IN A CYLINDRICAL SHAPE WITH SLOPED/TAPERED SIDES AND FLAT BOTTOM. THE DEPTH OF THE PLANT SHALL BE MEASURED FROM THE FINISH GRADE OF SOIL NOT MULCH AND AS DETAILED IN THE CONTRACT DRAWINGS. THE BASE OF ALL SOIL BALLS SHALL BE PLACED ON COMPACTED BACKFILL FILL.

B. TREES: THE DIAMETER OF ALL TREE PITS SHALL BE A MINIMUM OF 3 TIMES LARGER THAN THE DIAMETER OF THE BALL OR SPREAD OF THE ROOTS. EXCEPT AS INDICATED ON PLANTING DETAIL SHEETS. REMOVE WIRE BASKETS, BUNDLING CORDS, AND THE TOP 1/3 OF BURLAP FROM THE TREES. EXCEPT FOR TREES PLANTED ON SLOPES, THE TOP SURFACE OF ALL ROOT BALLS SHALL BE FLUSH WITH ADJACENT PLANTING BEDS OR WITH THE SUB GRADE BELOW SOD. IT IS IMPORTANT NOT TO PLACE TREE BALLS TOO LOW. THE TRUNK FLARE SHOULD BE EXPOSED AT THE SURFACE.

C. SHRUBS: THE DIAMETER OF ALL SHRUB PITS SHALL BE A MINIMUM OF TWICE THE DIAMETER OF THE BALL OR SPREAD OF ROOTS. THE BASE OF ALL SOIL BALLS SHALL BE PLACED ON COMPACTED BACKFILL FILL.

D. VINES, GROUND COVERS AND PERENNIALS: THE DIAMETER OF ALL VINE AND GROUND COVER PITS SHALL BE 6 INCHES GREATER THAN THE SPREAD OF ROOTS.

3.05 PLANT INSTALLATION PROCEDURE

A. PLANTING AND STAKING:

1. PLANTS SHALL BE SET IN THE CENTER OF THE PIT ON COMPACTED BACKFILL MIX. IMMEDIATELY AFTER SETTING THE PLANT IN THE PIT, ALL NON-BIODEGRADABLE MATERIALS SHALL BE COMPLETELY REMOVED FROM THE BALL AND TRUNK, INCLUDING BUT NOT LIMITED TO PLASTIC, METAL, WIRE, WOOD, CARDBOARD, PAPER, FIBER, TREATED BURLAP AND TWINE. THE ONLY EXCEPTIONS SHALL BE THE BOTTOMS (NOT SIDES) OF FIBER POTS. PLANT HANDLING SHALL BE DONE IN SUCH A MANNER AS NOT TO INJURE THE PLANT ROOT SYSTEM, DISTURB THE SOIL BALL OR IN ANY OTHER WAY CAUSE HARM OR STRESS TO THE PLANT. IF THE ROOT SYSTEM OF A CONTAINER-GROWN PLANT HAS BECOME CONTAINER-BOUND, THE ROOTS SHALL BE GENTLY CUT VERTICALLY ON FOUR SIDES OF THE ROOT BALL PRIOR TO PLANTING. DAMAGED OR BROKEN ROOTBALLS WILL NOT BE ACCEPTED.

2. ALL PLANTS SHALL BE PLACED AND KEPT PLUMB AND STRAIGHT AS THE PIT IS FILLED WITH BACKFILL MIX. CONTRACTOR SHALL ADJUST ANY PLANT WHICH IS NOT PERFECTLY UPRIGHT, AND PRIOR TO ACCEPTANCE, TO A PLUMB POSITION. TREES AND SHRUBS IN NON-IRRIGATED AREAS TO HAVE SAUCERS BUILT AROUND THEM AT THE DRIP LINES.

3. AFTER PLACING TREE IN THE PIT, THE HOLE AROUND THE PLANT ROOT SYSTEM SHALL BE HALFWAY BACKFILLED WITH SPECIFIED MIX AND ANY LARGE AIR POCKETS REMOVED BY HAND WITH THE BLUNT, HANDLE END OF A SHOVEL OR OTHER SUCH HAND TOOL. IF THE OWNER DETERMINES THAT THE BALL IS EXCESSIVELY DRY, THE CONTRACTOR SHALL THEN INSET A DEEP WATERING DEVICE INTO THE BALL AT A 45-DEGREE ANGLE EVERY 8 INCHES FOR ONE MINUTE. THE PIT SHALL THEN BE COMPLETELY FILLED WITH BACKFILL MIX AND TAMPED AGAIN WITH A SHOVEL. NO MECHANICAL COMPACTION SHALL BE ALLOWED. THE PIT SHALL THEN BE WATERED BY THOROUGHLY SATURATING THE BACKFILL WITH WATER TO A MINIMUM OF 3 FEET SURFACE DIMENSION. NO WATERING SHALL BE DONE PRIOR TO THIS TIME. WATERING SHALL BE REPEATED ONCE WHEN ALL FREE WATER HAS DISAPPEARED. THE SECOND WATERING SHALL NOT BE COMPLETED IF THE SUB GRADE AROUND THE PIT IS ALREADY MOIST. AFTER THE SECOND WATERING, THE CONTRACTOR SHALL ADD THE SPECIFIED MULCH. ALL SURPLUS SOIL AND DEBRIS SHALL BE REMOVED BY THE CONTRACTOR. THE CONTRACTOR SHALL STAKE AND GUY TREES IMMEDIATELY AFTER PLANTING ACCORDING TO STANDARD DETAIL.

4. FOR TREES IN GRASS AND PLANTING BEDS, THE CONTRACTOR SHALL DRIVE STAKES 3 FEET VERTICALLY INTO FIRM SOIL OUTSIDE THE PLANT PIT. THE CONTRACTOR SHALL RUN WIRE UP TO THE TREE TRUNK AND THROUGH THE NYLON WEBBING WRAPPED AROUND THE TREE AT APPROXIMATELY ½ THE HEIGHT OF THE TREE. WEBBING AND WIRE ATTACHMENT BETWEEN STAKE AND TREE SHALL BE ADJUSTED SO THE STRAPS ARE UNDER JUST ENOUGH TENSION TO AVOID VISIBLE SAG IN THE LINES.

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5. CONTRACTOR SHALL PLACE STAKES ACCORDING TO THE CONSTRUCTION DETAIL. THE CONTRACTOR SHALL RETURN TO THE SITE AND REMOVE STAKES ONE YEAR FROM PLANTING.
6.

B. SPRAYING, WRAPPING, PRUNING, WATERING AND MULCHING:

1. ALL DECIDUOUS TREES SHALL BE WRAPPED BY THE CONTRACTOR BETWEEN NOVEMBER 1ST AND APRIL 15TH OF THE YEAR IN WHICH THEY ARE PLANTED. SPECIFIED TREE WRAP SHALL BE CUT IN A CONTINUOUS STRIP OF SUFFICIENT LENGTH TO WRAP THE TREE. THIS WRAPPING SHALL BEGIN AT THE GROUND LINE WITH OVERLAPPING WRAPS OF1 ½ INCHES TERMINATING ABOVE THE LOWEST MAIN BRANCH OF THE TREE. FINAL WRAP SHALL BE SECURED WITH TAPE IN A MINIMUM OF THREE PLACES. THE CONTRACTOR SHALL RETURN TO THE SITE THE FOLLOWING SPRING AND REMOVE THE WRAP ONCE THE DANGER OF FROST HAS PASSED. THE CONTRACTOR SHALL NOTIFY THE OWNER A MINIMUM OF 1 WEEK PRIOR TO WRAP REMOVAL.
2. AFTER INSPECTION, AND WITH THE APPROVAL OF THE OWNER, THE CONTRACTOR SHALL NEATLY PRUNE PLANTS AS NECESSARY TO REMOVE ONLY DEAD, INJURED, DISEASED OR CROSSING BRANCHES. ALL CUTS SHALL BE MADE JUST OUTSIDE OF THE FLARE OF THE BRANCH BASE, LEAVING A SLIGHT STUB. ALL PRUNING SHALL BE EXECUTED SO AS TO PRESERVE THE NATURAL FORM AND CHARACTER OF THE PLANT. THE CONTRACTOR SHALL RETURN TO THE SITE ONE YEAR FROM THE INSTALLATION OF THE PLANTS AND PRUNE ALL DEAD, DISEASED OR INJURED BRANCHES FROM THE PLANTS AS SPECIFIED ABOVE. THE CONTRACTOR SHALL NOTIFY THE OWNER 1 WEEK PRIOR TO COMMENCING THE PRUNING TASK.

3. AFTER WATERING ON DAY OF PLANTING, AND THROUGHOUT THE MAINTENANCE PERIOD UP TO FINAL ACCEPTANCE, THE CONTRACTOR SHALL ENSURE THAT THE PLANTS ARE NOT OVER OR UNDER WATERED BY ONLY WATERING WHEN THE CONTRACTOR'S ON-SITE TESTING OF SOIL MOISTURE INDICATES THE ROOT ZONE AT 4 INCH DEPTH HAS BEGUN TO DRY OUT.

4. SPECIFIED GRAVEL OR BARK MULCH SHALL BE PLACED IN ALL PLANTING BED, SHRUB AREAS AND AT THE BASE OF EACH TREE. THE MULCH SHALL BE SPREAD CAREFULLY AND EVENLY TO MINIMUM DEPTH OF THREE INCHES. THE MULCHED AREAS SHALL BE GRADED SO THAT THE TOP OF THE MULCH WILL BE FLUSH WITH THE TOP OF THE PAVEMENT, AND ½" INCH BELOW THE TOP OF THE CURB.

5. UNDERGROUND OBSTRUCTIONS: THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ANY UNDERGROUND UTILITY, OR OTHER IMPROVEMENTS. IN THE EVENT A PIPE, LINE, ROCK FORMATION, OR OTHER OBSTRUCTION INTERFERES WITH THE PLANT LOCATION, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RECEIVE A NEW PLANT LOCATION.

C. BACKFILL FOR TREES AND SHRUBS

1. ORGANIC SOIL AMENDMENT: 33% VOLUME OF BACKFILL.

2. PLANTING PIT EXCAVATED MATERIAL: 67% VOLUME OF BACKFILL.

3. FERTILIZER TABLETS: ONE 21 GRAM FERTILIZER TABLET FOR EACH ½" OF TREE TRUNK CALIPER AND ONE TABLET PER 12 INCHES HEIGHT, OR SPREAD (WHICHEVER IS GREATER) FOR EACH SHRUB.

4. INSECTICIDE: TREES: INSTALL 1.0 TO 1.4 LEVEL TEASPOONS PER ONE-INCH OF TRUNK DIAMETER (D.B.H., AT BREAST HEIGHT) MINIMUM ONE (1) TEASPOON PER 2" CALIPER TREE. SHRUBS: INSTALL 0.7 TO 1.4 LEVEL TEASPOONS PER ONE-FOOT OF HEIGHT OF SHRUB.

3.06 SOIL PREPARATION

A. SOIL PREPARATION AND MULCHING FOR ALL LANDSCAPE AREAS, INCLUDING SEED AND SOD AREAS:

1. FINISH GRADING SHALL BE PERFORMED TO FILL IN EROSION GULLIES ON SLOPES IDENTIFIED ON DRAWINGS. WHERE THE USE OF LARGE MACHINERY IS DIFFICULT, FINISHED GRADE SHALL BE WORKED WITH SMALLER EQUIPMENT OR BY HAND.

2. REMOVE ALL RUBBLE, STONE AND EXTRANEOUS MATERIAL OVER TWO (2) INCHES IN DIAMETER FROM THE SITE.

3. FOR PLANTING AREAS, APPLY SHORT TERM HERBICIDE TO INHIBIT UNWANTED PLANT GROWTH PRIOR TO SEEDING. APPLY IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION FOR THIS PURPOSE AND SUFFICIENTLY IN ADVANCE OF PLANTING TO AVOID DAMAGE TO NEW PLANTS AND GRASS. SHORT TERM HERBICIDE SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE.

4. SPREAD APPROVED TOPSOIL AND THE FOLLOWING AMENDMENTS TO THE AREAS SPECIFIED ON THE DRAWINGS. NO ROTOTILLING OR DISKING OF TOPSOIL DRESSING. SEEDING TO FOLLOW WITHIN 7 DAYS OF TOPSOIL APPLICATION.

a. ORGANIC SOIL AMENDMENT: APPLY 3 CUBIC YARDS PER 1,000 SQUARE FEET.

b. COMMERCIAL FERTILIZER (18-46-0): APPLY 15 LBS OF AVAILABLE NITROGEN PER 1,000 SQUARE FEET.

c. SUBSTANTIATE QUANTITIES WITH DELIVERY TICKETS AND EMPTY MANUFACTURER BAGS ON A DAILY BASIS TO OWNER.

5. FINE GRADE TO RESTORE SMOOTH EVEN FINISH GRADES AND TO INSURE POSITIVE SURFACE DRAINAGE. NO PLANTING SHALL TAKE PLACE UNTIL OWNER ACCEPTS FINAL GRADE.

6. PROVIDE SOIL TEST OF FINISHED GRADE CONDITION TO LANDSCAPE ARCHITECT BEFORE PLANTING OR SEEDING OPERATIONS OCCUR.

7. MOISTEN PREPARED SOD/SEED AREAS BEFORE PLANTING IF SOIL IS DRY. WATER THOROUGHLY AND ALLOW SURFACE MOISTURE TO DRY BEFORE PLANTING LAWNS. DO NOT CREATE A MUDDY SOIL CONDITION.

3.07 INSTALLATION OF LANDSCAPE EDGER

A. CONTRACTOR SHALL INSTALL EDGING AS PER MANUFACTURER'S RECOMMENDATION. EDGING SHALL BE INSTALLED BETWEEN ALL PLANT BEDS AND SOD/SEEDED AREAS, OR AS SHOWN ON THE PLANS.

3.08 SCHEDULE

A. NO PLANTING WORK SHALL TAKE PLACE DURING FREEZING, EXCESSIVE WIND OR WET WETHER, OR WHEN CONDITIONS AR, IN THE OPINION OF THE OWNER, NOT IN A CONDITION TO BE PROPERLY WORKED. CONTRACTOR SHALL INCLUDE TIME IN HIS SCHEDULE FOR WORK STOPPAGE DUE TO INCLEMENT WEATHER OR GROUND CONDITIONS. INCLEMENT WEATHER OR GROUND CONDITIONS SHALL NOT BE CAUSE FOR AN EXTENSION OF PROJECT COMPLETION DATE UNLESS WRITTEN APPROVAL HAS BEEN OBTAINED FROM THE OWNER FOR EXTENSION OF THE PROJECT COMPLETION DATE.

B. NO PLANTING WORK SHALL COMMENCE UNTIL THE ADJACENT SITE IMPROVEMENTS, PAVEMENTS, UTILITY INSTALLATION AND FINISH GRADING IS COMPLETED. THE CONTRACTOR SHALL LIMIT HIS USE OF HEAVY EQUIPMENT ON PAVEMENTS AND PLANTED AREAS. IN ALL CASES, CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO EXISTING CONDITIONS.

3.09 CLEAN-UP

A. MATERIALS BROUGHT INTO THE PROJECT AREA SHALL BE NEATLY STOCKPILED UPON COMPLETION OF EACH PLANTING DAY. DEBRIS WILL BE REMOVED FROM THE PROJECT AREA AT COMPLETION OF EACH DAY'S WORK.

B. THE CONTRACTOR SHALL REMOVE FROM THE SITE, EQUIPMENT, EXCESS SOIL AND OTHER DEBRIS WHICH WAS REVEALED IN THE PLANTING PROCESS.

3.10 MAINTENANCE, ACCEPTANCE AND GUARANTEE

A. MAINTENANCE PERIOD SHALL BEGIN IMMEDIATELY AFTER EACH AREA IS PLANTED BASED ON THE FOLLOWING REQUIREMENTS:

1. ALL PLANTING SHALL BE PROTECTED AND MAINTAINED UNTIL FINAL ACCEPTANCE OF ALL WORK. MAINTENANCE SHALL INCLUDE MOWING, WATERING, WEEDING, CULTIVATING, MULCHING, TIGHTENING AND REPAIRING OF GUYS, ADJUSTING METAL EDGER, REMOVAL OF DEAD BRANCHES, RESETTING PLANTS TO PROPER GRADE OR UPRIGHT POSITION, BARRICADING THE SITE AND OTHER NECESSARY OPERATIONS. THE CONTRACTOR SHALL PROVIDE ALL WATER AND EQUIPMENT NECESSARY FOR MAINTENANCE DURING THE DURATION OF THE CONTRACT. WATER IS AVAILABLE AT THE PLANTING SITE. AFTER FINAL ACCEPTANCE, MAINTENANCE BECOMES THE RESPONSIBILITY OF THE OWNER.

2. IF DURING THE DURATION OF THE CONTRACT PERIOD, BUT PRIOR TO THE FINAL ACCEPTANCE, ANY OF THE PLANTS DIE, OR IF THEY ARE, IN THE OPINION OF THE OWNER, IN AN UNHEALTHY OR UNSIGHTLY CONDITION OR IF THEY HAVE LOST THEIR NATURAL SHAPE DUE TO DEAD BRANCHES OR EXCESSIVE PRUNING OF BRANCHES, THEN THE CONTRACTOR SHALL REPLACE THE MATERIAL AT THE CONTRACTOR'S EXPENSE. THIS REPLACEMENT SHALL BE COMPLETED PRIOR TO FINAL ACCEPTANCE OF THE PROJECT AND SHALL NOT VOID THE TWO YEAR GUARANTEE.

3. VANDALISM, THEFT OR OTHER DAMAGE TO THE PLANTINGS OR RELATED WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL WORK RECEIVES FINAL ACCEPTANCE.

B. PRIOR TO FINAL ACCEPTANCE, THE CONTRACTOR SHALL FURNISH FOUR (4) COPIES OF WRITTEN MAINTENANCE INSTRUCTIONS TO OWNER FOR MAINTENANCE AND CARE OF ALL NEW PLANTED AREAS FOR THE FIRST THREE YEARS AFTER INSTALLATION. THESE INSTRUCTIONS SHALL INCLUDE BUT NOT BE LIMITED TO STAKING, PRUNING, INSECT AND DISEASE CONTROL AND FERTILIZING.

C. GUARANTEE:

1. FOR THE PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE OF ALL WORK, AND AT NO ADDITIONAL COST TO THE OWNER, THE CONTRACTOR SHALL REPLACE ANY PLANTS THAT HAVE DIED, ARE PARTIALLY DEAD, IF THEY ARE IN THE OPINION OF THE OWNER, IN AN UNHEALTHY OR UNSIGHTLY CONDITION, OR THEY HAVE LOST THEIR NATURAL SHAPE DUE TO DEAD BRANCHES OR EXCESSIVE PRUNING OF DEAD BRANCHES. INADEQUATE OR IMPROPER MAINTENANCE BY THE OWNER SHALL NOT BE CAUSE FOR REPLACEMENT BY THE CONTRACTOR PROVIDED THE CONTRACTOR SHALL HAVE SUBMITTED THROUGHOUT THE GUARANTEE PERIOD A BI-WEEKLY LETTER OF REPORT TO THE OWNER ON IMPROPER OR INADEQUATE MAINTENANCE PRACTICES AND RECOMMENDED REMEDIAL ACTIONS. THE CONTRACTOR SHALL APPLY A "NEW" TWO YEAR GUARANTY PERIOD TO EACH REPLACEMENT PLANT THAT IS INSTALLED. THE CONTRACTOR SHALL GUARANTY ALL PLANTS TO BE TRUE TO NAME AND TO MEET ALL CONDITIONS OF THESE SPECIFICATIONS. ANY PLANT THAT IS NOT TRUE TO NAME AS INDICATED BY LEAF, FLOWER FORM OR FRUITING CHARACTERISTICS REVEALED WITHIN GUARANTEED PERIOD SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. ALL REPLACEMENT PLANTING UNDER THE GUARANTEE PROVISION SHALL BE EXECUTED WITHIN ONE MONTH OF NOTICE TO REPLACE SUCH PLANTS. UPON OWNER'S WRITTEN APPROVAL, THE CONTRACTOR SHALL REPLACE REJECTED PLANTS AT A LATER DATE, MUTUALLY AGREED UPON, PROVIDED THAT THE CONTRACTOR REMOVES ALL REJECTED PLANTS WITHIN SEVEN (7) DAYS OF THE NOTICE TO REPLACE SUCH PLANTS. IF THE REJECTED PLANTS ARE NOT REMOVED WITHIN SEVEN (7) DAYS, THE OWNER MAY AT HIS OPTION REMOVE THESE PLANTS AND COST OF THE REMOVAL SHALL BE CHARGED TO THE CONTRACTOR. REPLACEMENT PLANTING IS TO BE IN ACCORDANCE WITH ORIGINAL SPECIFICATIONS AND ITS COST CONSIDERED TO BE INCLUDED IN THE BID PRICE. ALL AREAS DAMAGED BY TREE OR SHRUB PLANTING OR REPLACEMENT OPERATIONS ARE TO BE FULLY RESTORED TO THEIR ORIGINAL CONDITIONS AS SPECIFIED.

END OF SECTION 02900

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Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 10 PLANTING		Project No./Code
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:			IM0252-423
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SECTION 02923 - TOPSOIL

PART 1 - GENERAL

1.01 RELATED WORK:

A. SECTION 02900 PLANTING AND LANDSCAPE

1.02 SOURCE QUALITY CONTROL:

A. A TESTING LABORATORY APPROVED BY THE CITY OF COLORADO SPRINGS AND PAID FOR BY THE CONTRACTOR WILL CARRY OUT AN INSPECTION AND TESTING OF SOIL MIXTURE.

B. TEST SOIL FROM SOURCE FOR SAND, SILT AND CLAY, NPK, MG, SOLUBLE SALT CONTENT, PH VALUE, AND ORGANIC MATTER. TEST SOIL PRIOR TO TRANSPORTING TO SITE. A RANDOM SAMPLING OF MATERIAL BEING DELIVERED TO THE SITE WILL BE TESTED, AND THE CONTRACTOR WILL BE RESPONSIBLE TO REPLACE ALL MATERIAL THAT DOES NOT CONFORM TO THE ORIGINAL APPROVED SOIL SAMPLES AT HIS COST.

1. SUBMIT 0.5 GALLON SAMPLE OF SOIL TO TESTING LABORATORY AND INDICATE PRESENT USE, INTENDED USE, TYPE OF SUBSOIL AND QUALITY OF DRAINAGE. PREPARE AND SHIP SAMPLE IN ACCORDANCE WITH TESTING LABORATORY REQUIREMENTS.

2. SUBMIT TWO COPIES OF SOIL ANALYSIS AND RECOMMENDATIONS FOR CORRECTION TO THE LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO DELIVERING ANY TOPSOIL TO THE SITE.

3. MAKE INITIAL TEXTURAL AMENDMENTS AND ALL FERTILITY AMENDMENTS TO IMPORTED SOIL MIXTURE IN ACCORDANCE WITH SOIL ANALYSIS RESULTS FOR A PERIOD UP TO AND INCLUDING THE MAINTENANCE PERIOD.

1.03 SCHEDULING OF WORK:

A. SCHEDULE PLACING OF SOIL AND FINISH GRADING TO PERMIT PLANTING OPERATIONS UNDER OPTIMUM CONDITIONS. COORDINATE OPERATIONS WITH IRRIGATION CONTRACTOR WHO WILL INSTALL AN AUTOMATIC IRRIGATION SYSTEM PRIOR TO THE INSTALLATION OF TOPSOIL AND PRIOR TO INSTALLATION OF THE PLANT MATERIAL.

PART 2 - PRODUCTS

2.01 MATERIAL TOLERANCES:

A. CONTRACTOR IS TO PROVIDE TOPSOIL MIX THAT CONFORMS TO THE FOLLOWING TOLERANCES.

B. TOPSOIL FOR ALL TREE, SHRUB, AND GROUND COVER PLANTING BEDS SHALL CONSIST OF THE FOLLOWING:

1. 60% TO 70% SAND
2. 10% MAX. SILT.
3. 10% MAX. CLAY.
4. MINIMUM 12% ORGANIC MATTER
5. PH VALUE OF 5.0 TO 6.0.
6. DRAINAGE MINIMUM OF 3/4 INCH/HR.

C. ACCEPTABLE AMENDMENTS INCLUDE:

1. COMPOSTED ORGANIC WOOD AND MANURE BASED PRODUCT WITH A CARBON TO NITROGEN RATIO BETWEEN 15:1 AND 30:1, WITH A PH OF 5 TO 6, SALT CONTENT BELOW 6 MMHOS/CM. OTHER MATERIALS SUCH AS MUSHROOM COMPOST, ETC. MAY BE CONSIDERED FOR APPROVAL.

2. AMENDMENTS SHALL BE FREE OF OBJECTIONABLE ODOR, AND FREE FROM ALL VIABLE WEED SEEDS, FINELY SHREDDED TO PASS 70% THROUGH A 1/4 INCH MESH SCREEN.

D. TOPSOIL FOR ALL LAWN AND MEADOW AREAS SHALL CONSIST OF THE FOLLOWING:

1. 60% TO 80% ROUND SAND.
2. 10% MAX. SILT.
3. 10% MAX. CLAY.
4. MINIMUM 5% ORGANIC MATTER
5. PH VALUE OF 6.0 TO 7.5.
6. DRAINAGE MINIMUM OF 3/4 INCH/HR.

E. SAND:

1. RIVER PUMP OR SCREENED QUARRY SAND WITH A PARTICLE SIZE BREAKDOWN AS FOLLOWS. PROVIDE SIEVE ANALYSIS FOR APPROVAL.

COARSE SAND15%MEDIUM SAND65%FINE SAND20%

F. COMPOST:

1. WELL-DECOMPOSED, 2 YEAR OLD, ORGANIC WOOD AND MANURE BASED PRODUCT WITH A CARBON TO NITROGEN RATIO BETWEEN 15:1 AND 30:1, WITH A PH OF 5 TO 6, AND A SALT CONTENT BELOW 6 MMHOS/CM. OTHER MATERIALS SUCH AS A DECOMPOSED MUSHROOM OR VEGETABLE MATTER OF NATURAL OCCURRENCE MAY BE CONSIDERED FOR APPROVAL. SHEEP AND PEAT IS ACCEPTABLE.
2. SHREDDED PARTICLE MINIMUM SIZE: 1/4 - 1/2 INCH.

G. FERTILIZER:

1. ANALYSIS AND APPLICATION RATES IN ACCORDANCE WITH SOIL ANALYSIS RESULTS - SLOW RELEASE TYPE SULPHUR COATED UREA COMPLETE WITH MICRO NUTRIENTS.

H. PEAT MOSS: (MOUNTAIN PEAT MOSS IS NOT ACCEPTABLE FOR USE ON THE PROJECT)

1. DERIVED FROM PARTIALLY DECOMPOSED FIBROUS OR CELLULAR STEMS AND LEAVES OF SPECIES OF SPHAGNUM MOSSES.
2. ELASTIC AND HOMOGENOUS, BROWN IN COLOR.
3. FREE OF WOOD AND DELETERIOUS MATERIAL THAT COULD PROHIBIT GROWTH.
4. SHREDDED PARTICLE MINIMUM SIZE: 1/4".

I. DRAIN GRAVEL: 3/4" DIAMETER CLEAN ROUND DRAIN ROCK, FREE OF FINES.

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE:

A. GRADE SOIL, ELIMINATING UNEVEN AREAS AND LOW SPOTS, ENSURING POSITIVE DRAINAGE TOWARDS STORM DRAINS. REMOVE SOIL CONTAMINATED WITH TOXIC MATERIALS OR MATERIALS DETRIMENTAL TO GROWTH SUCH AS ASPHALT, CONCRETE AND DEBRIS WHICH HAS CONTAMINATED SUBGRADE SOIL. DISPOSE OF REMOVED MATERIALS LEGALLY OFF OF SITE. IF HAZARDOUS MATERIALS ARE DISCOVERED NOTIFY OWNER IMMEDIATELY.

B. CULTIVATE AREA SUBSOIL THAT IS TO RECEIVE TOPSOIL TO DEPTH OF 12" IN THOSE AREAS WHERE EQUIPMENT USED FOR HAULING AND SPREADING HAS COMPACTED SOIL. NO-TILL DRILL WILL EXECUTE THE SEEDING OF THE SITE. MINIMUM DISTURBANCE IS REQUIRED. ADDITIONAL CULTIVATION OF DISTURBED OR COMPACTED AREAS SHALL BE THE COST OF THE CONTRACTOR.

C. REMOVE SURFACE DEBRIS, ROOTS, VEGETATION BRANCHES AND STONES IN EXCESS OF 4" DIAMETER.

3.02 SPREADING OF SOIL MIXTURE:

A. COORDINATE EFFORTS WITH OTHER TRADES. UNDER NO CIRCUMSTANCES IS THE SOIL MIXTURE TO BE SPREAD IF OTHER TRADES ARE NOT COMPLETED WITH THEIR WORK, WHICH COULD CONTAMINATE OR COMPACT THE INSTALLED SOIL MIXTURE.

B. SPREAD SOIL AFTER LANDSCAPE ARCHITECT HAS INSPECTED AND PROVIDED WRITTEN APPROVAL OF SUBGRADE PREPARATION IN TERMS OF SLOPE, SCARIFICATION AND DEPTHS. DO NOT SPREAD SOIL IN A FROZEN OR SATURATED CONDITION.

C. SPREAD SOIL MIXTURE WITH ADEQUATE MOISTURE IN UNIFORM LAYERS OVER APPROVED SUBGRADE, WHERE PLANTING IS INDICATED.

D. FOR SOIL APPLICATION AROUND TREES SEE SECTION 02900

E. MANUALLY SPREAD SOIL MIXTURE AROUND TREES, SHRUBS AND OBSTACLES.

3.03 FINISH GRADING OF SOIL MIXTURE:

A. GRADE SOIL, ELIMINATING UNEVEN AREAS AND LOW SPOTS, ENSURING POSITIVE DRAINAGE AWAY FROM BUILDINGS AND TOWARDS STORM DRAINAGE SYSTEMS. REMOVE SOIL CONTAMINATED WITH TOXIC MATERIALS. REMOVE SURFACE DEBRIS, ROOTS, VEGETATION, BRANCHES, STONES IN EXCESS OF 2" DIAMETER, AND ALL EXTRANEOUS MATERIAL. DISPOSE OF REMOVED MATERIALS. ELIMINATE ROUGH SPOTS AND LOW AREAS TO ENSURE POSITIVE DRAINAGE. PREPARE LOOSE FRIABLE BED BY MEANS OF HAND CULTIVATION AND SUBSEQUENT RAKING. FOLLOWING PLANTING, MULCH PLANTED SHRUB BEDS WITH A DEPTH OF 3" GRAVEL MULCH ON LANDSCAPE FABRIC AND RAKE SMOOTH.

END OF SECTION 02923

ADDITIONAL SPECIFICATIONS

THIS PROJECT SHALL ADHERE TO THE SPECIFICATIONS IN THIS PACKAGE AS WELL AS STANDARD SPECIFICATIONS FOR THE CITY OF COLORADO SPRINGS AND CDOT. SHOULD THERE BE A CONFLICT BETWEEN SPECIFICATIONS, THE MORE STRINGENT SPECIFICATION SHALL BE USED.

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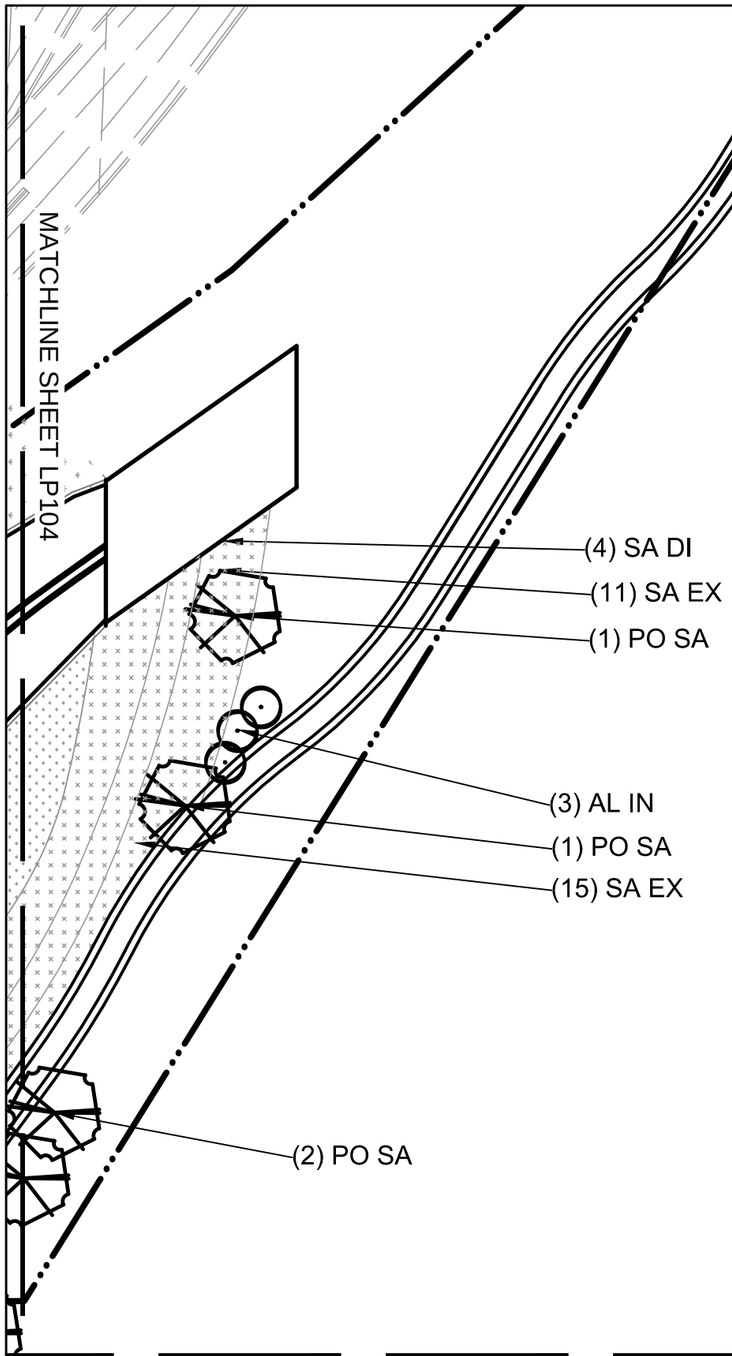

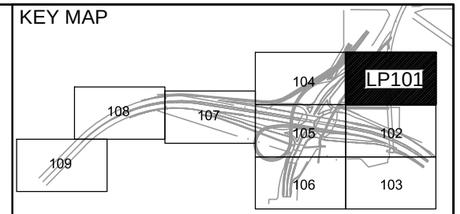

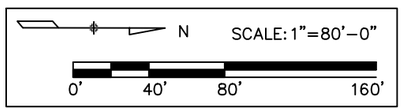

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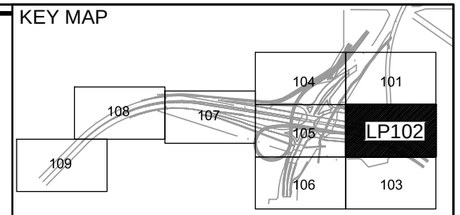

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CHAPTER 10 PLANTING		Project No./Code
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Detailer: JDA/AM		Sheet Number LP102
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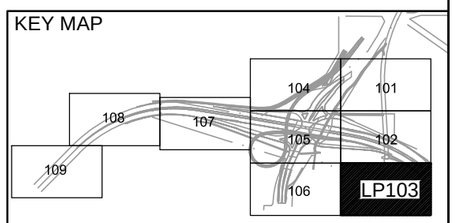

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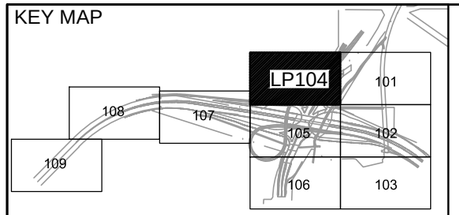

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Print Date: 07–24–2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 10 PLANTING		Project No./Code
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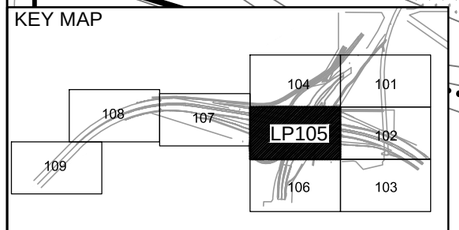

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Project No./Code
IM0252-423
19039
Sheet Number LP105

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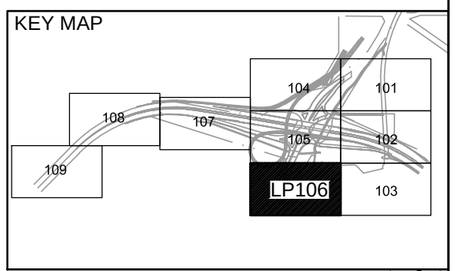

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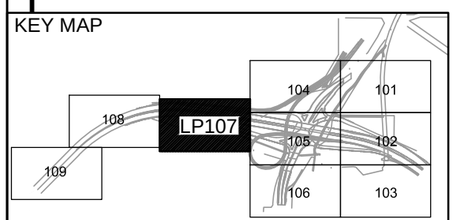

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No Revisions:			IM0252-423
Revised:	Designer: KRS	Structure Numbers	19039
Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LP107

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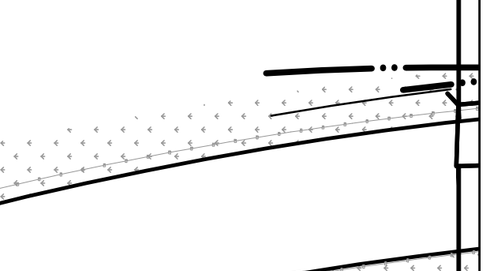
MATCHLINE SHEET LP107



MATCHLINE SHEET LP109

Print Date: 07-24-2014	Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted				Region 2 DW	Revised:
Unit Information Unit Leader Initials					Void:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132					

CHAPTER 10 PLANTING			Project No./Code
			IM0252-423
Designer: KRS	Structure Numbers		19039
Detailer: JDA/AM			
	Subset Sheets:		Sheet Number LP108

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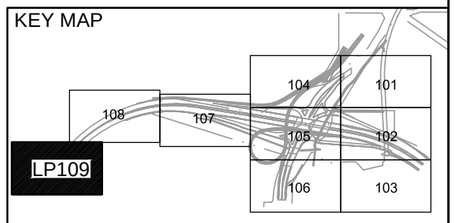
MATCHLINE SHEET LP108

KEY MAP



N

SCALE: 1"=80'-0"

0' 40' 80' 160'

Print Date: 07-24-2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: Comments Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
Unit Information Unit Leader Initials		Phone: 719-634-2323 FAX: 719-227-3298	Void:
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CHAPTER 10 PLANTING		Project No./Code
		IM0252-423
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	Subset Sheets:	

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FOUNTAIN CREEK RESTORATION/RECONSTRUCTION NOTES:

1. THESE NOTES AND DETAILS SHALL BE USED FOR THE STRETCH OF FOUNTAIN CREEK FROM THE CIMARRON BRIDGE OVER FOUNTAIN CREEK (TO THE WEST OF I25) TO THE CONFLUENCE WITH MONUMENT CREEK. THE AREA IS DEPICTED ON THE PLANTING PLANS (ATTACHED).
2. THESE NOTES AND DETAILS SHALL ALSO BE USED FOR THE AREAS ENCOMPASSED BY ARE #3.

PATH OF THE LOW FLOW CHANNEL:

1. THE LOW FLOW CHANNEL SHALL BE A CONSTANT 15'-0" WIDE.
2. THE LOW FLOW CHANNEL SHALL UNDULATE WITHIN THE 80'-0" WIDE TRAPEZOIDAL CHANNEL TO MIMIC A NATURALLY OCCURRING ALLUVIAL STREAM BED. THE UNDULATIONS AND PATH OF THE LOW FLOW CHANNEL SHALL ADHERE TO THE FOLLOWING CRITERIA:
   - 2.1. CURVE FREQUENCY: THERE SHALL BE 3 FULL CURVES WITHIN EVERY 600-700 LINEAL FEET.
   - 2.2. EACH CURVE SHALL HAVE A RADIUS THAT CAN RANGE FROM 250-350'.
   - 2.3. EACH CURVE SHALL HAVE A CHORD LENGTH THAT CAN RANGE FROM 200-350'.
   - 2.4. ALL CURVES MUST CONNECT TANGENTIALLY TO CREATE A SMOOTH FLOWING CHANNEL.
   - 2.5. CURVES CANNOT BE COMPRISED OF A SERIES OF STRAIGHT TANGENT LINES.
   - 2.6. THE EDGE OF THE LOW FLOW CHANNEL MUST REMAIN A MINIMUM OF 10'-0" FROM THE TOE OF THE TRAPEZOIDAL CHANNEL.
   - 2.7. THE GEOMETRY OF THE CURVES SHALL VARY TO AVOID REPITITION.

LOW FLOW CHANNEL EDGE TREATMENTS:

1. THE EDGE OF THE LOW FLOW CHANNEL SHALL RECEIVE THE FOLLOWING TREATMENTS:
   - 1.1. BOULDER EDGE: THIS TREATMENT SHALL BE USED ON APPROX. 80% OF THE CHANNEL.
   - 1.2. WILLOW FACINES: THIS TREATMENT SHALL BE USED ON APPROX. 20% OF THE CHANNEL.
2. THE WILLOW FACINES TREATMENT SHALL BE USED PRIMARILY ON THE EDGES OF THE INSIDE OF THE CURVES OF THE CHANNEL.
3. WILLOW STANDS/FACINES SHALL NOT CONTINUE FOR MORE THAN $\frac{2}{3}$ OF THE CHORD LENGTH OF ANY CURVE. WILLOW STANDS/FACINES MAY BE USED IN POCKETS OR LARGER STRETCHES (UP TO $\frac{2}{3}$ THE CHORD LENGTH OF THE CURVE). THE INTENT IS TO CREATE AREAS OF VEGETATED WILLOW EDGES WHILE STILL ALLOWING PHYSICAL AND VISUAL ACCESS TO THE CREEK.

VEGETATION:

1. ALL AREAS WITHIN THE 80'-0" TRAPEZOIDAL CHANNEL, BUT NOT WITHIN THE 15'-0" LOW FLOW CHANNEL, SHALL BE VEGETATED WITH RIPARIAN SEED AND WETLAND PLANTINGS AS OUTLINED BELOW.
2. WHERE POSSIBLE, WETLAND PLANTING BENCHES SHALL BE INSTALLED ON THE INSIDE OF CURVES OF THE LOW FLOW CHANNEL. WETLAND PLANTING BENCHES SHALL BE GRADED TO A SLOPE LESS THAN THAT OF THE LOW FLOW CHANNEL TO ENCOURAGE RIPARIAN PLAN GROWTH.
3. THE OUTSIDE EDGES OF WETLAND PLANTING BENCHES SHALL BE PLANTED WITH COYOTE WILLOW (*salix exigua)* STAKES TO FRAME VIEWS OF THE PLANTING BENCH. PUSSY WILLOW (*salix discolor)* MAY BE USED IN AREAS THAT WILL REMAIN SHADIER, SUCH AS AREAS CLOSER TO BRIDGE STRUCTURES.
4. POCKETS OF WILLOW STAKES MAY BE USED WITHIN THE MAIN AREA OF THE PLANTING BENCHES, AS LONG AS THEY ARE IN POCKETS AND DO NOT USE MORE THAN 30% OF THE PLANTING BENCH AREA.
5. WILLOW STANDS SHALL NOT CONTINUE FOR MORE THAN $\frac{2}{3}$ OF THE CHORD LENGTH OF ANY CURVE. WILLOW STANDS MAY BE USED IN POCKETS OR LARGER STRETCHES (UP TO $\frac{2}{3}$ THE CHORD LENGTH OF THE CURVE). THE INTENT IS TO CREATE AREAS OF VEGETATED WILLOW EDGES WHILE STILL ALLOWING PHYSICAL AND VISUAL ACCESS TO THE CREEK.
6. FOR AREAS UNDERNEATH THE BRIDGE STRUCTURES, LARGE SANDSTONE BOULDERS SHALL BE USED INSTEAD OF VEGETATION WITHIN THE TRAPEZOIDAL CHANNEL.

DROP STRUCTURES:

1. THE PROJECT SHALL INCLUDE THREE (3) ROCK DROP STRUCTURES.
2. EACH DROP STRUCTURE SHALL INCORPORATE APPROX. 9-12" OF TOTAL VERTICAL DROP. DROP STRUCTURES SHALL BE DESIGNED AS 'FISH-FRIENDLY' TO ALLOW SPECIES SUCH AS FLATHEAD CHUB AND TROUT TO NAVIGATE UP THE DROP STRUCTURES. THIS SHALL BE ACHIEVED BY PROVIDING POINTS WHERE VERTICAL DROP IS AS LITTLE AS 6". SEE DETAIL 1, SHEET LP203 FOR DESIGN CRITERIA AND AN EXAMPLE PHOTOGRAPH.
3. TYPICAL DETAILS OF THE DROP STRUCTURES MAY BE FOUND ON THE FOLLOWING SHEETS.
4. FOR THE AREAS ENCOMPASSED BY ARE #3, A MINIMUM OF (2) TWO DROP STRUCTURES SHALL BE INSTALLED. DROP STRUCTURES MUST ADHERE TO THE DETAILS IN THESE PLANS.

RIPARIAN SEED

BOTANICAL NAME*	COMMON NAME	LBS. PLS. PER ACRE
Andropogon gerardii	Big Bluestem Grass	0.90
Becmannia syzigachne	American Sloughgrass	2.52
Bouteloua curtipendula	Sideoats Grama	1.8
Calamovilfa longifolia	Prairie Sandreed	3.6
Elymus lanceolatus lanceolatus 'Critana'	Thickspike Wheatgrass	1.8
Elymus lanceolatus Psammophijilus 'Sodar'	Streambank Wheatgrass	5.4
Glyceria striata	Fowl Mannagrass	2.57
Juncus arcticus	Arctic/Baltic Rush	1.8
Nassella viridula 'Lodorm'	Green Needlegrass	0.90
Panicum virgatum	Switchgrass	2.16
Pascopyron smithii 'Arriba'	Western Wheatgrass	5.4
Poa palustris	Fowl Bluegrass	3.6
Spartina pectinata	Prairie Cordgrass	1.8
Sporobolus airoides	Alkali Sacaton	1.8
		36**

*NOMENCLATURE FOLLOWS CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL
**RATES ARE FOR DRILLED; DOUBLE IF HAND-BROADCASTED

Print Date: 07-24-2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: / Comments / Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
Unit Information Unit Leader Initials		Phone: 719-634-2323 FAX: 719-227-3298	Void:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132		Region 2 DW	

CHAPTER 10 PLANTING			Project No./Code
			IM0252-423
Designer: KRS	Structure Numbers		19039
Detailer: JDA/AM			Sheet Number LP201
	Subset Sheets:		

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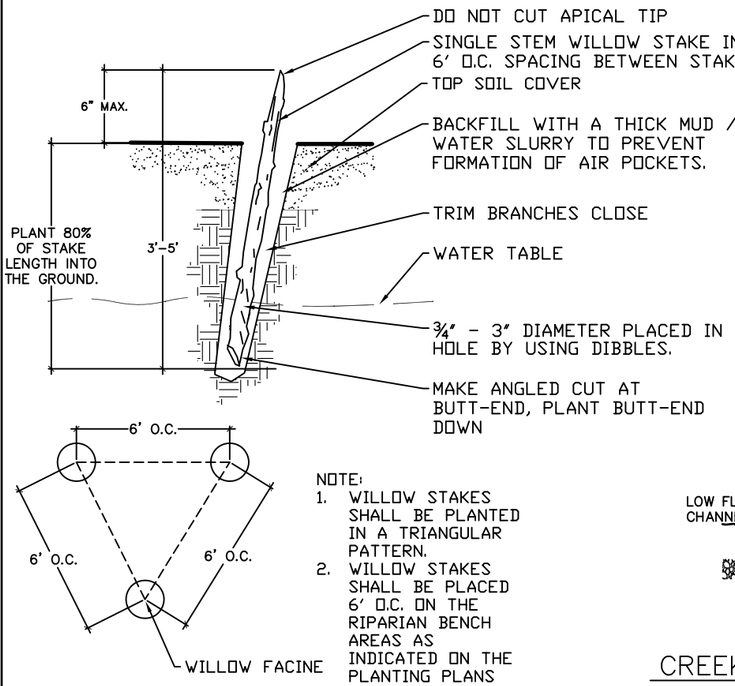
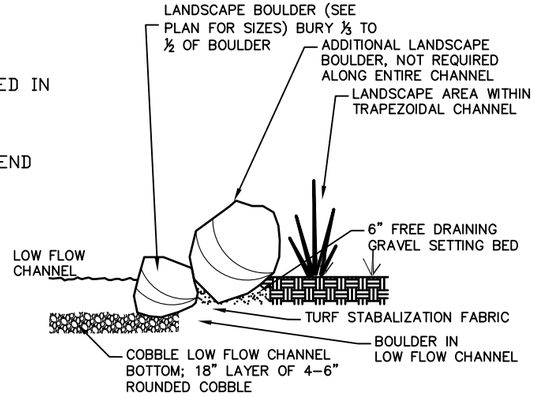


WILLOW CUTTING DETAIL (1)
NOT TO SCALE



CREEK CHANNEL EDGE-BOULDERS (2)
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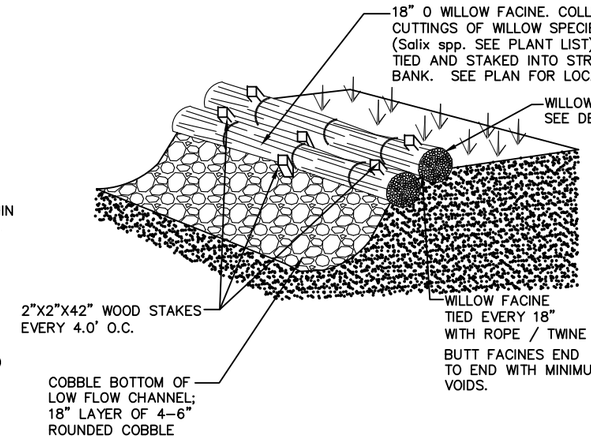
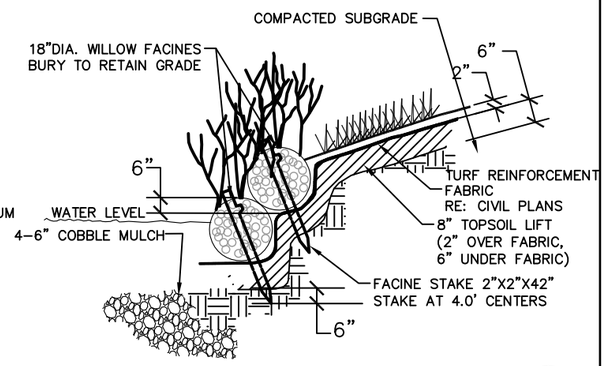
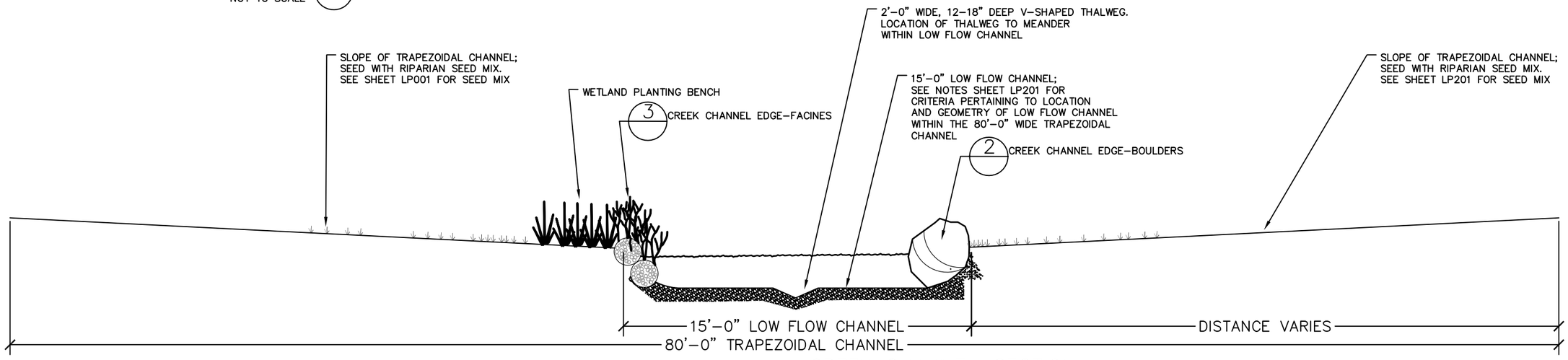


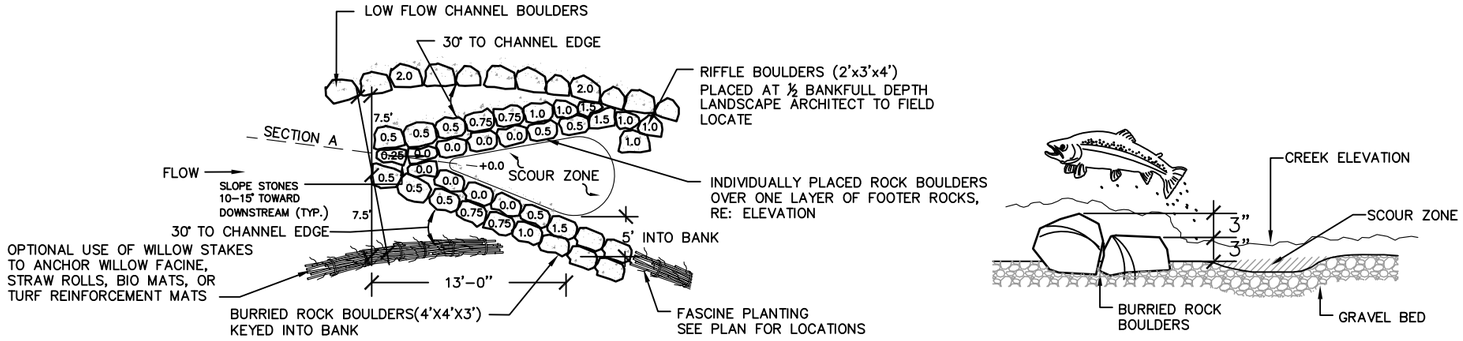
CREEK CHANNEL EDGE-FACINES (3)
NOT TO SCALE





CREEK CHANNEL-SECTION (4)
NOT TO SCALE

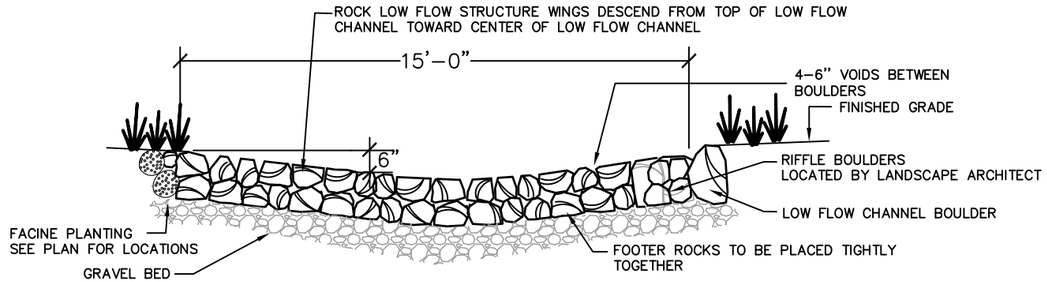
Print Date: 07-24-2014	Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 10 PLANTING		Project No./Code
File Name:	Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:			IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted					Revised:	Designer: KRS	Structure Numbers	19039
Unit Information Unit Leader Initials				Region 2 DW	Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LP202
HK associates Inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132								



TYPICAL ROCK LOW FLOW CHECK STRUCTURE – PLAN SECTION 1

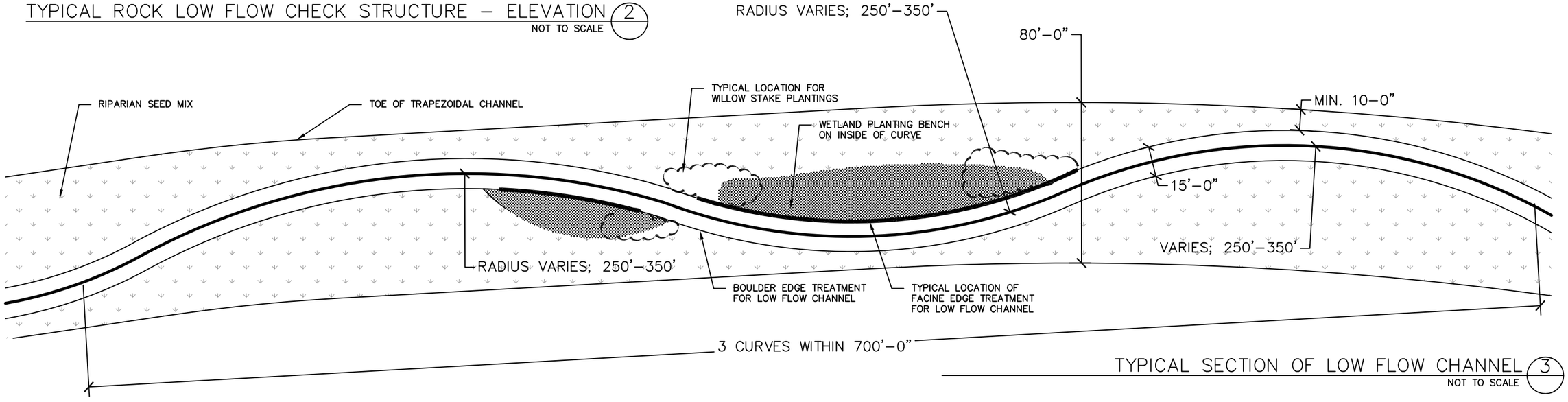
NOT TO SCALE

ROCK LOW FLOW CHECK STRUCTURE – INSTALLED



TYPICAL ROCK LOW FLOW CHECK STRUCTURE – ELEVATION 2

NOT TO SCALE



TYPICAL SECTION OF LOW FLOW CHANNEL 3

NOT TO SCALE

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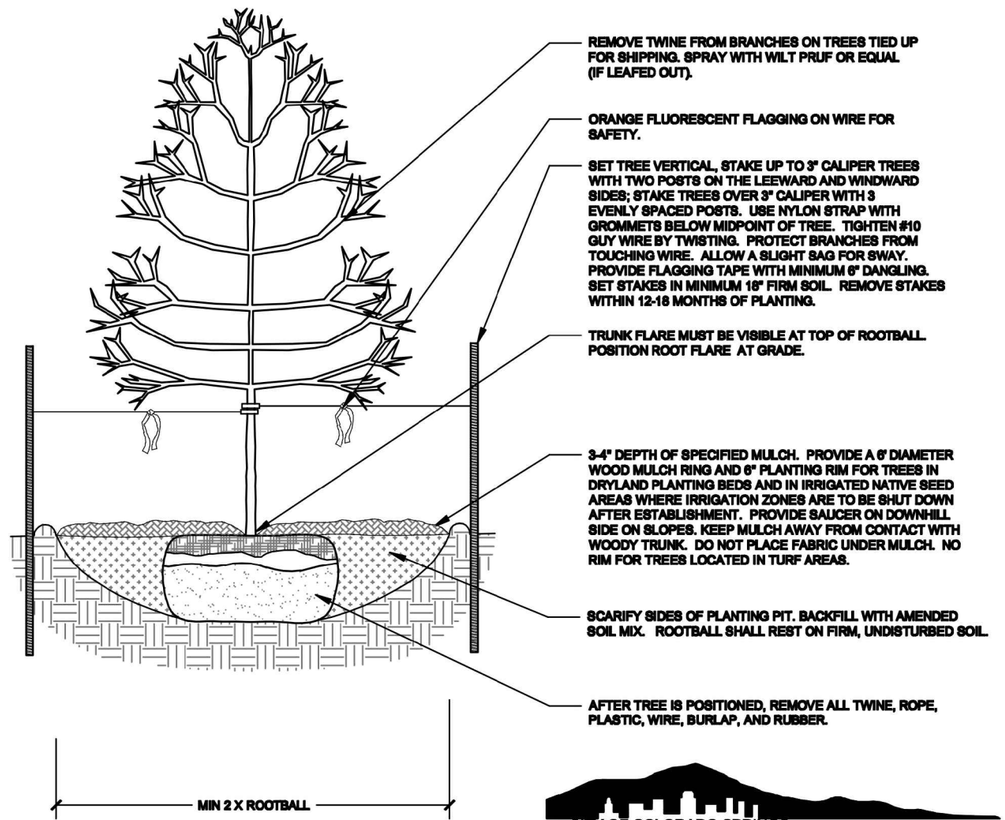
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:			IM0252–423
Horiz. Scale: As Noted Vert. Scale: As Noted					COLORADO SPRINGS, CO 80906	Revised:	Designer: KRS	Structure Numbers	19039
Unit Information Unit Leader Initials					Phone: 719–634–2323 FAX: 719–227–3298		Detailer: JDA/AM		
HK Associates Inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132					Region 2 DW	Void:		Subset Sheets:	Sheet Number LP203

NOTES:

1. MARK THE NORTH SIDE OF TREE IN THE NURSERY, AND ROTATE TREE TO FACE NORTH AT THE SITE WHENEVER POSSIBLE.
2. AT TIME OF PLANTING, DO NOT REMOVE OR CUT LEADER AND PRUNE ONLY DEAD OR BROKEN BRANCHES, CROSS OVER BRANCHES, AND WEAK OR NARROW CROTCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED. HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.
3. STRUCTURAL PRUNING SHOULD NOT BEGIN UNTIL AFTER ESTABLISHMENT PERIOD, USUALLY TWO GROWING SEASONS.
4. KEEP PLANTS MOIST AND SHADED UNTIL PLANTING.
5. DO NOT FERTILIZE FOR AT LEAST ONE GROWING SEASON.
6. AMENDED BACKFILL SHALL BE 1/3 COMPOST (PREFERABLY CLASSIFIED) AND 2/3 NATIVE AND/OR IMPORTED TOPSOIL.
7. WRAP TRUNK ON EXPOSED SITES AND SPECIES WITH THIN BARK. USE ELECTRICAL OR DUCT TAPE, NOT TWINE.
8. COORDINATE WITH CITY FORESTRY FOR CURRENT INSECT AND DISEASE RECOMMENDATIONS PRIOR TO PLANTING.
9. DEEP WATER ALL PLANTS AT TIME OF PLANTING.



CITY OF COLORADO SPRINGS

Rev: 11.13.08

Disclaimer: These planting details are for City review and approval process only and shall not be used for construction or bidding purposes.

1

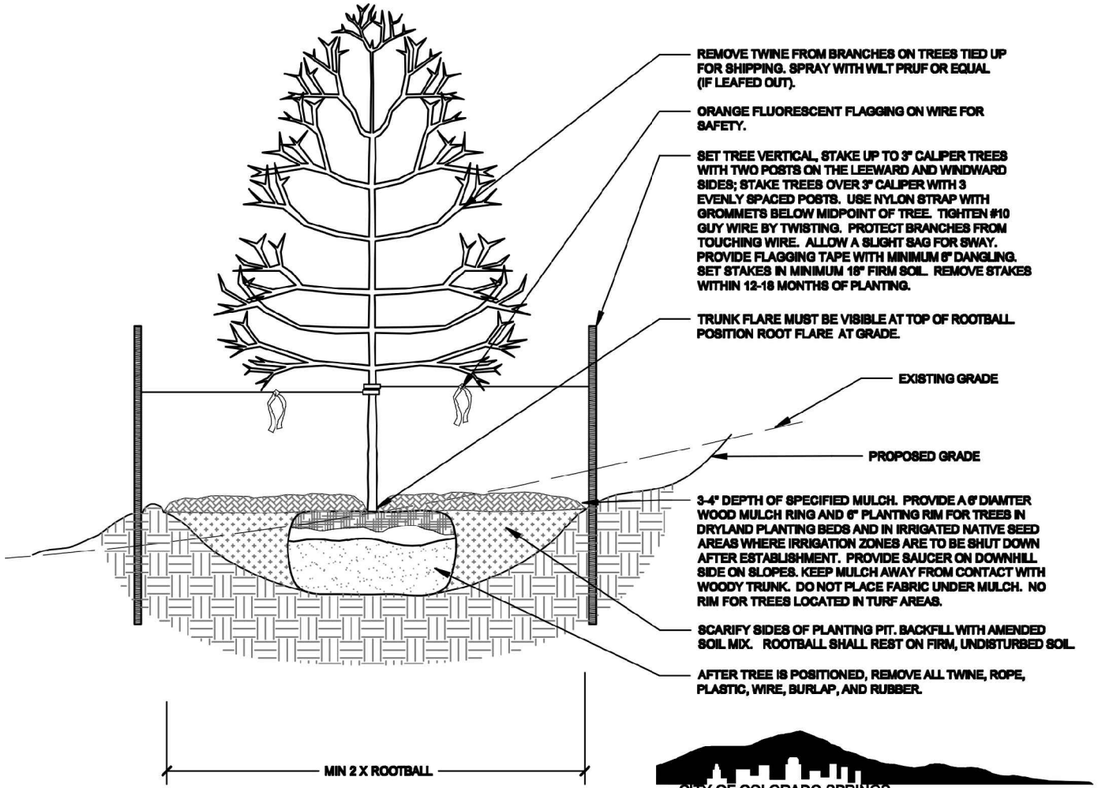
DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

SECTION

NOTES:

1. MARK THE NORTH SIDE OF TREE IN THE NURSERY, AND ROTATE TREE TO FACE NORTH AT THE SITE WHENEVER POSSIBLE.
2. AT TIME OF PLANTING, DO NOT REMOVE OR CUT LEADER AND PRUNE ONLY DEAD OR BROKEN BRANCHES, CROSS OVER BRANCHES, AND WEAK OR NARROW CROTCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED. HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.
3. STRUCTURAL PRUNING SHOULD NOT BEGIN UNTIL AFTER ESTABLISHMENT PERIOD, USUALLY TWO GROWING SEASONS.
4. KEEP PLANTS MOIST AND SHADED UNTIL PLANTING.
5. DO NOT FERTILIZE FOR AT LEAST ONE GROWING SEASON.
6. AMENDED BACKFILL SHALL BE 1/3 COMPOST (PREFERABLY CLASSIFIED) AND 2/3 NATIVE AND/OR IMPORTED TOPSOIL.
7. WRAP TRUNK ON EXPOSED SITES AND SPECIES WITH THIN BARK. USE ELECTRICAL OR DUCT TAPE, NOT TWINE. OCTOBER 31 AND REMOVE MARCH 31 FOR THE PIKES PEAK REGION.
8. COORDINATE WITH CITY FORESTRY FOR CURRENT INSECT AND DISEASE RECOMMENDATIONS PRIOR TO PLANTING.
9. DEEP WATER ALL PLANTS AT TIME OF PLANTING.



CITY OF COLORADO SPRINGS

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2

DECIDUOUS TREE PLANTING ON SLOPES DETAIL

NOT TO SCALE

SECTION

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File Name:		Date:	Comments	Init.	DOT DEPARTMENT OF TRANSPORTATION 1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:			IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted						Revised:	Designer: KRS	Structure Numbers	19039
Unit Information Unit Leader Initials					Region 2 DW	Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LP204
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132									

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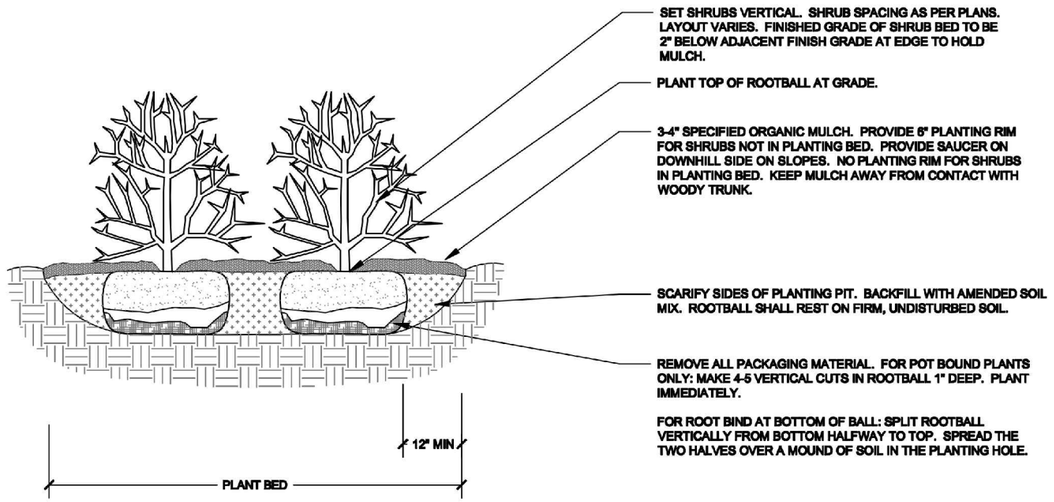
NOTES:
1. PRUNE ONLY DEAD OR BROKEN BRANCHES AND WEAK OR NARROW CROTCHES.
2. KEEP PLANTS MOIST AND SHADED UNTIL PLANTING.
3. DO NOT FERTILIZE FOR AT LEAST ONE GROWING SEASON.
4. AMENDED BACKFILL SHALL BE 1/3 COMPOST (PREFERABLY CLASSIFIED) AND 2/3 NATIVE AND/OR IMPORTED TOPSOIL.
5. ALL SHRUBS IN ROCK AREAS TO RECEIVE SHREDDED MULCH RINGS.
6. DEEP WATER ALL PLANTS AT TIME OF PLANTING.



CITY OF COLORADO SPRINGS Rev: 11.13.08

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1 SHRUB PLANTING DETAIL

NOT TO SCALE SECTION

NOTES:
1. PRUNE ONLY DEAD OR BROKEN BRANCHES AND WEAK OR NARROW CROTCHES.
2. KEEP PLANTS MOIST AND SHADED UNTIL PLANTING.
3. DO NOT FERTILIZE FOR AT LEAST ONE GROWING SEASON.
4. AMENDED BACKFILL SHALL BE 1/3 COMPOST (PREFERABLY CLASSIFIED) AND 2/3 NATIVE AND/OR IMPORTED TOPSOIL.
5. ALL SHRUBS IN ROCK AREAS TO RECEIVE SHREDDED MULCH RINGS.
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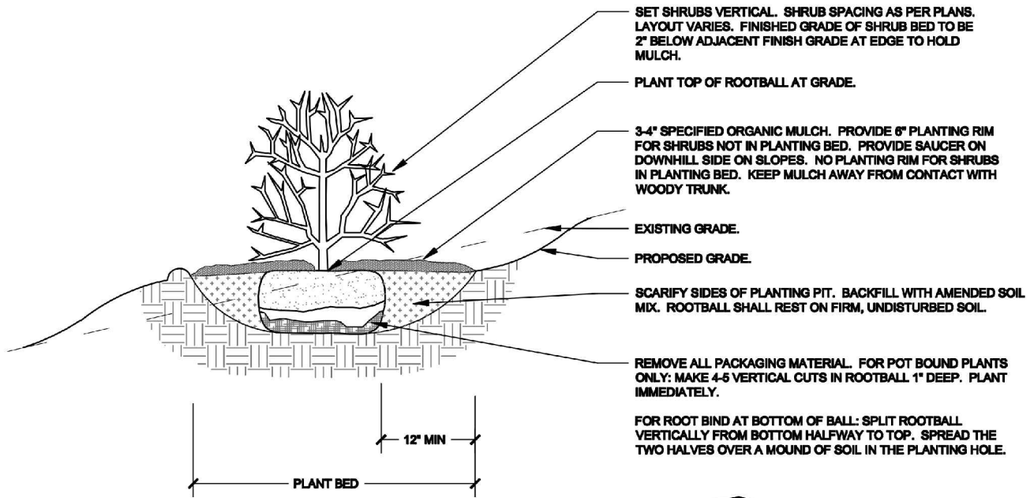

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2 SHRUB PLANTING ON SLOPES DETAIL

NOT TO SCALE SECTION

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Horiz. Scale: As Noted Vert. Scale: As Noted						Revised:	Designer: KRS	Structure Numbers	19039
Unit Information Unit Leader Initials					Region 2 DW	Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LP205
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132									

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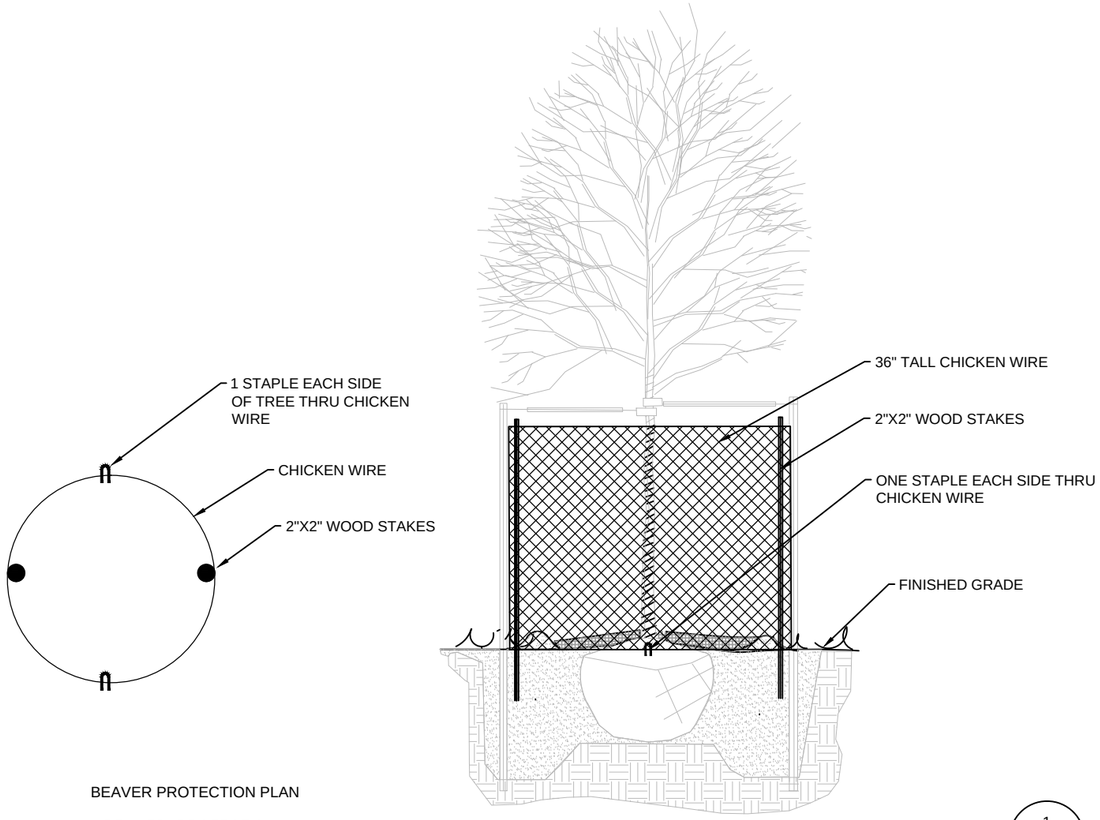

BEAVER PROTECTION PLAN

BEAVER PROTECTION
N.T.S.

1

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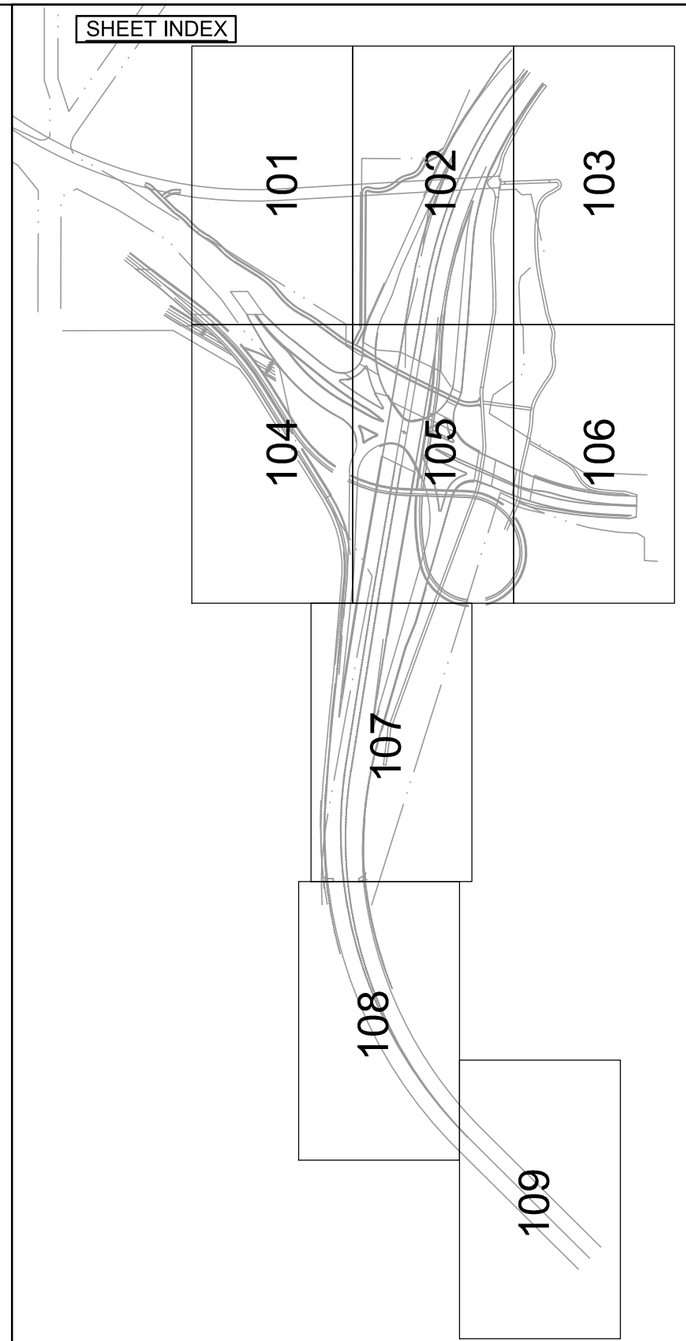
Unit Information Unit Leader Initials					Region 2 DW	Void:	Detailer: JDA/AM	Subset Sheets:	Sheet Number LP206
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132									

SHEET INDEX



CHAPTER 11 - IRRIGATION PLANS AND SPECIFICATIONS

NOTES:

1. CONTRACTOR SHALL COORDINATE USE OF THE EXISTING WATER TAP AND NEW CONTROLLER CLOCK WITH THE CITY OF COLORADO SPRINGS.
2. NON-POTABLE WATER TAP IS LOCATED ON THE EAST SIDE OF INTERSTATE 25, SOUTH OF CIMARRON ST.
3. IRRIGATION SYSTEM SHALL BE NON-POTABLE. ALL IRRIGATION SYSTEM COMPONENTS SHALL BE RATED AND DESIGNED FOR NON-POTABLE USE.
4. CONTRACTOR SHALL COORDINATE THE WORK FOR THE IRRIGATION TAP WITH COLORADO SPRINGS UTILITIES. CONTRACTOR IS RESPONSIBLE FOR ANY SAW CUT AND REMOVAL AND REPLACEMENT OF THE ASPHALT IN ROADWAY.
5. ANY CONNECTION, BACKFLOW, CONTROLLER COSTS FOR THE IRRIGATION SYSTEM SHALL BE INCLUDED IN THE WORK.
6. IRRIGATION ROTOR HEADS ALONG TRAILS SHALL BE LOCATED AT THE BACK OF WALK ALONG THE TRAIL. CONTRACTOR SHALL INSTALL ROTOR NOZZLES OR HEADS THAT MAXIMIZE THE IRRIGATED AREA WITH OUT OVER SPRAY ONTO THE TRAILS OR EXIT RAMPS.
7. ROTOR HEADS SHALL BE PLACED ALONG TRAIL AND A MINIMUM OF 3' OFF THE EDGE OF ROADWAY TO PROVIDE MAXIMUM COVERAGE OF NATIVE SEED
8. ALL TREES, SHRUBS AND ORNAMENTAL GRASSES SHALL HAVE DRIP IRRIGATION.
9. IRRIGATION SYSTEM SHALL BE NEW FROM THE POINT OF CONNECTION.
10. FOUNTAIN CREEK RIPARIAN AREAS (WITHIN THE 80' TRAPEZOIDAL CHANNEL) SHALL BE IRRIGATED BY ROTORS ALONG THE OUTER EDGE OF THE CHANNEL. ROTOR HEADS SHALL NOT BE PLACED WITHIN THE 80' CHANNEL. IRRIGATION WITHIN THE TRAPEZOIDAL CHANNEL IS NOT EXPECTED TO BE HEAD-TO-HEAD COVERAGE.
11. THE INTENT OF IRRIGATING THE NATIVE SEED AREAS IS TO PROVIDE ADEQUATE IRRIGATION FOR ESTABLISHMENT AND FOR SUPPLEMENTAL USE IN DROUGHT YEARS. IF THE CONTRACTOR CAN PROVIDE CONSIDERABLE COST SAVINGS TO THE PROJECT WHILE STILL PROVIDING ADEQUATE IRRIGATION FOR THESE PURPOSES WITHOUT PROVIDING HEAD-TO-HEAD COVERAGE, THIS MAY BE PROPOSED WITH APPROVAL FROM CDOT AND THE ENGINEER.
12. WHERE HEADS ARE TO BE PLACED AT THE TOE OF SLOPES, HEAD LOCATION SHALL ENSURE FULL 360 DEGREE SPRAY PATTERN BASED UPON TRAJECTORY OF HEADS USED.

SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

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CHAPTER 11
IRRIGATION

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SECTION 02810 IRRIGATION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes piping, valves, sprinklers, specialties, controls, and wiring for automatic-control irrigation system.

B. Related Sections include the following:

C. The work shall consist of installing a new underground irrigation system. Included as part of this contract will be provision and installation of all labor, equipment, tools and materials necessary for the construction of the irrigation system per specifications and drawings, including any miscellaneous incidental material required to result in a complete and operable system.

1. Installation of electric pedestal, electric meter and extension of secondary power in order to serve Controller is the responsibility of the Contractor. Owner's Representative will initiate meter service.
2. Water costs for the duration of the Landscape Establishment Period are the responsibility of the Contractor.

D. Work under this section to include provision of all labor, material, permits, and services needed to complete the underground sprinkler system in accordance with the Drawings, General Notes, and Specifications.

1. Provision and installation of incidental equipment of the wet tap and point of connection as required on the Drawings, including a meter pit per City of Colorado Springs Specifications.
2. Provision and installation of subsurface sleeves as required on the irrigation Drawings.
3. Boring beneath existing pavements, which are not to be cut.
4. Saw cutting existing pavements and pavement restoration.
5. Provision and installation of miscellaneous incidental equipment which may not be indicated on drawings but which are required to result in a complete and operable system.
6. Irrigation lines shown on the drawings are diagrammatic. The Contractor shall establish locations of all sprinkler heads, valves, piping, wiring, etc. at the time of construction. Spacing of the sprinkler heads or quick-coupling valves are shown on the drawings and shall not be altered in any manner without the permission of the Owner's Representative.
7. Preparation and provisions of professionally drafted reproducible Mylar full scale as-built Drawings.

1.2 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Irrigation Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under regulated distribution.

D. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. FRP: Fiberglass-reinforced plastic.
3. PA: Polyamide (nylon) plastic.
4. PE: Polyethylene plastic.
5. PP: Polypropylene plastic.
6. PTFE: Polytetrafluoroethylene plastic.
7. PVC: Polyvinyl chloride plastic.
8. TFE: Tetrafluoroethylene plastic.

1.3 PERFORMANCE REQUIREMENTS

A. Location of Sprinklers and Specialities: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. 100 percent water coverage must be maintained in areas where indicated.

B. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:

1. Irrigation Main Piping: 200 psig
2. Circuit Piping: 200 psig
3. Drain Piping: 200 psig

C. Field Verification: All sprinkler heads, control valve locations, and pipeline locations are to be flagged prior to commencing excavation.

D. The services of a professional engineer may be retained at the irrigation contractor's expense to assist in accurate field dimensioning and precise location of sprinkler heads proposed or installation per the Drawings.

E. Minor relocation of equipment, which facilitates the installation, may be made with Owner's approval. Changes shall be made and documented on as-built Drawings.

F. Parallel piping shall not be combined in common trenches.

G. Sprinkler heads, which are adjacent to curbing and pavement, are to be installed no closer than one inch and not further than four inches away from curbing/pavement to accommodate turf-trimming operations.

1.4 SUBMITTALS

A. Product Data: Include pressure ratings, rated capacities, and settings of selected models for the following:

1. Water regulators.
2. Water hammer arresters.
3. General-duty valves.
4. Specialty valves.
5. Control-valve boxes.
6. Sprinklers.
7. Irrigation specialties.
8. Controllers. Include wiring diagrams.
9. Control cables. Include splice kits and conduit.

B. Shop Drawings: Shop Drawings which clearly indicate changes proposed by the installer to pipe routing, sprinkler head placement, valve placement, zone sequencing, etc., which improve operation and serviceability of the system may be provided. The Owner's Representative must approve any deviations in layout prior to construction.

C. Other submittals shall be made in accordance with the contract documents and Requirements at Substantial Completion under this Section.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For irrigation systems, to include in operation and maintenance manuals. In addition to items specified in Division 1 Section “Closeout Procedures Operation and Maintenance Data,” include data for the following:

1. Automatic-control valves.
2. Sprinklers.
3. Controllers.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with the following codes, ordinances, regulations, and standards in effect at time of installation:

1. American Society for Testing and Materials (ASTM).
2. National Plumbing Code (NPC).
3. Federal Specifications (FS).
4. Plastic Pipe Institute (PPI).
5. National Electric Code (NEC).
6. National Sanitation Code (NEC).
7. All State and Local codes for cross connection of potable water systems.
8. All cut-sheets, catalogs, and published data of the manufacturers whose equipment is scheduled for use under this contract.

C. Failure to be familiar with any requirement shall not preclude installer's responsibility to abide by them.

D. In the event of a conflict between requirements, the most stringent requirement will prevail in any case.

E. Qualified personnel who have successfully completed comparable projects previously, and who are knowledgeable and familiar with irrigation system hydraulics shall perform all work under this Section.

F. On-site personnel shall be capable of determining feasibility of proposed installations (with regard to hydraulics). Failure to be familiar with hydraulic feasibility will not preclude installer's responsibility of accidental or deliberate installation of incompatible equipment, pipe sizes, etc., which do not permit operation of system as intended by design.

G. The installer shall field verify static pressure at the point of connection and determine its suitability prior to commencing any work downstream of the backflow preventer.

H. Failure to test and verify adequate static pressure prior to constructing the sprinkler system shall not relieve the installer to provide the adequate operating pressure to provide coverage as intended by design.

I. It is the installer's responsibility to report inadequate static pressure to the Owner's Representative and to correct the problem prior to commencing work downstream of the point of connection.

J. All material for use under this Section to be new and previously unused.

K. The installer shall be responsible for measuring and verifying accuracy of field dimensions versus drawing dimensions. All discrepancies shall be reported to the Owner's Representative and resolved prior to commencing work.

L. Conflicts and/or discrepancies, which are not fully resolved by the installer prior to commencing work under this Section, shall be resolved in favor of the Owner after commencement of work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support the pipe to prevent sagging and bNo PVC piping shall be stored on job site for longer than 90 days.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

B. Notify Owner's Representative no fewer than two days in advance of proposed interruption of water service. Do not proceed with interruption of water service without Owner's Representative written permission.

C. The installer shall be completely familiar with all job site conditions, which may affect the work prior to commencing any work under this Section.

D. No work shall commence until unsatisfactory job site conditions have been brought to the Owner's Representative's attention or otherwise totally resolved.

E. Should the installer fail to resolve job site conditions, which may negatively affect the work under this Section, he shall assume responsibility for subsequent additional work and costs to resolve unsatisfactory job site conditions.

F. Prior to commencing any work under this Section, it will be this installer's responsibility for scheduling and coordinating the locations of all existing utilities on the job site which may affect the work.

G. All known existing utilities shall be clearly indicated on field drawings, and shall be flagged or otherwise marked on the job site.

H. Failure to locate existing utilities and provide adequate protection to them during the work shall not preclude responsibility for subsequent damage.

I. Costs for repair to existing utilities because of failure to properly locate and protect utilities shall be this installer's responsibility. “Utility” shall include but may not be limited to gas, electric, sewer and water, telephone, cablevision lines and sprinkler lines.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements as specified in Section 02751 Cement Concrete Pavement.

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. A minimum of (6), irrigation heads or 2% of amount installed.

1. Spare sprinkler head bodies and nozzles of each type installed.
2. Two spare valve keys for drain valves installed.
3. Two spare quick coupling valve keys suitable for use with valves installed.
4. Two spare swivel hose bibs suitable for use with quick coupling valves installed.
5. Two spare locking valve cap keys.

B. All spare equipment to be new and unused.

C. All Spare equipment to be provided in a new, sealed cardboard plan tube clearly labeled with the job name and “Spare Irrigation Equipment”. Valve keys may be securely taped to the outside of box.

D. Mylar as-built drawing to be provided in a new sealed cardboard plan tube clearly labeled with the job name “Irrigation System As-Built”.

E. Provision of required spare equipment and closet material in format specified above is to occur at inspection for Substantial Completion.

F. Failure to provide spare equipment and closet material in the format and at the time required will result in delay of Final Acceptance of all work provided and installed under this Section.

1. Sprinkler Units: Equal to A minimum of (6), or 2% of amount installed for each type and size indicated, which ever is greater.
2. Emitter Units: Equal to A minimum of (6), or 2% of amount installed for each type and size indicated, which ever is greater.
3. Drip Tube Units: Equal to A minimum of (6), or 2% of amount installed for each type and size indicated, which ever is greater.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

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SECTION 02810 IRRIGATION SYSTEMS

2.2 PIPES, TUBES, AND FITTINGS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.
B. Steel Pipe: ASTM A 53/A 53M, Schedule 40, Type S or E, Grade A or B, galvanized with threaded ends
   1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe with threaded ends.
   2. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface and female threaded ends.
   3. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
   4. Cast-Iron Flanges: ASME B16.1, Class 125.
   5. Cast-Iron Flanged Fittings: ASME B16.1, Class 125 galvanized.
C. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint, bell-and plain-spigot end.
   1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
      a. Glands, Gaskets, and Bolts: AWWA C111, ductile-or gray-iron glands, rubber gaskets, and steel bolts.
D. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint, bell- and plain-spigot end.
   1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
      a. Gaskets: AWWA C111, rubber.
E. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.
   1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings unless otherwise indicated.
   2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
   3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
F. Hard Copper Tube: STM B 88, Type L.
   1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings unless otherwise indicated.
   2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
   3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends
G. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 40.
   1. PVC Socket Fittings, Schedule 40: ASTM D 2466.
H. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 80.
   1. PVC Socket Fittings: Schedule 80.
   2. PVC Threaded Fittings: ASTM D2464.
I. PVC, Pressure-Rated Pipe: ASTM D 2241, PVC 1120 compound, SDR 21.
   1. PVC Socket Fittings: Schedule 40
J. PE, Controlled OD Pipe: ASTM F 771 and ASTMD 3035 PE 3408 compound, DR 9 and DR 11.
   1. PE Socket Fittings: ASTM D 2683.
   2. PE Butt-Fusion Fittings: ASTM D3261
K. PE, Controlled Pipe: ASTM F 771 and ASTM D 3035, PE 3408 compound, DR 9 and DR 11.
   1. Insert Fittings for PE Pipe: ASTM D 2609, PA or PP. Include bands or other fasteners.
L. Transition Fittings: Basic Materials and Methods for transition fittings.
M. Dielectric Fittings: Basic Materials and Methods for dielectric fittings.
N. Furnish all equipment to complete the sprinkler system per the Drawings and Specification
O. Acceptable manufacturers, including alternates, as per the Drawings.
P. Piping:
   1. All PVC piping for all mainlines and lateral lines shall be of the size and classification stated on Drawings.
      a. All piping shall be new and NSF approved.
   2. All mainline PVC pipefittings shall be NSF approved Schedule 40. Unless otherwise indicated on the drawings.
      a. BOE PVC Class 200 mainline pipe shall meet ASTM requirements 3" and larger mainline pipe to be ring-tite gasketed pipe.
      b. BOE PVC Class 200 lateral pipelines shall meet ASTM requirements.
      c. Solvent weld for PVC pipe shall meet ASTM requirements. Cement to be fast set or very fast set.
      d. Teflon based pipe sealant shall be used on all threaded joints.
      e. Pipe shall be homogeneous throughout, free from imperfections, cracks, or holes.
      f. Pipe must be continuously and permanently marked with manufacturer's name or trademark, kind and size (IPS) of pipe, material, and manufacturer's lot number, schedule of type and NSF seal of approval.
   3. Unless otherwise indicated on the Drawings, all sprinkler heads shall be installed on polyethylene swing riser pipe with spiral barb elbows or swing joints as required per the Drawings.
   4. Copper pipe and fittings to be wrought and fastened with silver solder.
Q. PVC sleeves to be Class 200 BOE of the size and length indicated on the Drawings. Low voltage wiring shall be run in separate sleeve from mainline or lateral sleeve. All hard surfaces, that have sleeves under them, shall be stamped with an "S" into the surface on each end of where the sleeve protrudes.
   1. Cast iron sleeves as called for shall be Class 125 of the size and length indicated on the Drawings.

2.3 CORROSION-PROTECTION ENCASEMENT FOR PIPING

A. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch minimum thickness, tube or sheet.

2.4 GENERAL-DUTY VALVES

A. AWWA, Cast-Iron Gate Valves: AWWA C509, resilient-seated nonrising-stem, gray-or ductile-iron body and bonnet gate valve; with bronze and stem nut.
   1. Minimum Working Pressure; 200 psig.
   2. End Connections: Mechanical joint.
   3. Interior Coating: Complying with AWWA C550.
B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," Bottom section with Base of size to fit over valve, and approximately 5-inch-diameter barrel.
   1. Operating Wrenches: Furnish total of one steel, tee-handle operating wrench with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
C. MSS, Cast-Iron, Nonrising Stem Gate Valves: MSS SP-70, Type I, Class 125, with solid wedge and flanged ends. Include all bronze trim, cast-iron body, and hand wheel.
D. Curb Valves: AWWA C800. As indicated on drawings.
E. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over curb valve.
   1. Shutoff Rods: Furnish total of one steel, tee-handle shutoff rod(s) with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.
F. Copper-Alloy Ball Valves: As indicated on drawings.
G. Bronze Gates Valves: As indicated on drawings.
H. Bronze Globe Valves: As indicated on drawings.
I. PVC Ball Valves: As indicated on drawings.
   1. Material Option: MSS SP-122, of plastic other than PVC and suitable for potable water. Include threaded ends and pressure rating not less than 150 psig, unless otherwise indicated.

2.5 SPECIALTY VALVES

A. Electric control valves shall be of the type, size and manufacturer indicated on the Drawings.
B. Unless otherwise indicated on the Drawings, all control valves shall be installed in a globe configuration.
C. Automatic Drain Valves: As indicated on drawings.
D. Quick-Couplers: Factory-fabricated, bronze or brass, one-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASE B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key or as indicated on drawings.

2.6 PIPING SPECIALTIES

A. Water Regulators:
B. Water Hammer Arresters: As indicated on drawings.
C. Pressure Gages: As indicated on drawings.

2.7 SPRINKLERS

A. Description: Brass or plastic housing and corrosion-resistant interior parts designed for uniform coverage over entire spray area indicated, at available water pressure.
   1. Flush, Surface Sprinklers: Fixed pattern, with screw-type flow adjustment.
   2. Bubblers: Fixed pattern, with screw-type flow adjustment.
   3. Shrubbery Sprinklers: Fixed pattern, with screw-type flow adjustment.
   4. Pop-up Spray Sprinklers: Fixed pattern, with screw-type flow adjustment and stainless-steel retraction spring.
   5. Pop-up Rotary Sprinklers: Gear drive, full-circle and adjustable part-circle types.
   6. Pop-up Rotary, Impact Sprinklers: Impact drive, full-circle and part-circle types.
   7. Aboveground, Rotary, Impact Sprinklers: Impact drive full-circle and part-circle types.
B. Pop up Heads:
   Sprinkler heads shall be of the type, size, and manufacturer indicated on the Drawings.
   - Nozzle types and arcs to be provided shall be as indicated on the Drawings to satisfy the coverage requirements intended by the design.
   - Sprinkler nozzles installed on any single zone shall have matched rates of precipitation.
C. Gear Driven Heads:
   All irrigation heads shall be of type, size and manufacturer as designated on drawings. All sprinklers to be installed shall be rubber-covered models, or the heads shall be capable of retracting below finished grade.

2.8 SPRINKLER SPECIALTIES

A. Application Pressure Regulators: Brass or plastic housing, NPS 3/4, with corrosion-resistant internal parts, and capable of controlling outlet pressure to approximately 20 psig.
B. Strainer/Filter Units: Brass or plastic housing, with corrosion-resistant internal parts, of size and capacity required for devices downstream from unit.
C. Emitters: As indicated on drawings.
D. Drip Tubes: As indicated on drawings.
E. Other Equipment:
   1) Other equipment to be provided and installed, including but not limited to valves, gauges, pressure regulating valves needed to result in a complete and operable sprinkler system shall be provided and installed under this Section.
      - Installation of other equipment shall be as indicated on Drawings, and per manufacturer's recommendations.
      - Water meter pits that are used for irrigation systems will use a 30-300 psi. range clay-valve water regulator.
   a. Clay-valve 90-016-2" threaded.
   b. Clay-valve 90-016-3" 150# flange.
   c. Clay-valve 90-016-4" 150# flange.

2.9 AUTOMATIC-CONTROL SYSTEM

A. As indicated on drawings.
B. Exterior Control Enclosures: As indicated on drawings.
C. Interior Control Enclosures: NEMA 250, Type 12, drip proof, with locking cover and two matching keys.
D. Wiring: UL 493, Type UF-B multiconductor, with solid-copper conductors and insulated cable; suitable for direct burial.
   1. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
   2. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.
E. Concrete Base: As indicated on drawings.
F. Automatic controllers shall be of the size, type, and manufacturer indicated in the drawings.
G. Pedestal or cabinet for the controller shall be of the same manufacturer or as indicated in the drawings.
H. PVC conduit of adequate size shall be installed under this Section to enclose all control wiring from controller to master control valve and mainline location.
I. The installer shall provide at least three sets of controller cabinet keys to the Owner's Representative at the time of Final Acceptance
J. Provide and install type UF 600 volt stranded or solid copper, single conductor wire with PVC insulation and bearing UL approval for direct underground burial.

2.10 Backflow Preventer:

A. Backflow preventer to be the type, size and manufacturer indicated on the Drawings, and shall be reduced pressure type rated for high hazard application.
   - Provide and install concrete pad and protective enclosure for backflow preventer or as indicated on Drawings.
B. The installer shall be responsible for coordinating and providing required point-of-connection, tap, meter pit, etc., as needed to complete all work under this Section.
   - Permits, tap fees, and all related fees associated with cross connection needed to complete work under this Section are the installer's responsibility.
   - It is the installer's responsibility to schedule and perform backflow preventer tests that may be required as per local codes. Fees associated with any tests are the installer's responsibility.

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HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132		Region 2 DW			

SECTION 02810 IRRIGATION SYSTEMS

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.
B. Install piping and wiring in sleeves under sidewalks, roadways, parking lots, and railroads as indicated on drawings.
   1. Install piping sleeves by boring or jacking under existing paving if possible.
C. Provide minimum cover over top of underground piping according to the following:
   1. Irrigation Main Piping: Minimum depth of 24 inches below finished grade.
   2. Lateral Piping: **12 inches.**
   3. Drain Piping: **12 inches**
   4. Sleeves: **24 inches for main line and 12 inches for laterals**
   5. As indicated on drawings.

D. Clean cuts shall be made on all severed tree roots greater than 2-inch diameter. If excavation is within drip line of a public tree, City Forestry and Owner's Representative shall be contacted whenever a tree root greater than 2" is encountered under drip line, work is not proceed until City Forester has made a recommendation. Trenches located within five feet of existing tree trunks are to be hand dug. Auguring may be required.
E. This installer shall provide all necessary excavation required for proper installation of work under this Section.
F. Mechanical trenchers used for excavation shall be capable of digging smooth, flat bottom trenches regardless of slope conditions.
G. Sumps for manual drains and control valves shall be over-excavated to facilitate valve installation as shown on drawings.
H. Sleeves crossing beneath roadways shall be installed to the depth of not less than twenty-four inches below finish grade from top of pipe.
I. Concrete curbs above sleeve locations shall be painted or stamped with an "S" to permanently locate sleeve location on existing curbs.
J. Mainline and lateral pipelines shall not be installed in common sleeves. Control wiring must be installed in a separate sleeve.
K. Generally, piping under existing concrete or asphalt shall be installed by jacking, boring or hydraulic driving. Where any cutting or break of concrete or asphalt is necessary, it shall be removed and replaced by the Contractor. Permission to cut or break paved areas shall be obtained from the Owner's Representative.
L. Trenches for irrigation lines shall be excavated of sufficient depth and width to permit proper handling and installation of the pipe and fittings, or the piping may be installed by trenchless technique, if approved by the Owner. The backfill shall be thoroughly compacted, and evened off with the adjacent soil level. Approved fill dirt or sand shall be used if soil condition is determined rocky by Owner's Representative. In rocky areas, the trenching depth shall be two inches (2") below normal trench depth to allow for this bedding. The fill dirt or sand shall be used in filling four inches (4") above the pipe. The remainder of the backfills shall contain no lumps or rocks larger than three inches (3"). The top six inches (6") of backfill shall be free of rocks larger than one (1"", and free from subsoil or trash. All trenches that are opened during any particular working day shall be backfilled the same day.
M. In the event the installer is required to re-route pipe, relocate sprinkler heads, or deviate in any way from the Drawing as a result of encountering consolidated rock or debris, and additional material/labor is required to complete installation, the Owner Representative may issue a change order for additional material and labor costs.
N. Consolidated material shall be defined as any obstruction occurring in an area normally scheduled to be excavated which runs ten feet or longer in any trench, or is greater than twenty-five square feet in area, both at depths less than thirty inches for irrigation pipelines.
O. The installer shall provide a unit cost per linear foot for excavation through consolidated material in his bid to be used in determining change order value.
P. Additional costs for excavating previously known consolidated material shall be the installer's responsibility.
Q. Provide clean backfill soil free of colds and rocks greater than one inch in size, and debris that could puncture and damage pipelines and equipment installed under this Section.
R. Clean sand may be provided and installed as bedding material beneath pipelines to facilitate installation.
S. Backfilling to be done when pipelines are cool to avoid excessive contraction.
T. Frozen or saturated soil is not to be used as backfill at any time.
U. Open trenches and other excavations are to be backfilled with suitable material and compacted to not less than eighty five percent density modified in six inch lifts.
V. Compaction shall only be done with a vibratory plate, jumping jack or trench flooding.
W. After compaction, backfill shall be precisely flush with surrounding finish grades.
X. The installer is responsible for the repair to damaged equipment, finish grades, undermined pavements, sod, mulches and underlayments, etc., from settling of one inch or more in any trench or excavation as a result of work under this Section for a period of not less than two years from date of Final Acceptance.

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Owner's Representative's approval before excavation.

3.3 PIPING APPLICATIONS

A. Install components having pressure rating equal to or greater than system operating pressure.
B. Piping in control-valve boxes and above ground may be joined with flanges instead of joints indicated.
C. Underground Irrigation Main Piping: As indicated on drawings.
D. Lateral Piping: As indicated on drawings.
E. Underground Branches and Offsets at Sprinklers and Devices: Schedule 40, PVC pipe; threaded PVC fittings; and threaded joints.
   1. Option: Plastic piping manufactured for this application may be used instead of pipe and fittings specified.
F. Drain Piping: As indicated on drawings.
G. Sleeves: Class 200, PVC pipe and socket fittings; and solvent-cemented joints.
H. Transition Fittings: Use transition fittings for plastic-to-metal pipe connections according to the following:
   1. Couplings:
      a. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
      b. Underground Piping NPS 2 and Larger: AWWA transition coupling.
   2. Fittings: Underground Piping: Union with plastic end of same material as plastic piping.
   3. Transition fittings are specified in "Basic Materials and Methods."
I. Dielectric Fittings: Use dielectric fittings for dissimilar-metal pipe connections according to the following:
   1. Underground Piping:
      a. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
      b. NPS 2-1/2 and Larger: Prohibited except in valve box.
   2. Piping in Valve Boxes or Vaults:
      a. NPS 2 and Smaller: Dielectric unions.
      b. NPS 2-1/2 to NPS 4 Dielectric flanges.
   3. Dielectric fittings are specified in "Basic Materials and Methods".

3.4 VALVE APPLICATIONS

A. Underground, Shutoff-Duty Valves: Use the following:
   1. NPS 2 and Smaller: Curb stop with tee head, curb-stop service box, and shutoff rod.
   2. NPS 3 and Larger: AWWA cast-iron gate valve with elastomeric gaskets and stem nut, valve box, and shutoff rod.
B. Underground, Manual Control Valves: Bronze globe valve with control-valve box and valve key.
C. Control Valves: As indicated on drawings.
D. Drain Valves: As indicated on drawings.

3.5 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved by Owner's Representative.
B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
C. Install piping free of sags and bends.
D. Install groups of pipes parallel to each other, spaced a minimum of 6 inches to permit valve servicing.
E. Install fittings for changes in direction and branch connections.
F. Install dielectric fittings to connect piping of dissimilar metals.
G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
H. Install ductile-iron piping according to AWWA C600.
I. Install PVC piping in dry weather when temperature is above 40 degree F 5 degree C. Allow joints to cure at least 24 hours at temperatures above 40 degrees F 5 degree C before testing unless otherwise recommended by manufacturer.
J. All installations are to be made in full accordance with the Drawings. Specifications, Local Codes and Ordinances, etc., with the most stringent requirement prevailing at all times in the event of conflict.
K. Generally, no deviations from the layout of pipelines, sprinkler heads, control valves, point of connection, controller locations, or other scheduled installations will be considered or accepted by the Owner's Representative from that indicated on the Drawings.
L. The irrigation installer is not authorized to make minor field adjustments in layout to facilitate minor changes in site layout without prior approval from Owner's Representative.
M. No direct contact between any equipment installed under this Section and other utilities or structures is permitted.
N. Open pipe ends are to be taped or plugged closed at all times to keep out dirt and debris during installation.
O. All pipes are to be flushed with clean water to remove all dirt and debris prior to installing sprinkler heads.

3.6 VALVE INSTALLATION

A. Underground Gate Valves: Install in valve box that is flush with grade.
B. Underground Curb Stops: Install in service box with top flush with grade.
C. Underground, Manual Control Valves: Install in manual control-valve box.
D. All electrical control valves, gate valves, and wire connections are to be housed in control valve boxes with lock-bolt-equipped covers equal to Ametek 10-170-001 and 10-173-134 or Carson 1419E.
   - Valve boxes shall be adequately sized to allow clearance around all valves for servicing and removal without excavation of box, and shall not bear on valve or system pipes.
   - Valve boxes and covers shall be green or black in color and purple for non-potable systems. Valve coverlid shall be etched with the corresponding valve number, controller zone, and stamped "Irrigation Control Valve".
   - Valves shall have a brass tag labeled with etched corresponding controller zone number, as recorded on the as-built Drawings.
E. Drain Valves: Install in control valve box.
F. Electric control valves are to be connected to mainline per the Drawing detail allowing clearance for servicing valve in valve box.
G. Control valves are to be adjusted for optimum flow to provide coverage as intended by design.
H. Quick coupling valves to be installed on PVC swing joint riser assemblies, and are to be installed plumb and one inch above adjacent finish grade or bed mulch.
I. Quick coupling valves and boxes shown next to a control valve on the drawings shall not be installed in same control valve box as control valve. Quick Coupling will be installed in a 6" or 10" round box next to the control valve. As shown on drawings.
J. Control valves and boxes to be installed above aggregate drainage sumps not less than two cubic feet in size.
   - Aggregate to be separated from soil with filter fabric equal to Mirafi or Trevira.
   - Aggregate sumps to be constructed prior to installation of control valve and box; do not attempt to fill valve boxes with aggregate.
   - Valve box interiors to be completely free of standing water, mud, or other debris at all times.
K. Provide and install manufactured valve box extensions as needed to result in box cover being precisely one inch above adjacent finish grades, or flush with top of mulches.

3.7 SPRINKLER INSTALLATION/ALTERNATE EQUIPMENT

A. Flush circuit piping with full head of water and install sprinklers after hydrostatic test is completed.
B. Install sprinklers at manufacturer's recommended heights.
C. Locate part-circle sprinklers to maintain a distance of 6 inches from walls and 2 inches from other boundaries, unless otherwise indicated.
D. Generally, only the equipment appearing on the Drawings will be considered or accepted for installation. The Owner may approve alternate manufacturers for certain equipment.
E. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet.
F. Water Hammer Arresters: As indicated on drawings.
G. Swing pipe risers to be installed and adjusted to result in all sprinkler heads being flush a plumb with finish grades prior to backfilling around heads.
H. No sprinkler head is to be pulled into a plumb and flush position after installing backfill.
I. Backflow preventer to be installed per the Drawings and in full accordance with applicable State and Local code for backflow prevention.
J. Unless indicated otherwise on the Drawings, all backflow preventers shall be reduced pressure type for high hazard service, equal to the 825Y series manufactured by Febco Backflow Prevention Assemblies.
K. Other equipment, miscellaneous products, fittings, etc., which are not specifically indicated on the Drawings but which are required to result in a complete and operable system are to be provided and installed under this Section within the base contract sum.

3.8 AUTOMATIC-CONTROL SYSTEM WIRING INSTALLATION

A. Install control wiring in same trench as irrigation piping. Installer is responsible for sizing all wire in accordance with recognized practice, and shall clearly indicate changes in wire sizes on as-built Drawings. Install wiring in separate sleeve under paved areas if irrigation piping is installed in sleeve.
B. All control wiring is to be installed in mainline trench when possible. All Main lines shall have a common white wire run with them.
C. Wiring to be installed at a depth not less than twenty-four inches. Splices are to be made in valve boxes.
D. No splices are to occur in any sleeve.
E. Multiple wires in trenches are to be banded together at twenty foot intervals, and banded alongside all mainline piping with duct tape.
F. Two yellow spare wires for system expansion shall be pulled to the end points of the mainline, labeled with indelible markings for corresponding controller zone, and installed in control valve boxes.
G. All wire connections to be made with 6T Tan 20111 King wire connectors or approved equal. Wire connection and sealant to be made water-resistant. All splices to be made in a valve box.
H. All wire splices and connections shall be left with sufficient "slack" so that the wire may be brought to the surface without disconnection.
I. Installer shall furnish and install indelible wire markers at the end of each control wire and inside controller cabinet with corresponding controller zone number.

SECTION 02810 IRRIGATION SYSTEMS

3.9 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.10 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.

B. Operational requirements: Indicate safety and emergency precautions, and warn of hazards and improper operations.

3.11 FIELD QUALITY CONTROL/TESTING AND INSPECTION

A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After any electrical circuitry is energized, operate controllers and automatic control valves to confirm proper system operation.

B. Remove and replace units and retest as specified above.

C. After completion of all work under this Section, the installer shall activate the water source and pressurize the mainline to not less than 150 psi., or maximum available pressure if less than 150 psi.

D. The mainline shall remain closed and pressurized for not less than twenty-four hours prior to preparation of the completed system.

E. The installer shall request Owner's Representative to inspect point of connection, and all equipment installed on the mainline. Twenty-four hours notice must be given to Owner's Representative.

F. Inspection at this time is mandatory and Owner's Representative upon successful completion of the pressure test will issue a certificate of approval.

G. After all irrigation piping and risers are connected, and prior to installation of sprinkler heads, control valves shall be opened and a full head of water used to flush out the system. After the system is thoroughly flushed, risers shall be capped and the system pressure tested.

H. At the conclusion of the pressure test, heads shall be installed and tested for operation in accordance with design requirements under normal operating pressure. Adjustments shall be made to eliminate back splash on any building, structures, or fences.

I. After successful completion of the pressurized period and repair to any leaks, and when the system is operating at the pressure intended by design, the installer shall adjust and fine-tune all equipment for optimum performance and coverage as intended by design.

J. When wind conditions are less than five mph, the installer shall adjust all sprinkler head nozzles to provide coverage to areas as intended by design. Over spray onto roadways shall be minimal.

K. All sprinkler heads are to be fully adjusted to be plumb and flush prior to sodding, seeding, and mulching operations.

L. The installer shall assume all liability for sod, seed, and mulch that is installed prior to adjustment, fine-tuning, and functional operation of the sprinkler system.

M. The installer shall assume all liability for manually operating the sprinkler system and furnishing supplemental irrigation to sustain optimum condition of all landscaping should the system not be fully operable prior to installation of landscaping.

N. After the installer has verified that all adjustments and fine-tuning have been adequately performed, the Owner's Representative shall be given two days notice that an inspection for Substantial Completion is requested.

O. The entire installed system shall operate automatically via the controller through entire cycles prior to requesting an inspection.

P. The Owner's Representative inspection for Substantial Completion shall include visually observing the operation of all work provide and installed under this Section.

Q. Any installation, which does not comply entirely with any part of this Section, will be documented in a written punch list.

R. All punch lit items are to be corrected by the installer prior to re-inspection by Owner's Representative.

S. Re-inspection for correction of punch list items for consideration of Final Acceptance will be made within five working days from date of Owner's Representative's first inspection and punch list

3.12 STARTUP SERVICE

A. Engage a service representative to perform startup service.

B. Verify that controllers are installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.

D. Complete startup checks according to manufacturer's written instructions.

3.13 ADJUSTING/WINTERIZATION AND START-UP

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. The installer is responsible for initial programming of controller to operating sequence of all zones shall be per the Drawings.

D. Unless otherwise approved by the Owner's Representative, the operating sequence of all zones shall be per the Drawings.

E. During and up until Final Acceptance, the installer is responsible for making any adjustments that may be required to equipment installed under this Section.

F. It shall be the contractor's responsibility to shut down and winterize the completed irrigation system on a date to be agreed upon by the City of Colorado Springs and the contractor.

G. It shall be the contractor's responsibility to activate the irrigation in the spring after the first winter on a date agreed upon by the City of Colorado Springs and the contractor. Contractor shall verify the correct functioning of the system and repair any leaks at this time.

3.14 CLEANING AND JOB SITE RESTORATION

A. Flush dirt and debris from piping before installing sprinklers and other devices.

B. Prior to Final Acceptance, all areas on the job site in which work under this Section has occurred will be thoroughly cleaned of dirt, unused material, and the installer's installation equipment.

C. Work by other trades, which is damaged or destroyed because of work under this Section, shall be fully restored by this installer as a condition of Final Acceptance.

D. Damage caused by water from the sprinkler system because of incorrect adjustment and controller programming is this installer's responsibility.

E. Sod, trim edges, mulches, pavements, and other existing work which is damaged as a result of work under this Section is to be completely restored as a condition of Final Acceptance of all work completed under this Section.

3.15 DEMONSTRATION/ENACTMENT

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain controller and automatic control valves. Refer to Division 1 Section “Close Out Procedures Demonstration and Training.”

B. During the warranty period, the installer is responsible for all the following:

1. Winterization: Shut off all water sources to system, drain all pipelines, and provide air injection as required to prevent freeze damages to all equipment.
2. Activation: Turn on all water sources to system, charge all pipelines, repair damaged equipment not caused by vandalism, snow removal, or unauthorized winter-use of system, adjust and fine tune all equipment to provide optimum performance.
3. Controller programming: Program controller at frequencies deemed necessary to sustain and promote establishment of landscaping until time of Final Acceptance, shut down controller at winterization, re-program controller at time of activation
4. It is this installer's responsibility to perform seasonal service at the time he deems appropriate to protect his warranty interests.
5. The installer is responsible for damages caused to equipment installed under this Section as a result of his failure to provide seasonal maintenance at the appropriate times
6. The installer may be back charged if the services of others are employed to perform seasonal maintenance, as determined necessary by Owner's Representative.
7. During the warranty period, the installer is responsible for providing labor and material as needed to keep the system completely operable as intended by design.
8. Equipment, which fails to operate as intended by design, shall be repaired and/or replaced by the installer at his expense within twenty-four hours after Owner's notice.
9. Equipment, which is removed from the system for repair, shall be replaced immediately with equal equipment capable of providing uninterrupted operation of the system as intended by design.
10. Should at any time during the warranty period the installer fail to repair/replace equipment after being given reasonable notice from Owner to do so, he may be back charged for any costs incurred by the Owner for needed repairs which must be made by others.

3.16 EXCLUSIONS FROM WARRANTY

A. The following do not constitute valid warranty claims:

B. Vandalism to equipment.

C. Damage to the installed system because of work performed by others in the work area after Final Acceptance.

D. Unauthorized use of the system after installer's completion of winterization.

3.17 REQUIREMENTS AT SUBSTANTIAL COMPLETION

A. At Owner's Representative's inspection for Substantial Completion the installer shall provide Owner's Representative with all of the following:

1. Reproducible full-scale Mylar as-built drawing.
2. Blue line fifty percent reduction of the as-built drawing, enclosed in an envelope for installation inside the controller cabinet.
3. Black one inch size three-ringed binders, indexed and including the following type written data:
4. Warranty statement on installer's letterhead, including date of enactment, emergency contact name and phone number, and FAX telephone number if available.
5. Recommended routine and seasonal maintenance procedures.
6. Operating instructions for automatic controller.
7. Operating Schedule for the initial program entered into the controller at the time of inspection for Substantial Completion.
8. Copies of equipment warranties provided by manufacturers of products installed which are transferable to the Owner.
9. Statement of names and addresses of all local suppliers to the project from which replacement equipment can be obtained.
10. The owner's copy of the current cross connection control device test report.

END OF SECTION 02810 - IRRIGATION SYSTEMS (REVISED 2013)

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Print Date: 07-24-2014	Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 11 IRRIGATION	Project No./Code
File Name:	Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted					Revised:	Designer: KRS Detailer: JDA/AM	Structure Numbers: 19039
Unit Information Unit Leader Initials				Region 2 DW	Void:		Subset Sheets:
HK associates inc. 2953 South Peoria Street, Ste 101 Aurora, Colorado 80014 303-770-7201 FAX 770-7132							Sheet Number LI005

IRRIGATION CONTROLLER REQUIREMENTS

1.0 FIELD EQUIPMENT

1.1 Automatic Controller

A. The irrigation controller shall have a backlit 16 line by 40 character display where information can be viewed on the same screen, with a user interface similar to an ATM design that makes programming intuitive and easy to follow.

B. The controller shall have a 'Finish Times' key whereas the controller will automatically determine each program's ending time in AM or PM and by date, so as the end user can adjust program start times and station minutes when necessary.

C. The controller shall have a 7-day programmable schedule for opening and closing a master valve, one ON time and one OFF time for each of those seven days of the week.

D. When any program starts, the controller shall be able to determine automatically which station at any given moment will take the longest to finish based on the programmed total minutes, cycle minutes, and soak-in minutes and prioritize the start of that station first or now, so as to optimize the time it takes to irrigate all zones, instead of running valves sequentially.

E. The controller shall display a detailed water usage report when a flow sensor is installed, categorizing for each month the usage during scheduled irrigation, during test and manual key operation, when valves are bled manually or when quick couplers or hose bibs are used.

F. The controller shall have an operator-set water window in 10-minute intervals. Irrigation will not continue past a set end time. Remaining run-times will be carried over in a hold-over table to be applied at next scheduled irrigation.

G. The controller shall have a water budget feature that displays monthly water volume allotments in either HCF or gallons for each of the 12 calendar months labeled as January thru December. This monthly guideline shall be calculated three ways, either directly entered, calculated by the controller using a yearly budget and dividing that out amongst the 12 months proportionately using historical ET, or by calculating the monthly numbers using total square footage and a user selected percent of historical ET. If the expected water use for the month exceeds the monthly budget, the user shall be notified with an alarm before the month ends so changes to the program can be made. The controller shall not terminate irrigation automatically in this process.

H. The irrigation controller shall be able to store in memory a history log for each station for the last 30 watering days the following information:

- Time and date irrigation ran
- Number of repeat cycles run
- Programmed minutes and actual minutes run
- Programmed inches and actual inches applied
- Manual & Test minutes
- No Water days programmed
- Hold-Over Time left over after hitting a water window stop time
- Actual GPM flow rate that night compared to Learned or Limit value
- Alert Flags

I. The irrigation controller shall have three separate mainline break settings available for proper flow detection of catastrophic issues without interfering with standard irrigation practices and shall be programmed for 1.) 'during irrigation', 2.) 'master valve override' functions, and 3) 'all other times'

J. The controller shall have flow management capability as a standard feature whereas the controller shall learn each station's expected GPM flow rate automatically at night over several irrigations, and use the mainline GPM capacity programmed, to operate up to four (4) valves at the same time plus the master valve to shorten the water window.

K. The radio remote receiver board shall be built-in the controller allowing the operator with the hand-held transmitter to trouble shoot valves remotely without having to go to the controller. Five user selectable frequencies shall be available and be incorporated into the transmitter to minimize interference. The corresponding radio remote transmitter shall display operational information such as valve on with area description; station expected flow in gpm, current real-time gpm flow rate, and electrical draw in amps. The operator using the hand-held device shall be able to program station minutes, cycle minutes, soak-in minutes, station % of ET, and change station expected flow rates, turn Lights ON/OFF, set NO WATER days by station or program, and manually open or close the master valve.

L. Several controllers, up to twelve shall be able to share one or multiple points of connection with multiple flow sensors and master valves. This option shall allow several controllers without the use of a central control computer to share the irrigation programs and flow information for:

1. Monitoring of system flows.
2. Shortening water windows by maximizing the number of valves on without exceeding system flow capacity.
3. Turning OFF valves with excessive flow rates due to broken lateral lines.
4. Tracking water usage and comparing to a water budget.
5. Eliminating relays when sharing pumps and master valves.

M. The irrigation controller shall have the ability to interface with 3 separate flow sensors with the addition of a -F board.

N. The irrigation controller shall have a 10-year, limited warranty.

1.2 Controller Communication Options

A. The field controller(s) shall be capable of utilizing a single mode or a combination of communication modes such as hardwire cable, standard telephone, Ethernet, wireless Ethernet, point-to-point spread spectrum radio, local radio in the 450-470 MHz range, or GPRS wireless modem application as communication links to the central computer. The field controllers shall be capable of directly receiving, storing, and operating commands downloaded from the central computer.

B. The controller shall be able to utilize a wireless, cell modem in remote areas where an Ethernet connection is not possible for direct communication back to the desktop or laptop computer via the Internet.

C. The controller shall be able to utilize a short-range, spread-spectrum radio in order to communicate with other controllers in line-of-sight proximity providing a reliable communication link instead of a hardwire communication path when sharing data. The spread-spectrum radio option does not require FCC licensing, and offers a secure error correcting frequency hopping radio link immune to outside interference.

1.3 Wall Mount Installation

A. The wall mount configuration shall include a transient protection package consisting of the transient protection board populated with the correct transorb protected terminals according to the corresponding controller station outputs and accessory boards, communication modems, etc as determined by the controller model call out.

B. The wall-mount package shall consist of the controller housed in a weatherproof, lockable powder coat painted stainless-steel cabinet, and consisting of a transient protection board labeled with the appropriate station count and accessory component terminals, housed in a outdoor, weatherproof, and lockable powder coat painted steel cabinet, and an AC line and surge protection on the 110 VAC side.

C. All wall-mount equipment shall be available as a pre-assembled package mounted on a stainless-steel back plate, 22" by 32", including GFI and receptacle, offering a turnkey solution directly from the manufacturer's factory.

1.4 Pedestal Enclosure

A. The enclosure shall be of a vandal and weather resistant nature manufactured entirely of 304-grade stainless steel, and the top shall be 12 gauge and the body 14 gauge. The main housing shall be louvered upper and lower body to allow for cross flow ventilation. A stainless steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment. The stainless steel backboard shall be mounted on four stainless steel bolts that will allow for easy removal of the backboard.

B. The 38-inch height with flip top shall provide easy access for programming from a standing position under normal installations.

C. The pre-assembled vandal resistant enclosure factory pre-assembled and supplied by controller manufacturer shall come complete with lightning and surge protection and all terminals shall be factory labeled. The pre-assembled enclosure shall come provided with an On/Off switch to isolate the controller along with a GFI receptacle. Specific radio antenna(s) shall be pre-mounted and connected on enclosure. The enclosure shall include 2-7/8", 1-1/2" thick, 6-pin cylinder, die-cast steel padlock with unique shackles design.

D. Factory pre-assembled enclosure with controller shall carry a full UL listing.

E. Controller manufacturer shall offer a double-wide pre-assembled enclosure for two controller placements side by side. All necessary wiring between the two controllers in order to share central communications and/or flow and weather data shall be pre-wired by manufacturer for easy installation

F. The factory pre-assembled enclosures shall carry a ten (10) year limited warranty.

1.5 Weather Monitoring

A. The controller shall be able to interface with an on-site ET gage able to measure daily localized, evapo-transpiration and log the amount of inches lost each day without the use of a central computer.

B. The ET measuring device shall be powered by the selected field controller. ET is measured directly in 0.01" increments and pulses from the gage are sent directly to the field controller. The controller shall be able to store and display daily, on-site ET in a 28-day table which is updated every 24 hours.

C. The controller shall be able to receive real-time ET data from computer generated weather data sets based on the latitude and longitude of the controller location, without the use of an on-site ET gage. The manufacturer of the control system shall use the internet to gather ET data from multiple weather sources including National Weather Service, METAR, NOAA and others and shall provide ET weather information without a monthly charge associated for this service.

D. The user shall be able to view over 100 selections of built-in historical ET tables or program monthly historical ET data for a given area directly, to be used as a backup for that night's calculation in case the ET gage malfunctioned or the real-time value sent normally through the Internet failed.

E. The user shall be able to cap the amount of daily ET used by the controller for that night's calculation by selecting a percent of historical ET for the given area to be used instead of the actual ET received.

F. The irrigation controller shall have the capability to calculate station run times using the average of the last 7 days of ET instead of using a single ET value to calculate the next run times.

G. The controller shall be able to interface directly with a tipping rain bucket and shall accurately measure rainfall in 0.01" increments by means of a tipping and emptying device mounted below the center of the collection dish.

H. The rain-measuring device shall be wired using the 60' of 2-conductor cable supplied with the Rain Bucket to the selected field controller. The cable should be installed in conduit and the connections are to be made at a terminal strip inside the enclosure. Maximum length of cable run shall be 200 feet.

I. The irrigation controller shall provide the following programming parameters for rain:

- Stop Irrigation after x.xx inches
- Maximum Rain in One Hour is x.xx inches
- Maximum Rain in 24 Hours is x.xx inches
- Let Rain only build up to x.xx inches

1.6 Flow Monitoring

A. The flow sensor used shall be supplied by the same manufacturer as the irrigation controller.

B. The flow sensor shall wired back to the irrigation controller using two #14 AWG wires, one red, and one black in 1" PVC conduit to connect to the irrigation controller. The maximum wire run between flow meter and controller shall be 2000 ft. The flow meter shall send low voltage digital pulses back to the controller and therefore all electrical connections must be waterproof and be resistant to any moisture entry.

C. It is intended that all wire runs between the controller and flow meter shall be direct pulls and have no splices. If wire splices are unavoidable, they must be installed in a valve box with Spears DS-100 connectors with Spears sealant or 3M Scotchlok No. 3570 connector sealing pack used.

D. Each flow sensor shall have the following characteristics:

1. Housing to be a Sch 80 polyvinyl chloride tee or bronze tee
2. Have a pulsing output that operates at 9VDC and a pulse rate that is proportionate to the GPM
3. Fully compatible with the internal interface at each field controller
4. Powered by the controller
5. Replaceable metering insert
6. Shall feature a six-bladed design with a proprietary, non-magnetic sensing mechanism

2.0 Central Control Software

A. The central control software shall be an intuitive Windows-based menu driven format and shall not conflict with any other software programs running on the same computer.

B. The software shall have two types of user account levels, administrative and standard user whereas the administrator adds users, creates passwords, and sets up access levels for standard users and assigns controllers to users, while the standard user is one who uses the central control software to manage a group of controllers under his charge.

C. The software shall be capable of operating with multiple communication modes and shall allow for mixed modes within the same system, including Local Radio, Spread-Spectrum radio, Ethernet, wireless Ethernet, GPRS, Phone, and Direct Hardwire.

D. The software shall allow for the uploading and downloading of all programs and log data by controller or groups of controllers. All programming shall be capable at the central computer as well as at each individual field controller .

E. The software shall allow direct, real-time access as a direct link to a controller and shall provide a real time view of the controller's display screen and current activity and shall allow the user to test and manually water stations, check for flows, check master valve operation, and turn controllers on or off.

F. The software shall have a back-up and restore feature that allows the user to record and store controller information data on several different storage media types, and retrieve the information when required.

G. The Communications Server Status screen of the software shall provide a useful tool to the end user by providing and viewing what the status is of any one given communication server and it is currently doing.

H. The central software system shall provide a multi-level access control up to four (4) levels for controlling who programs what at each controller. A 3 character password can be sent to each field controller for up to 10 users. The controller shall have the ability to track and report on when an access code or "individual" user logged into the controller, what keys were pushed while there, and when an access code logged out of the controller. These shall be date and time stamped.

I. The software program shall be able to provide and print a built-in water management report including graph depicting by month the amount of irrigation water used compared to a monthly allotment in HCF or gallons, and ET weather demand for the month, with a percent savings without the need to export data to any formatting program in order to produce said reports.

J. The software program shall be able to provide and print a water usage report per station, per controller, per month, per year in gallons or HCF, the total as well as in the following categories: programmed irrigation, test and manual, radio remote usage, and non-controller (quick coupler, hose bib usage, bleeding valves manually, etc.).

Print Date: 07–24–2014		Sheet Revisions			Colorado Department of Transportation
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719–634–2323 FAX: 719–227–3298
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DESIGN BUILD RFP	CHAPTER 11 IRRIGATION		Project No./Code
No Revisions:			IM0252–423
Revised:	Designer: KRS	Structure Numbers	19039
Void:	Detailer: JDA/AM		Sheet Number LI006
		Subset Sheets:	

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IRRIGATION CONTROLLER REQUIREMENTS, CONT.

K. Weather data from an ET gage, Campbell Scientific model 108 weather station, a tipping rain bucket and/or through the Internet weather data network shall be uploaded automatically and re-distributed to all field units. Each individual field controller shall then calculate station run times based on the % of ET dialed in for each station and the programmed precipitation rate for each station.

L. Rain polling shall be a central function used to consistently poll a controller with a tipping rain bucket and to then automatically contact all controllers in a weather share group to run them off, once the minimum of allowable rainfall has been reached.

M. Failure of the central computer system or communication links to the field controller shall not affect normal, water management and/or flow management operation of irrigation controller.

N. The software shall allow all program data, log data, summary data and alert data for each controller to be printed by selecting date ranges by controller, by group, or by user.

O. The software shall have the capability to interface with GIS data and provide an integrated GIS Viewer visually representing user's controllers on a map. Highly customizable, this feature shall show the status of each controller including mainline breaks and flow alerts through the use of color coded icons.

P. An alerts report shall print each day based on operator-set filters. This feature shall print only program changes, communication status and problem flags selected by the operator.

Q. Central software shall have the ability to download all site/controller/station setup data directly into the handheld, radio remote through the use of an infrared cable.

R. Future software upgrades and enhancements to the central control software shall be provided to the end user at no charge.

3.0 Warranty, Service & Training

A. The manufacturer shall provide after-sale support that is a ***no charge*** service whereas on-going training and education shall be provided by factory direct personnel and not by an irrigation distributor representative to the end user(s) using the central control system.

B. The central control manufacturer shall warrant to the purchaser of its manufactured products against defects in material and workmanship for a period of ten (10) years from the date of original purchase by the owner.

C. All peripheral, accessory, and RF equipment such as radio and cell phone modems, ET gages, flow sensors, and rain buckets (but not limited to) and used in conjunction with central irrigation controllers, shall have distinct warranties of their own and should be noted separately from this warranty.

Print Date: 07-24-2014		Sheet Revisions			Colorado Department of Transportation	DESIGN BUILD RFP	CHAPTER 11 IRRIGATION	Project No./Code
File Name:		Date:	Comments	Init.	1480 QUAIL LAKE LOOP, SUITE A COLORADO SPRINGS, CO 80906 Phone: 719-634-2323 FAX: 719-227-3298	No Revisions:		IM0252-423
Horiz. Scale: As Noted Vert. Scale: As Noted						Revised:	Designer: KRS / Detailer: JDA/AM	19039
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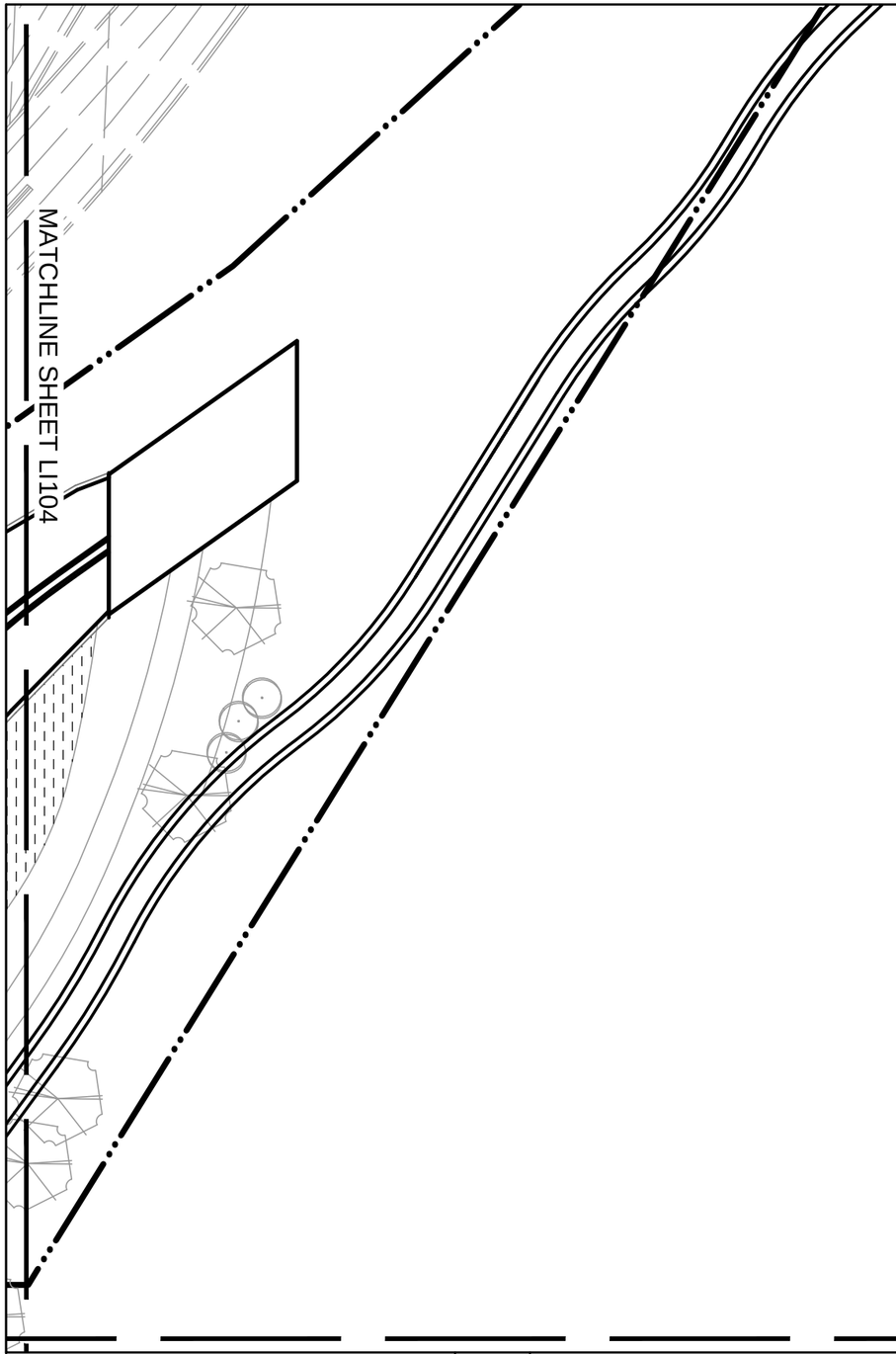
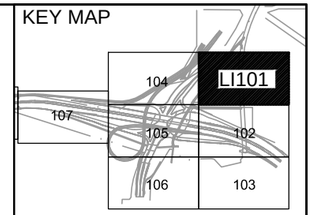


KEY MAP



SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

N SCALE: 1"=80'-0"

0' 40' 80' 160'

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CHAPTER 11
IRRIGATION

Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LI101

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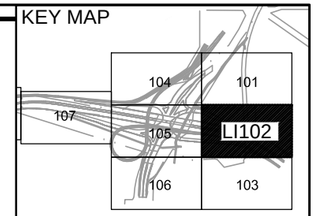
MATCHLINE SHEET LI101

MATCHLINE SHEET LI105

MATCHLINE SHEET LI103

KEY MAP



SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

NOTES:
1. ROTOR HEADS SHALL BE PLACED ALONG TRAILS AND A MINIMUM OF 3' OFF THE EDGE OF PAVEMENT TO PROVIDE MAXIMUM COVERAGE OF NATIVE SEED.
2. ALL TREES SHALL HAVE SEPARATE DRIP IRRIGATION.

N SCALE: 1"=80'-0"

0' 40' 80' 160'

Print Date: 07-24-2014	Sheet Revisions	Colorado Department of Transportation	DESIGN BUILD RFP
File Name:	Date: Comments Init.	1480 QUAIL LAKE LOOP, SUITE A	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted		COLORADO SPRINGS, CO 80906	Revised:
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CHAPTER 11 IRRIGATION		Project No./Code
		IM0252-423
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM		Sheet Number LI102
	Subset Sheets:	

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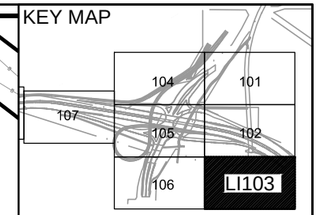
MATCHLINE SHEET LI102

MATCHLINE SHEET LI106

KEY MAP



SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

NOTES:
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CHAPTER 11
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Designer: KRS
Detailer: JDA/AM
Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LI103

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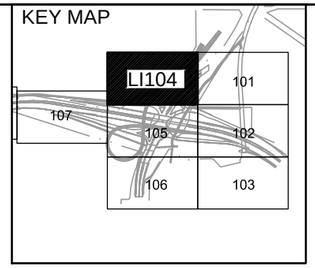
SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

N SCALE: 1"=80'-0"

0' 40' 80' 160'

KEY MAP



NOTES:
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Designer: KRS
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Structure Numbers
Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LI104

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MATCHLINE SHEET LI104

MATCHLINE SHEET LI107

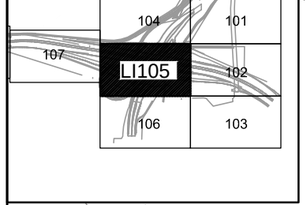
MATCHLINE SHEET LI102

MATCHLINE SHEET LI106

SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

KEY MAP



N

SCALE: 1"=80'-0"

0' 40' 80' 160'

NOTES:

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No Revisions:

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CHAPTER 11
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Designer: KRS
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Structure Numbers

Subset Sheets:

Project No./Code
IM0252-423
19039
Sheet Number LI105

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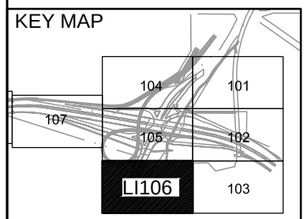
MATCHLINE SHEET LI105

MATCHLINE SHEET LI103

KEY MAP



SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

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CHAPTER 11 IRRIGATION		Project No./Code
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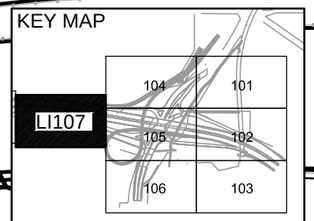
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM		Sheet Number LI106
	Subset Sheets:	

KEY MAP



SHRUB MASSINGS-DRIP IRRIGATE

SEEDED AREAS-ROTOR IRRIGATION
DRIP INDIVIDUAL TREES

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CHAPTER 11 IRRIGATION		Project No./Code
		IM0252-423
Designer: KRS	Structure Numbers	19039
Detailer: JDA/AM		
	Subset Sheets:	Sheet Number LI107

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