



FINAL STORMWATER MANAGEMENT PLAN (SWMP) 65th AVENUE ROAD WIDENING

65th Ave. and US 34 Bypass

Project No. 87-17-006

February 2020

Prepared For:

City of Greeley, Public Works Division, 1000 10th St, Greeley, CO 80631



Prepared By:


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(970) 377-3602

Project Number: 87-17-006



This Stormwater Management Plan (SWMP) has been submitted to the City of Greeley in fulfillment of the City Criteria. Additional erosion and sediment control measures (control measures or BMPs) may be needed if unforeseen problems occur or if the submitted plan does not function as intended. The SWMP has been created for this site and it shall be the obligation of the land owner to follow it until such time as the plan is properly completed, modified, or voided.


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Location

This project is for roadway improvements to 65th Avenue and US Highway 34 Bypass (US34) located in the City of Greeley (City), Colorado. The project encompasses the southern side of Section 16 and the northern side of Section 21, Township 5 North, Range 66 West, of the 6th Principal Meridian, Weld County, Colorado. See Appendix A for the vicinity map.

65th Avenue is a north-south arterial roadway in the south-west area of the City that intersects US34 and is included in the City's Long-Range Expected Growth Area. Residential low and medium density developments exist along the north side of US34 along with a few commercial sites mixed in. South of US34 is high density residential and commercial developments including the Greeley Health Center that opened in 2019. Development directly south of the site and west of 65th Avenue is part of the Saint Michael's Subdivision. Developments north of the site are part of the Peterson Subdivision and West Ridge Annexation.

The existing northern Right-of-Way (R/W) limit of US34 separates the site into lands owned by Colorado Department of Transportation (CDOT), the City, and private owners. Both existing and proposed stormwater drainage routes cross the boundary between CDOT, the City and private owners. The improvements proposed are designed in a way to minimize impacts within the CDOT R/W where possible and reduce stormwater ponding that currently occurs in front-yard swales and landscape areas near the intersection of US34 and 65th Avenue.

Project Description

The proposed improvements located north of US34 will widen 65th Avenue near the intersection with US34 to include two thru-lanes in each direction, bike lanes, two left-turn lanes, and protected right-turn lanes at both corners. Improvements extend 1,100-feet north along 65th Avenue from US34 as improvements transition to match existing. Proposed improvements along US34 include the addition of a westbound acceleration lane with shoulder connecting to the existing protected right-turn lane at 71st Avenue and pedestrian islands at both north corners of the intersection with 65th Avenue. Proposed improvements along frontage road W. 28th Street are re-alignment of the roadway to accommodate the addition of a multi-use trail between 71st Street and 61st Avenue. Improvements also include removing a portion of W. 28th Street between 65th Avenue and the first driveway to the east, eliminating through vehicle traffic east of 65th Avenue at this intersection.

Two locations within the site route stormwater flows across US34 in existing storm pipe systems. The existing storm pipe system at the intersection of 65th Avenue and US34 routes storm flows south into the Saint Michael's detention pond. Connection to this system is proposed with the detention pond outfall. The other existing storm system routes offsite stormwater flows across US34 to the landscape area between US34 and W. 28th Street. These systems are further described and discussed in this project's drainage report. The proposed design relating to both existing storm systems is to improve the site while mimicking historic conditions and creating negligible change to the existing systems.

During the course of the project there will be a total of 8,442 cubic yards of soil excavation. The embankment required to complete the roadway totals 2,258 cubic yards. The total area of land disturbed by the project is approximately 7-acres.

For a detailed layout of existing and proposed drainage basins as well as site information, see Appendix E.

Existing Site Conditions and Wetland Locations

A wetlands delineation for the project site was completed by Auckland Environmental Consulting in April 2017, where it was found that there are no wetlands on site. The site was revisited on February 17, 2019 to check for any changes to environmental conditions and none were identified.

Soils Information

According to the geotechnical report completed by Kumar & Associates in November of 2019, the soil consists mostly of sandy lean clay, silty sand, and clayey sand. Existing soil types on-site consist mostly of sandy loam and are classified as Type A and B soils with some pocket areas of clay soil classified as Type D. See this project's drainage report for the Natural Resources Conservation Services Web Soil Survey maps and soil descriptions for the site. Final Drainage Report for 65th Avenue and US 34 Bypass completed by J-U-B Engineers, dated October 2019.

Neighboring Areas

W. 28th Street is the frontage road along the north side of US34 with residences and business along the north side and landscape with roadside swales along the south side. Most lots along the north side are residential lots that are multi-acre residences without-buildings and a few businesses: The Faith Tabernacle Church, Sirius Fun Doggie Day Care, Pope Farms Produce and Garden Center (Pope Farms), and Mountain View Church. The City anticipates approval of the Farm Preschool development on 6805 W. 28th Street soon which includes demolition of the residence and construction of a business to be completed in 2020. W. 28th Street is a two-lane roadway with no curb and gutter; surface water typically flows to roadside or front yard swales. Refer to this project's drainage report for additional information about the in-site and off-site drainage areas within the project.

Potential Pollution Sources and Prevention

In accordance with Urban Storm Drainage Criteria Manual (USDCM) Volume 3, a list of sources of pollutants and the pollutants associated with the activity is compiled below:

Potential Pollutant Source	Pollutant Associated with Activity
Outdoor Material Storage and Handling	Sediment, Litter, Debris, Nutrients, Organic Matter, Hydrocarbons, Toxics, Chemicals, Paints
Parked Vehicles	Sediment, Debris, Hydrocarbons
Vehicle Fueling	Hydrocarbons
Roads	Sediment, Debris, Bacteria, Hydrocarbons
Waste Storage/Disposal Practices	Sediment, Litter, Debris, Nutrients, Organic Matter, Bacteria, Hydrocarbons, Toxics, Chemicals, Paint
Landscapes	Sediment, Debris, Nutrients, Organic Matter
Storm Drain System	Sediment, Nutrients, Organic Matter

To prevent spills be sure to identify equipment that may be exposed to stormwater pollutants that may be generated and possible sources of leaks or discharges. Perform regular inspections and preventative maintenance of equipment. Make sure employees are trained on inspection, repairs and containment of pollutants to maximize safety.

To properly manage stormwater, make sure materials are handled properly. Keep bulk solid materials such as gravel and topsoil covered and protected from stormwater. If it is practical, store materials on impervious surfaces. Be certain to store all hazardous materials according to local, state, and federal requirements. Adopt procedures to handle any spills that may occur.

Any waste accumulated on site should be disposed of according to federal, state, and local regulations. Waste management BMPs are measures implemented to minimize or prevent contamination of the natural resources present from waste materials. The optimal approach to reduce the potential for stormwater contamination from wastes (such as soil contamination buildup, surface impoundment overflow, or improperly stored solid waste) is to reduce the amount generated and the amount stored on site. BMPs relating to items such as concrete waste, solid waste, sanitary and septic waste (Port-A-Potties), liquid waste, hazardous waste, and contaminated waste shall be used to provide guidance on dealing with wastes.

Any materials that can be safely recycled should be. Recycling containers will be placed next to dumpsters to encourage material recycling. Any common refuse should be disposed of through traditional means. Dumpsters will be placed around the project site to ensure manageable waste disposal. Any toxins on site should be safely handled and disposed of. Toxic material containers shall be placed on site to provide for easy disposal. All traditional dumpsters, recycling containers, and toxin containers shall be checked and emptied periodically to prevent overflow and spills. For more information on disposal of site waste and removal of buildup (including concrete washout waste) consult the Urban Storm Drainage Manual Volume 3.

BMP Maintenance and Schedule

The current condition of the site allows for minimal erosion; however, during construction there will be significant changes made that will require the use of BMPs to protect from stormwater runoff. Prior to the start of construction that is scheduled for Spring of 2020, the contractor will place temporary BMPs to protect existing features. This includes the placement of silt fence, concrete washout areas, vehicle tracking control, and inlet and outlet protection.

As demolition of the roadway begins, the contractor will place vehicle tracking control, concrete washout structures, any additional inlet and outlet protection, and silt fence to minimize erosion as construction proceeds. The placement of these BMPs will evolve as the construction is phased and will require the relocation of some BMPs. Silt fence and permanent seeding are sediment control measures that may be used to prevent erosion. For details on the location of the BMPs throughout the project, see Appendix B for the erosion control sheets and details. Once the proposed storm systems are placed, the contractor will install the permanent outlet protection.

Since this project is projected to take 3.5 months to complete it will be done in stages. BMP's will be utilized and chosen based on the contractor's judgement and/or preference for each stage of construction. During each stage the location and types of BMPs will vary in accordance with the work being performed at each area. The stages are outlined below:

All stages of construction will include roadway improvements; utility installation and grading that connects to existing.

Typical BMPs during these stages includes:

- Inlet Protection
- Silt fence
- Plastic construction fence
- Riprap
- Permanent seeding
- Wattle
- Vehicle tracking control
- Concrete washout area
- Staging and stockpile areas
- Protection of trees

The construction tasks to be completed are:

- Clearing, grubbing and demolition
- Utility installation and relocation
- Storm system including pipe, inlets, FES and riprap
- Private utility company relocations
- Curb and gutter, concrete trail, ramps and driveways
- Final grading
- Final asphalt and concrete paving
- Final stabilization of exposed soil including tackifier, erosion control blankets or permanent seeding

No concrete or asphalt batch plants will be used on the project.

Dewatering is not anticipated for this site. All dewatering activities, including groundwater and discharge sampling, shall comply with Colorado Department of Health and Environment Construction Dewatering Discharges Permit COG070000. Potential dewatering techniques may be found in USDCM Volume 3, SM-9.

Final stabilization is reached when all ground surface disturbing activities at the site have been completed. This includes curb, gutter, sidewalks and asphalt construction which makes up 73% of the project site. Additionally, uniform vegetative cover will have been established with an individual plant density of at least 70% of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed. Refer to project special provisions for seed mix, application rates, soil preparations and amendments.

When the project is finished, the exposed soil will be protected with a combination of tackifier, erosion control blankets and permanent seeding for a period of about 8 months. It is anticipated that construction will finish in summer 2020. All disturbed areas outside of the construction area shall be returned to preconstruction conditions.

The contractor will be responsible for all maintenance and installation of BMPs. The BMPs will be inspected at the end of each workday and within 24 hours of a major storm event. The cost for the BMPs are included in the cost estimate for the project and will be provided by the contractor. All installation and maintenance will be done in accordance with the City of Greeley's standards and the Urban Storm Drainage Manual. For location of selected BMPs please see attached erosion control sheets. For Erosion Control sheets with BMPs and details see Appendix B.

In addition to implementation and operational maintenance of BMPs in accordance with the SWMP, the contractor shall, at a minimum, make a thorough inspection at least once every 14 calendar days. Also, post-storm event inspections must be conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. Provided the timing is appropriate, the post-storm inspections may be used to fulfill the 14-day routine inspection requirement. A more frequent inspection schedule than the minimum inspections described may be necessary to ensure that BMPs continue to operate as needed to comply with the permit.

If no construction activities will occur following a post storm event, post-storm event inspections shall be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event. The occurrence of any such delayed inspection must be documented in the inspection record.

The construction site perimeter, all disturbed areas, material and/or waste storage areas that are exposed to precipitation, discharge locations, and locations where vehicles access the site shall be inspected for evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters. All erosion and sediment control practices identified in the SWMP shall be evaluated to ensure that they are maintained and operating correctly.

All erosion and sediment control practices and other protective measures identified in the SWMP must be maintained in effective operating condition. BMPs that are not adequately maintained in accordance with good engineering, hydrologic and pollution control practices, including removal of collected sediment outside the acceptable tolerances of the BMPs, are considered to be no longer operating effectively and must be addressed in accordance with Part I.D.8 in the permit.

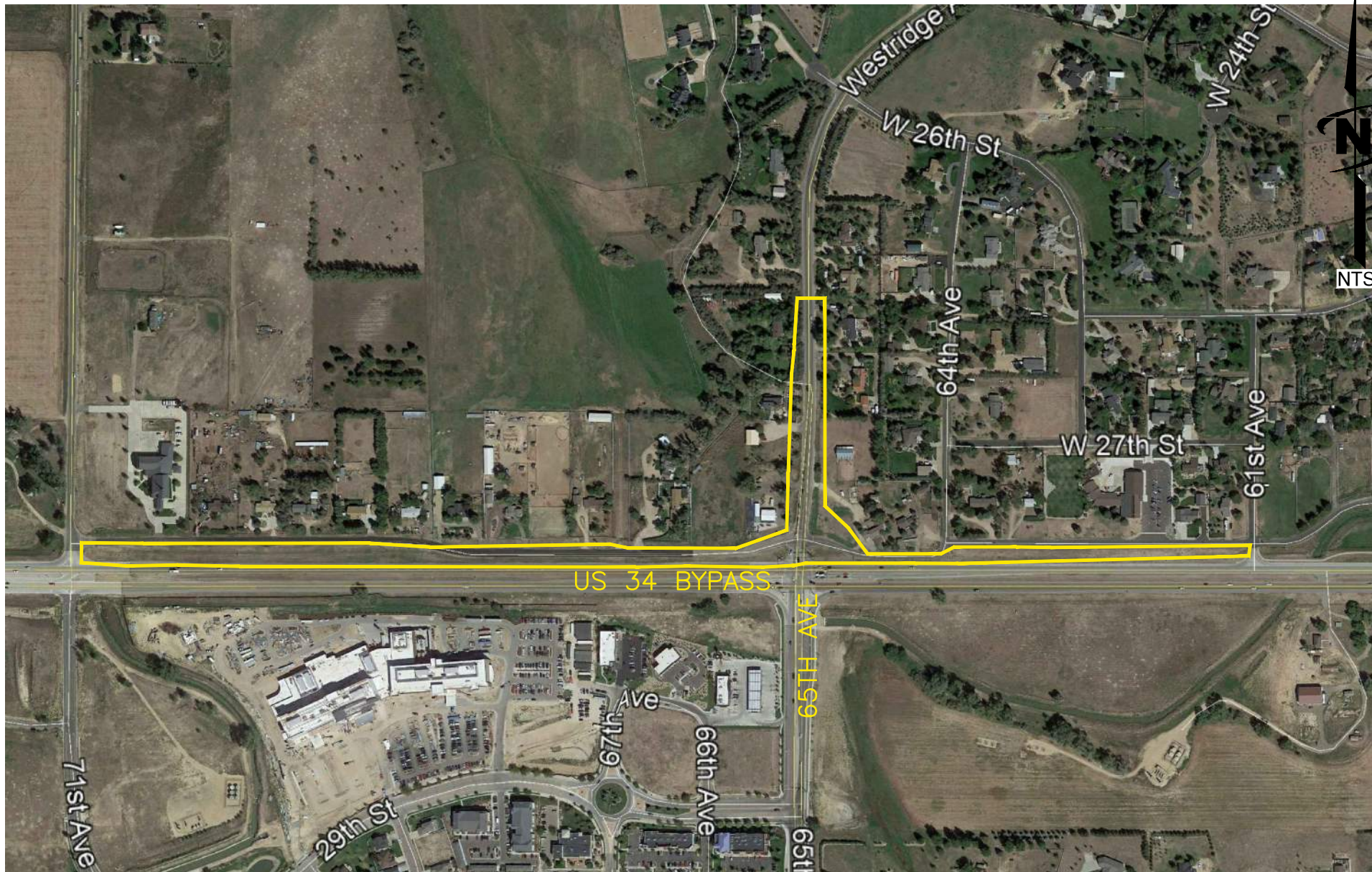
The removal of the BMPs will occur under the following conditions:

BMP	Removal Condition
Rock Sock	Project Completion
Stockpile	Upon the completion of final grading
Inlet Protection	Project completion
Vehicle Tracking Control	After placement of asphalt
Concrete Washout Structure	After median curb and gutter or final concrete pour
Silt Fence	Project completion

APPENDICES

APPENDIX A – VICINITY MAP

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65TH AVE., US 34 BYPASS FRONTAGE ROAD RELOCATION
CITY OF GREELEY

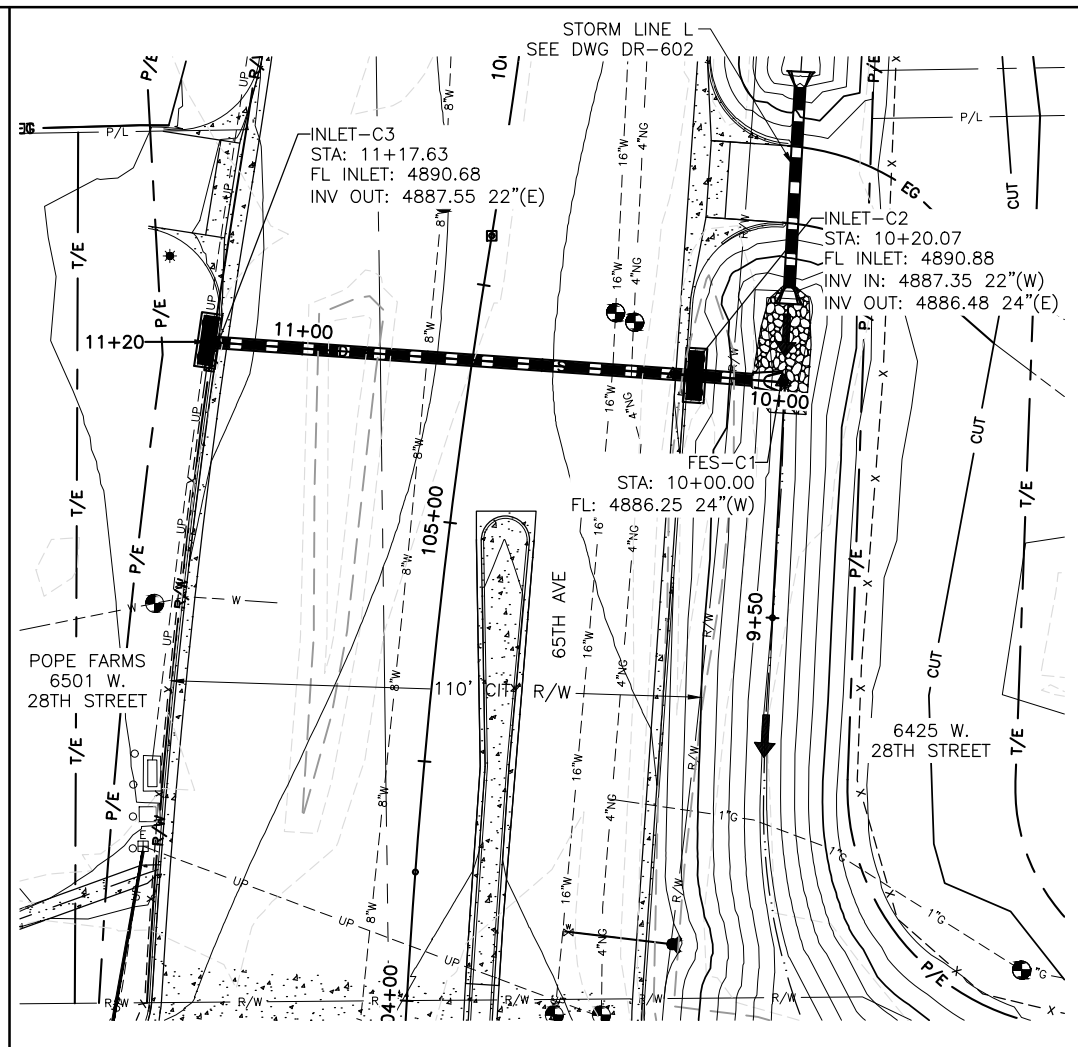
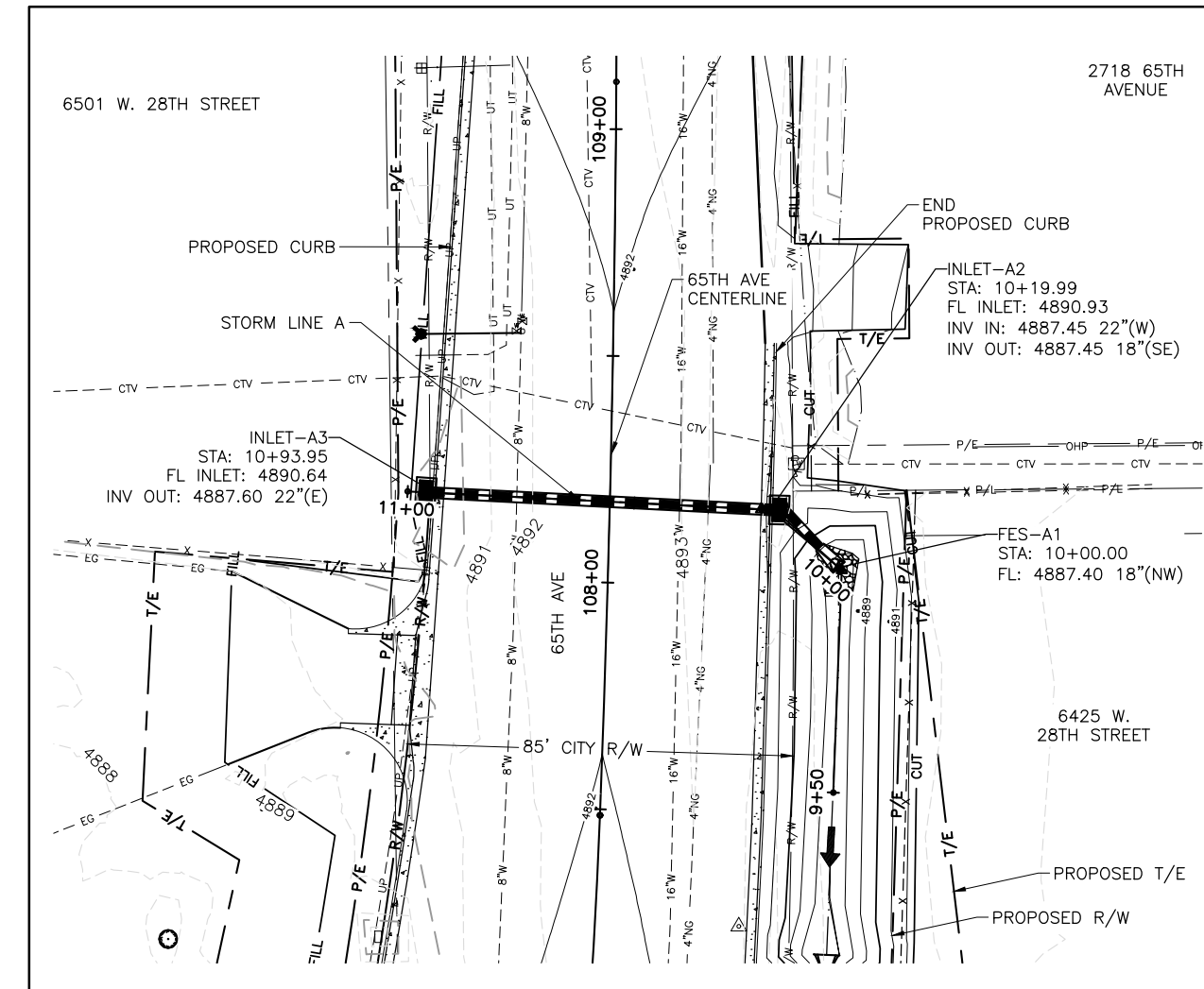


J-U-B ENGINEERS, INC.

VICINITY MAP

LAST UPDATE: 2/1/2019
PLOT DATE: 2/4/2019
FILE: 07-17-2008_VICINITY MAP

APPENDIX B – EROSION CONTROL SHEETS AND DETAILS



HORZ 0 20 40
VERT 0 5 10
SCALE IN FEET

LEGEND:

- 4900 PROPOSED MAJOR CONTOUR
- 4902 PROPOSED MINOR CONTOUR
- 4900 EXISTING MAJOR CONTOUR
- 4902 EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- POTHOLE - SEE UT DRAWINGS

NOTES:

- ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
- INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
- INLET DETAILS SEE DWG DT-1106
- STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
- RIPRAP SIZING & DETAILS SEE DWG EC-710.
- STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

A2 - 5' TYPE R	D2 - TYPE C - MESH
A3 - 5' TYPE R	G1 - TYPE C - MESH
C2 - 10' TYPE R	
C3 - 10' TYPE R	

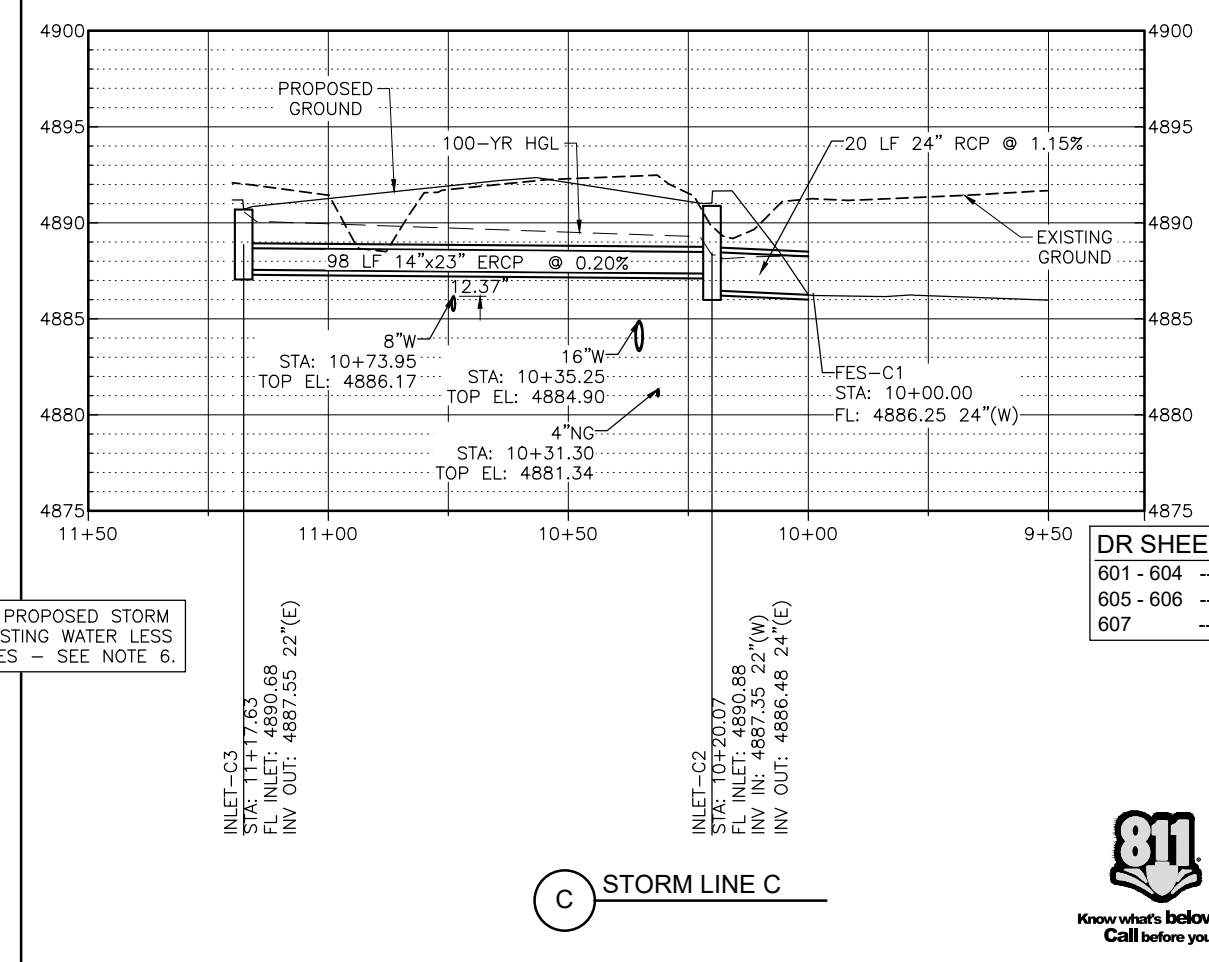
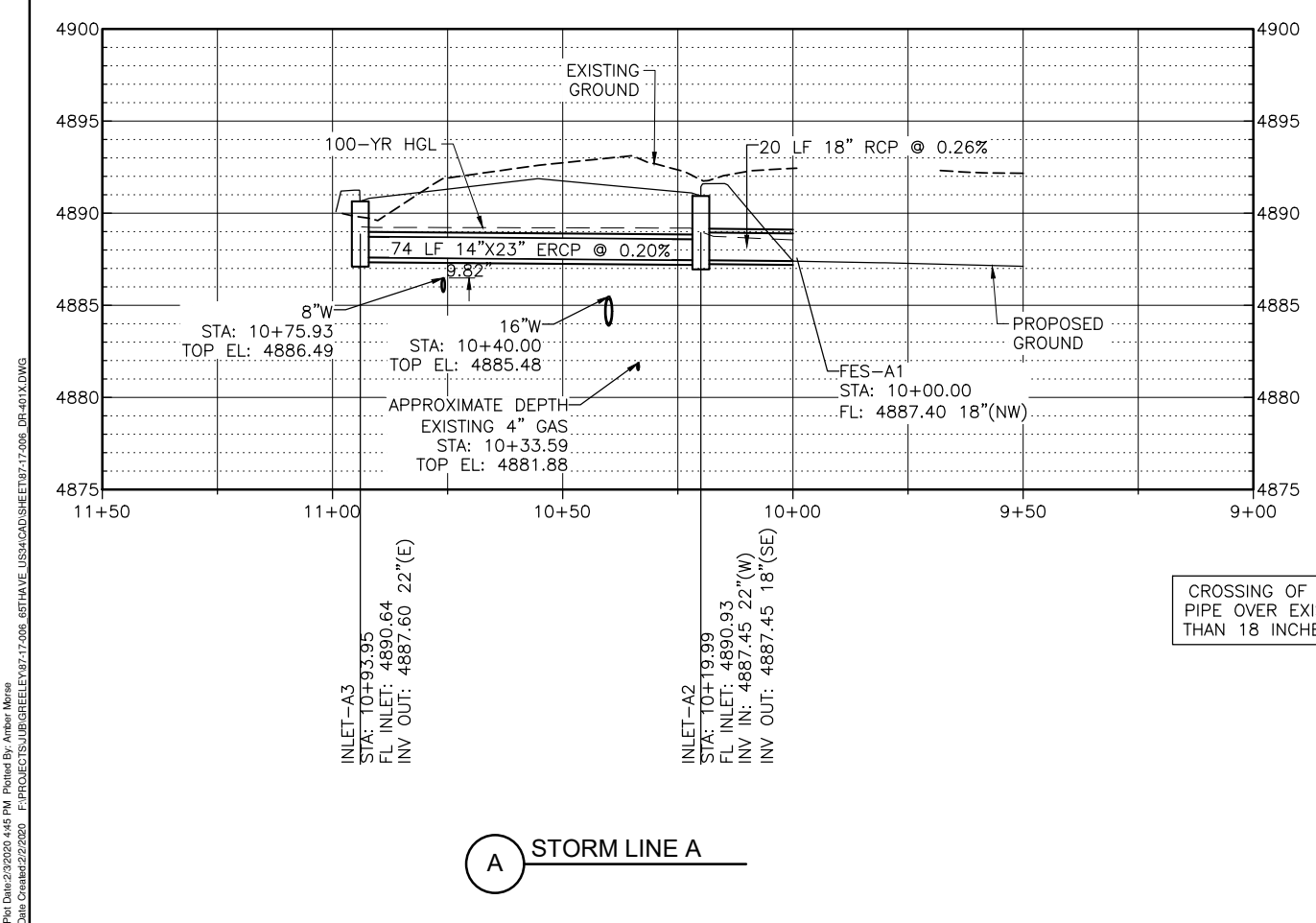
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NO.	REVISION	DESCRIPTION	BY	DATE



CROSSING OF PROPOSED STORM PIPE OVER EXISTING WATER LESS THAN 18 INCHES - SEE NOTE 6.

DR SHEET LIST:

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605 - 606	--	ULTIMATE: E. OF 65TH AVE
607	--	ULTIMATE: W. OF 65TH AVE



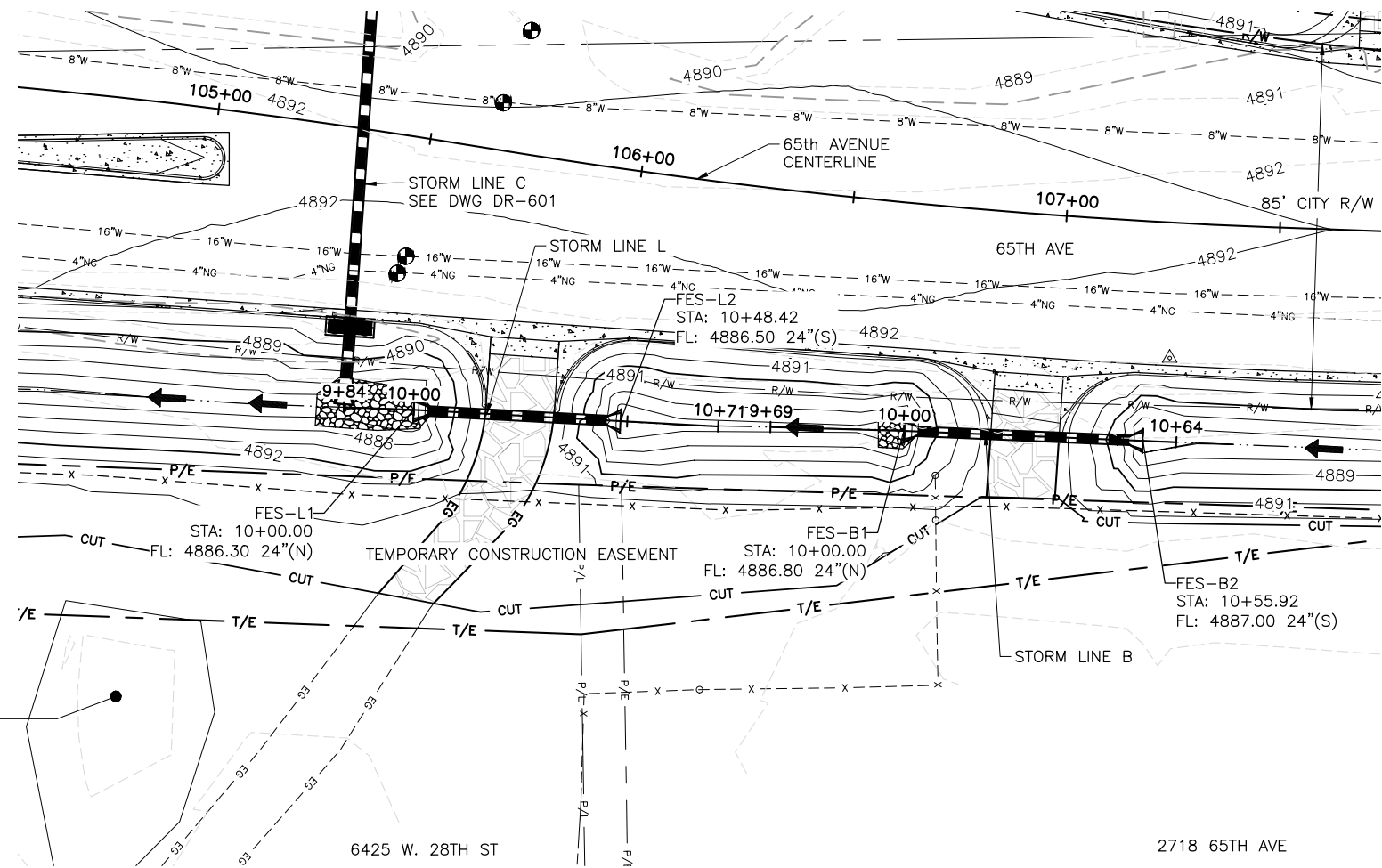
65th AVENUE ROAD WIDENING
CITY OF GREELEY

STORM DRAINAGE PLAN & PROFILE
LINES A & C

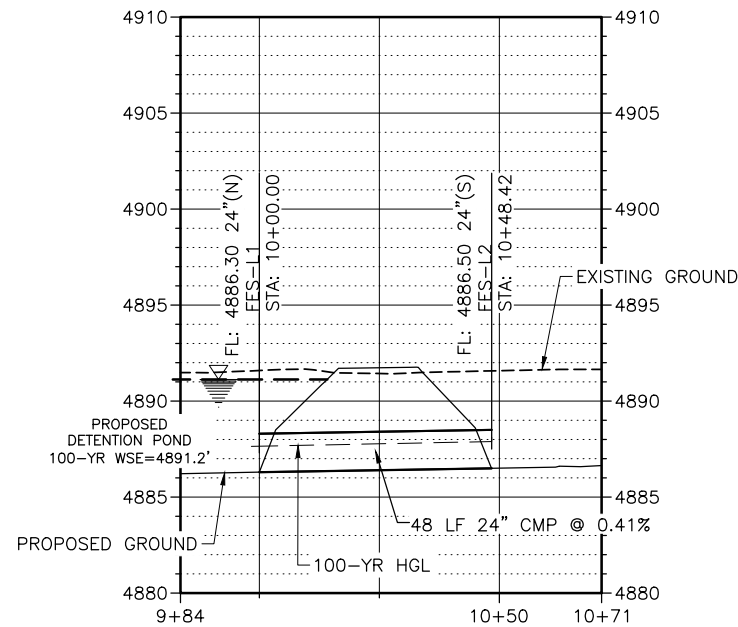
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DESIGN BY: BK
CHECKED BY: ALM
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LAST UPDATED: 2/2/2020
DRAWING NUMBER:
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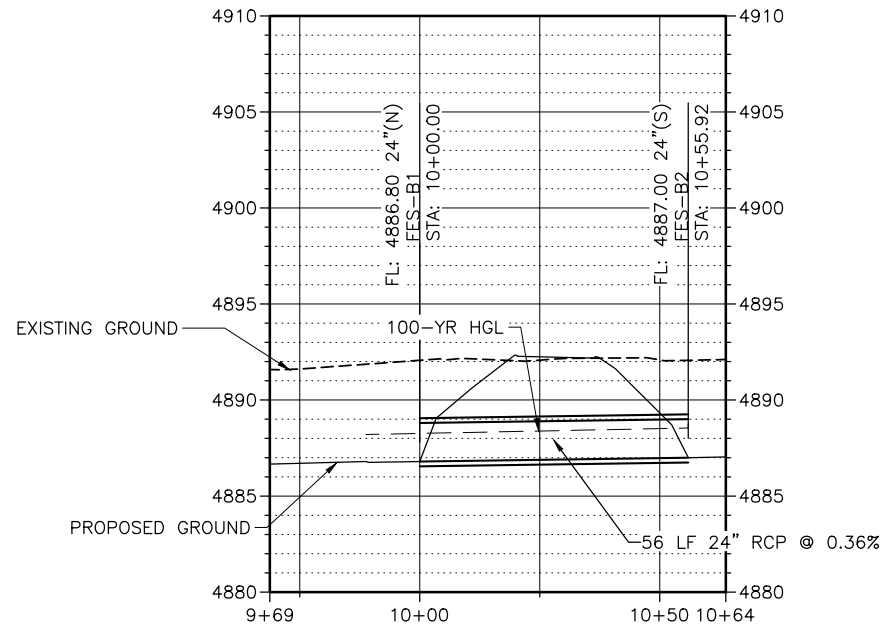
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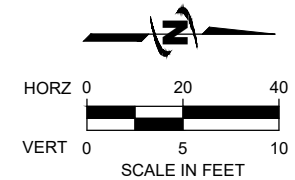
SEPTIC LEACH FIELD (SEE NOTE)



L STORM LINE L



B STORM LINE B



LEGEND:

- 4900 — PROPOSED MAJOR CONTOUR
- 4902 — PROPOSED MINOR CONTOUR
- - - 4900 - - - EXISTING MAJOR CONTOUR
- - - 4902 - - - EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- ⊙ POT HOLE - SEE UT DRAWINGS

NOTES:

1. ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
2. INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
3. INLET DETAILS SEE DWG DT-1106
4. STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
5. RIPRAP SIZING & DETAILS SEE DWG EC-710.
6. STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

- A2 - 5' TYPE R
- A3 - 5' TYPE R
- C2 - 10' TYPE R
- C3 - 10' TYPE R
- D2 - TYPE C - MESH
- G1 - TYPE C - MESH

LEACH FIELD NOTES

1. ALL PRIVATE LOTS WITHIN AND NEAR THE SITE HAVE A PRIVATE SEPTIC SYSTEM. UNDERGROUND GRAVITY SEWER DOES NOT EXIST IN THIS AREA.
2. CONTRACTOR SHALL USE CAUTION WHEN WORKING ON ALL PRIVATE LOTS WITHIN THE SITE TO NOT DAMAGE ANY PRIVATE SEPTIC SYSTEM. LOTS THAT HAVE BEEN IDENTIFIED TO HAVE A SEPTIC SYSTEM COMPONENT THAT MAY BE CLOSE TO CONSTRUCTION ACTIVITY ARE 6501 W. 28TH STREET AND 6425 W. 28TH STREET. SEPTIC SYSTEM HAVE BEEN LOCATED AT THE BACK OF BUILDING ON 6501 W. 28TH STREET AND IN THE SOUTHWEST OPEN SPACE AREA OF 6425 W. 28TH STREET. CAUTION SHALL BE USED WHEN WORKING ON UTILITIES AND PROPOSED DETENTION POND ON AND NEAR 6425 W. 28TH STREET.

DR SHEET LIST:

- 601 - 604 --- 65TH AVENUE & POND
- 605 - 606 --- ULTIMATE: E. OF 65TH AVE
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CITY OF GREELEY PUBLIC WORKS
 Engineering Division
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 Greeley, CO 80631
 Phone: 970.377.3602

BID SET

NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
 CITY OF GREELEY
 STORM DRAINAGE PLAN & PROFILE
 LINES B & L

FILE : 87-17-006 DR-602X
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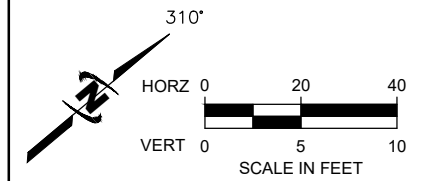
65th AVENUE ROAD WIDENING
CITY OF GREELEY
STORM DRAINAGE PLAN & PROFILE
LINE D

DR SHEET LIST:

601 - 604	65TH AVENUE & POND
605 - 606	ULTIMATE: E. OF 65TH AVE
607	ULTIMATE: W. OF 65TH AVE

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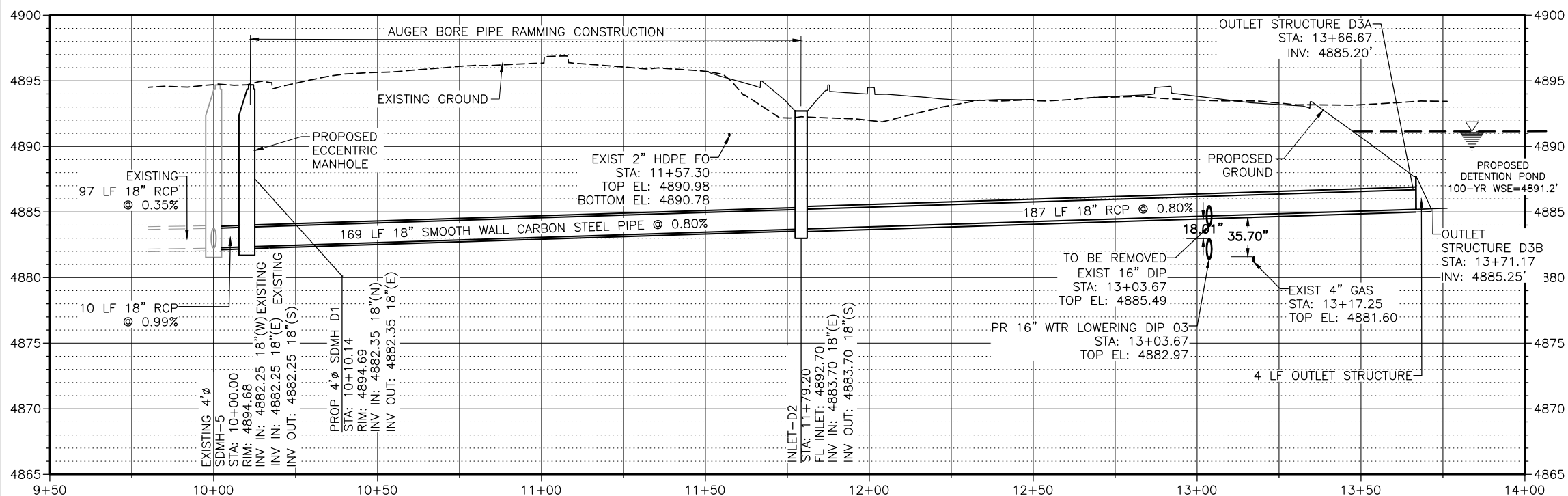
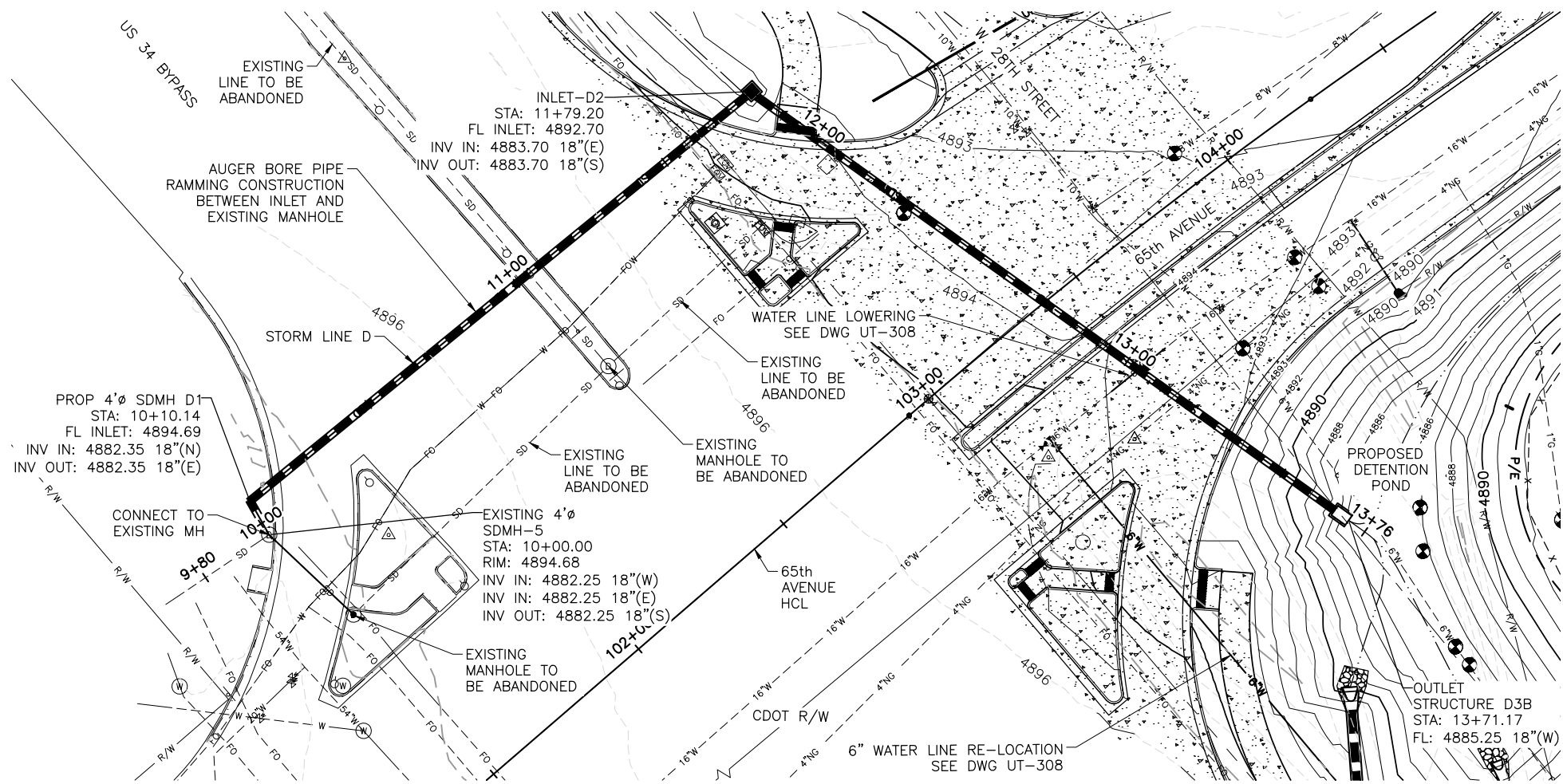
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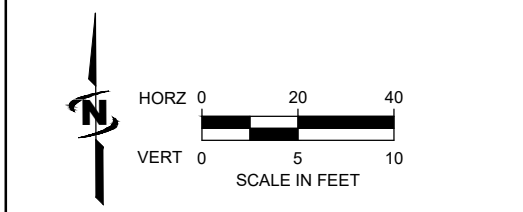
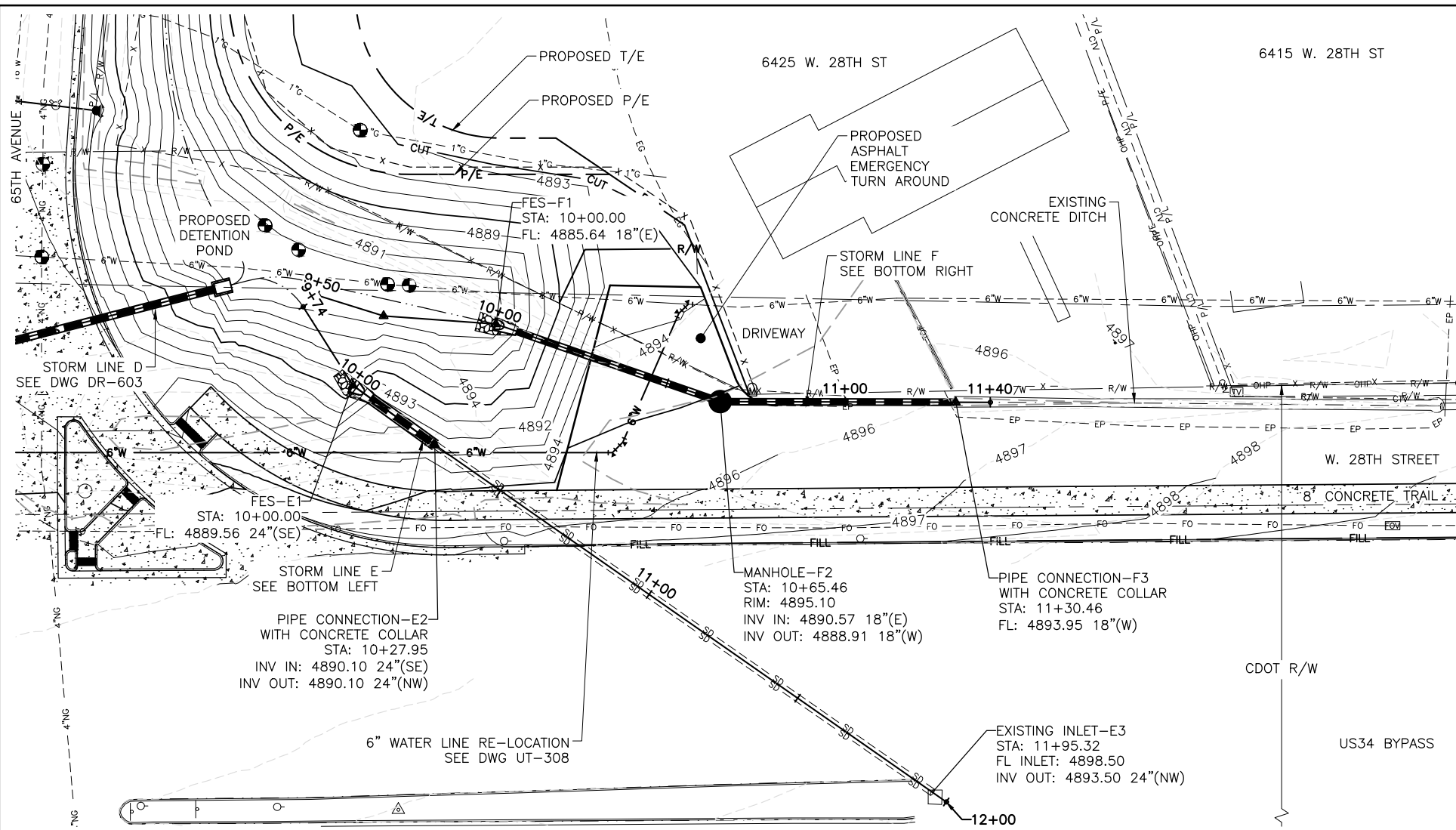
OUTLET STRUCTURE WITH ORIFICE PLATE DETAIL ON SHEET DT-1106

DR SHEET LIST:

601 - 604	65TH AVENUE & POND
605 - 606	ULTIMATE: E. OF 65TH AVE
607	ULTIMATE: W. OF 65TH AVE

CROSSING OF PROPOSED STORM PIPE OVER EXISTING WATER LESS THAN 18 INCHES SEE NOTE 6.



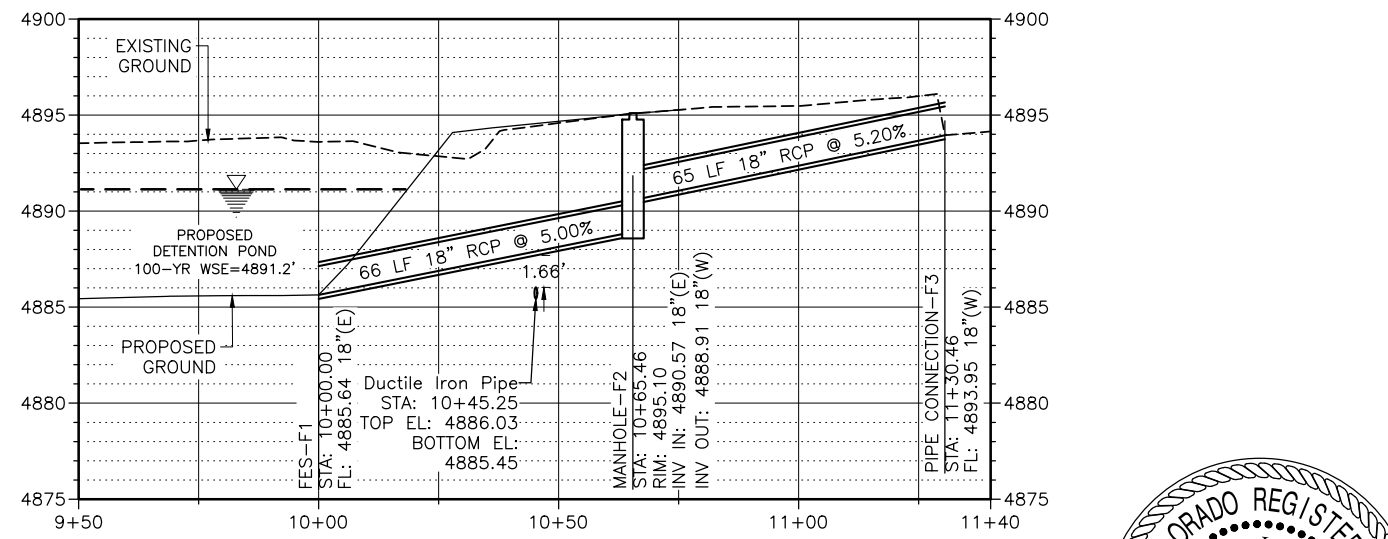
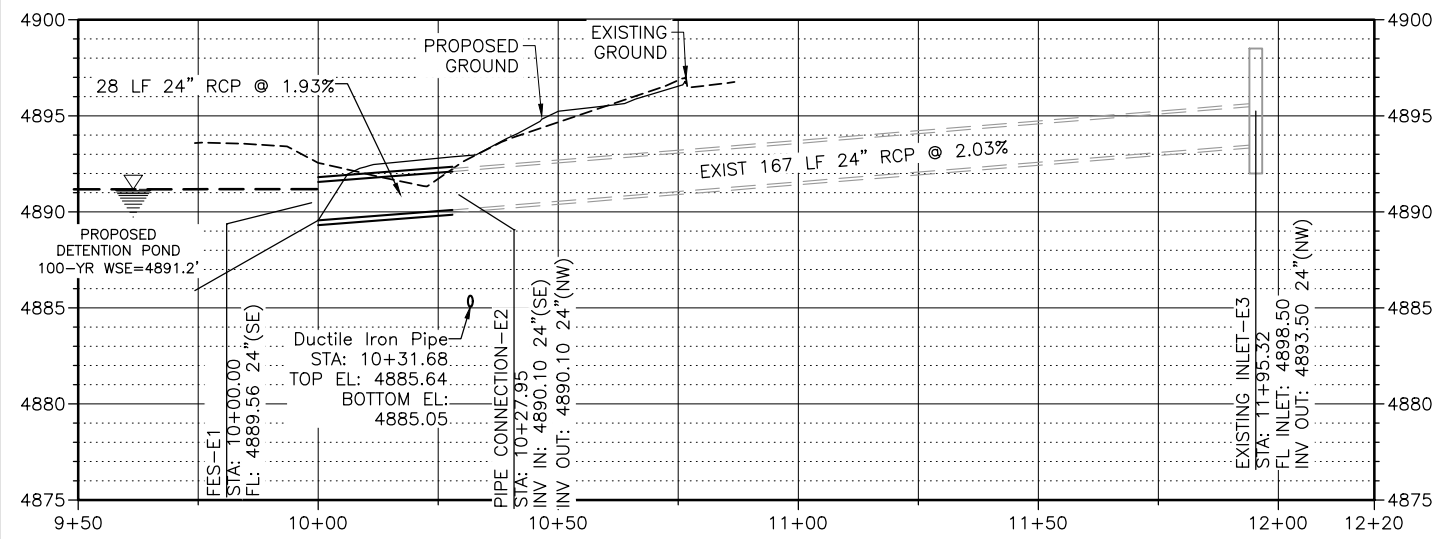


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 - EG 89.56 EXISTING GRADE SPOT ELEVATION
 - POTHOLE - SEE UT DRAWINGS

- NOTES:**
1. ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
 2. INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
 3. INLET DETAILS SEE DWG DT-1106
 4. STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
 5. RIPRAP SIZING & DETAILS SEE DWG EC-710.
 6. STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

- INLET SCHEDULE:**
- A2 - 5' TYPE R D2 - TYPE C - MESH
 - A3 - 5' TYPE R G1 - TYPE C - MESH
 - C2 - 10' TYPE R
 - C3 - 10' TYPE R

- DR SHEET LIST:**
- 601 - 604 --- 65TH AVENUE & POND
 - 605 - 606 --- ULTIMATE: E. OF 65TH AVE
 - 607 --- ULTIMATE: W. OF 65TH AVE



E STORM LINE E

F STORM LINE F

JUB
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 Fax: 970.377.3935
 www.jub.com

BID SET
 CITY OF GREELEY
 PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

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NO.	REVISION	DESCRIPTION	BY	DATE

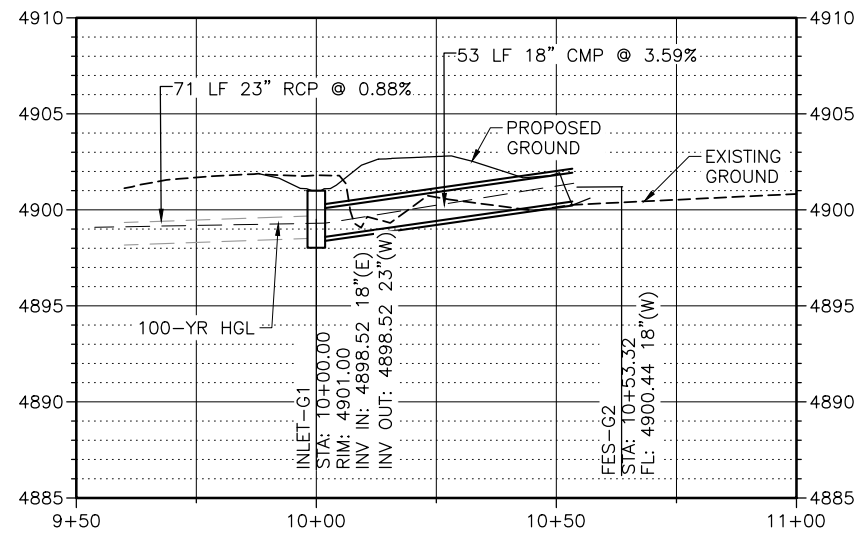
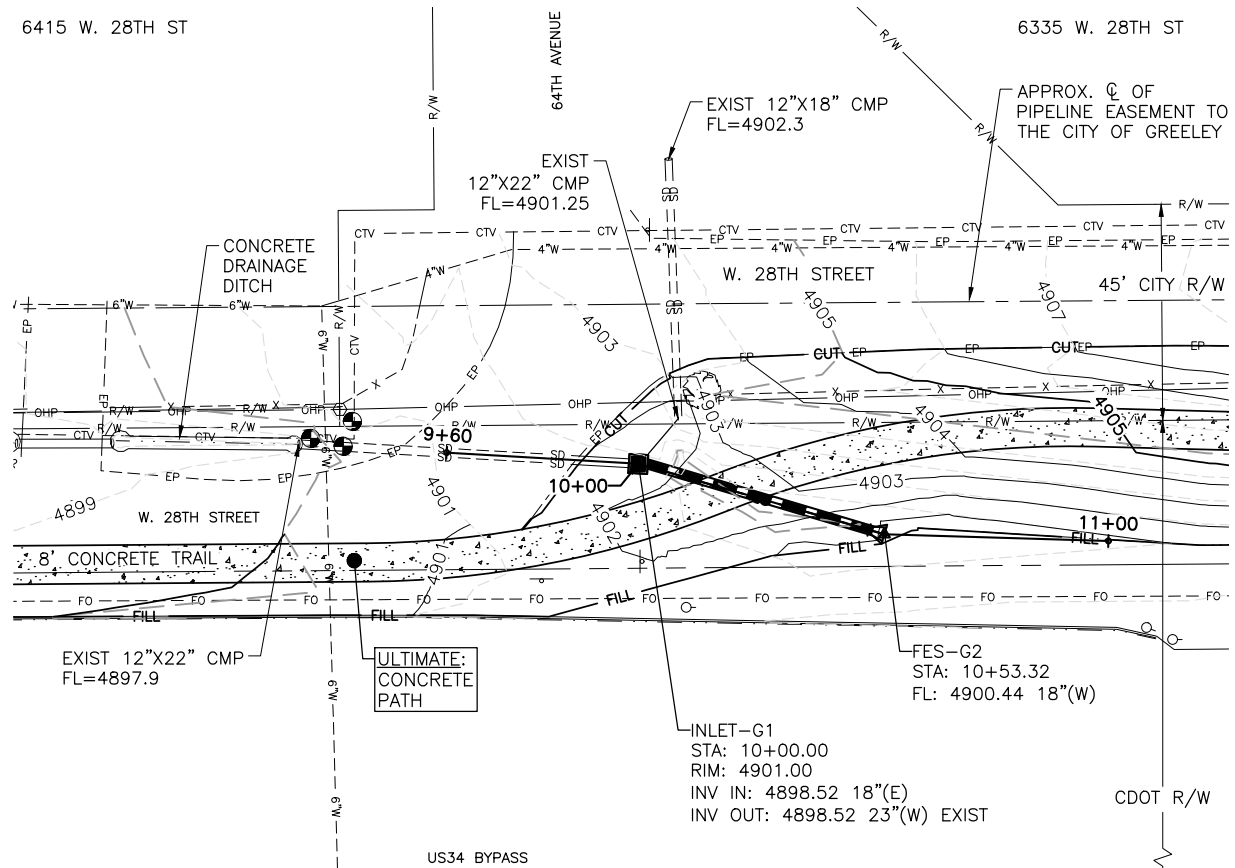
65th AVENUE ROAD WIDENING
 CITY OF GREELEY
 STORM DRAINAGE PLAN & PROFILE
 LINES E & F

FILE: 87-17-006-DR-406X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020
 DRAWING NUMBER:
DR-604
 SHEET
74
 OF
115

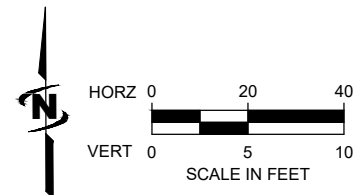


Plot Date: 2/2/2020 4:46 PM, Plotted By: Amber Morse
 Date Created: 2/2/2020, Project: JUB-GREELEY-17-206-65TH AVE, US34/CDOT SHEET E/F, 17-206-DR-406X.DWG

Plot Date: 2/2/2020 4:47 PM Plotted By: Amber Morse
 Date Created: 2/2/2020 File Path: J:\PROJECTS\JUB\GREELEY\09-17-2006-65TH AVE US34\CAD\SH01\09-17-2006-DR-407X.DWG



G ULTIMATE STORM LINE G



LEGEND:

- 4900 — PROPOSED MAJOR CONTOUR
- 4902 — PROPOSED MINOR CONTOUR
- - - 4900 - - - EXISTING MAJOR CONTOUR
- - - 4902 - - - EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- POT HOLE - SEE UT DRAWINGS

NOTES:

1. ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
2. INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
3. INLET DETAILS SEE DWG DT-1106
4. STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
5. RIPRAP SIZING & DETAILS SEE DWG EC-710.
6. STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

- A2 - 5' TYPE R
- A3 - 5' TYPE R
- C2 - 10' TYPE R
- C3 - 10' TYPE R
- D2 - TYPE C - MESH
- G1 - TYPE C - MESH

DR SHEET LIST:

- 601 - 604 --- 65TH AVENUE & POND
- 605 - 606 --- ULTIMATE: E. OF 65TH AVE
- 607 --- ULTIMATE: W. OF 65TH AVE



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 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

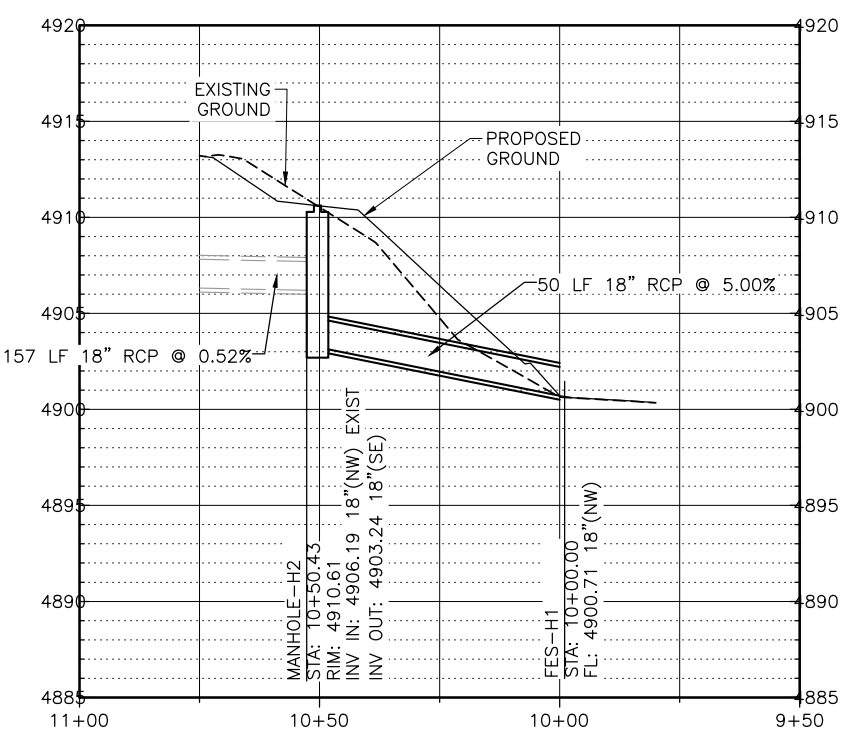
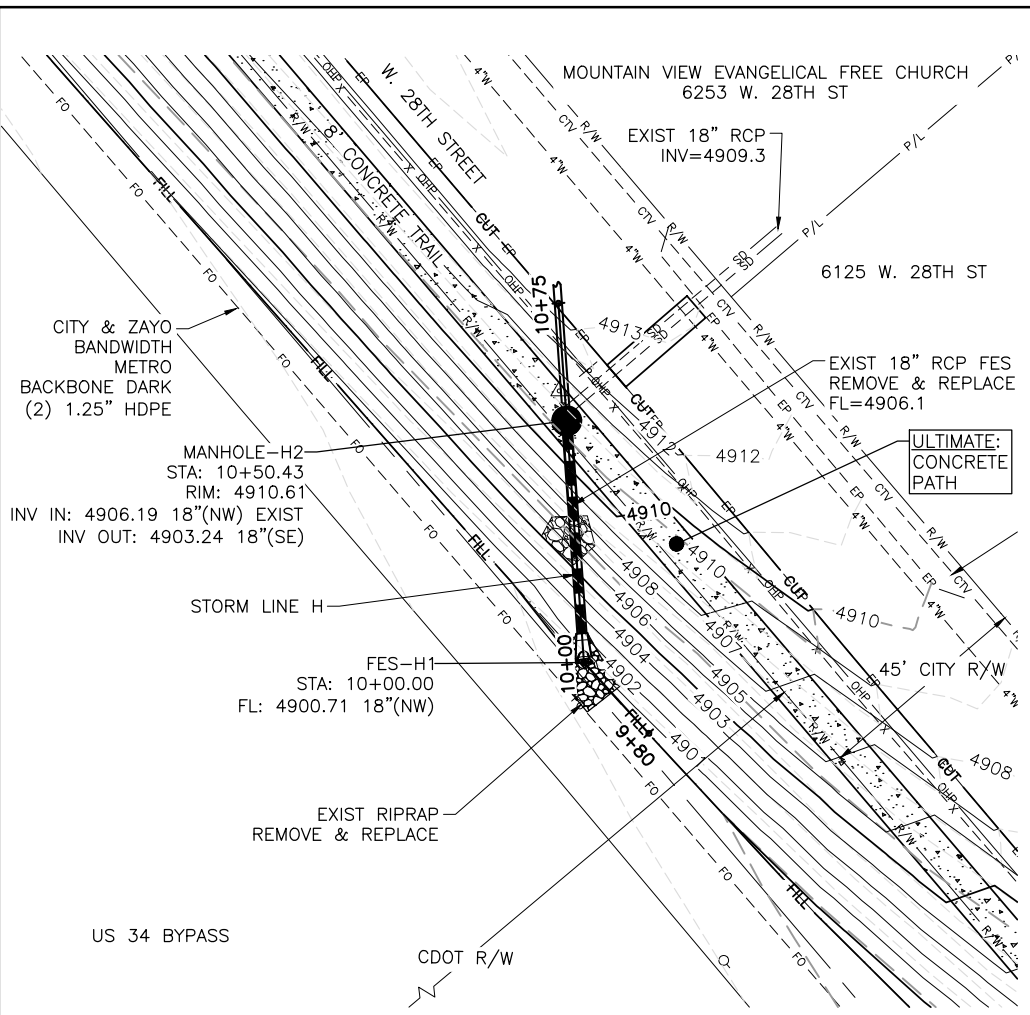
BID SET

NO.	REVISION	DESCRIPTION	BY	DATE

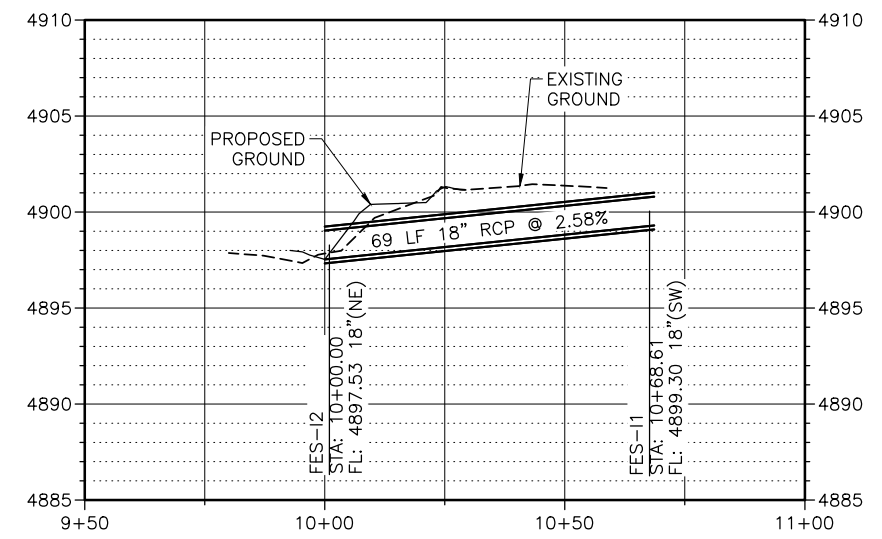
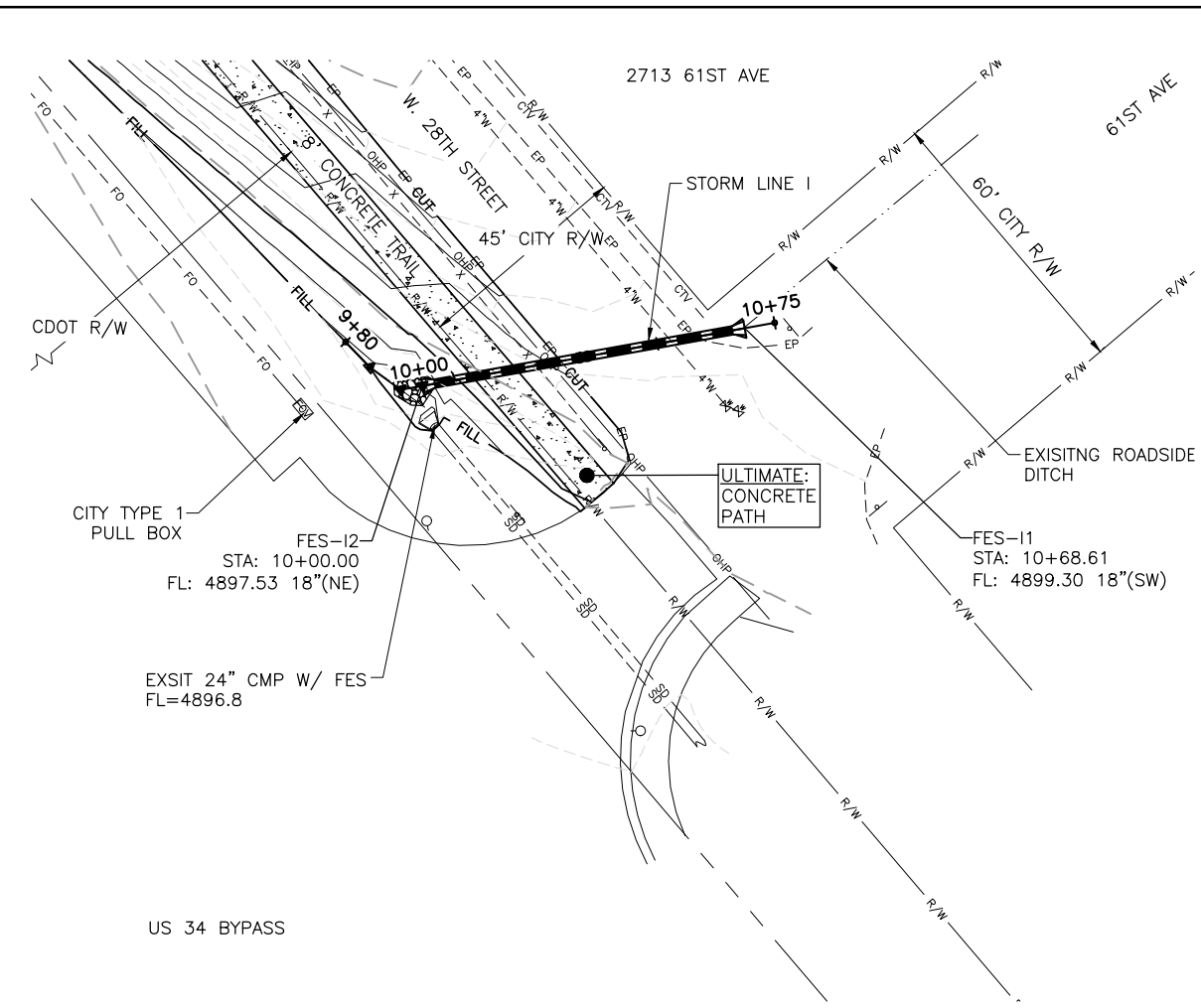
65th AVENUE ROAD WIDENING
 CITY OF GREELEY
 ULTIMATE
 STORM DRAINAGE PLAN & PROFILE
 LINE G

FILE : 87-17-006-DR-407X
 JUB PROJ. # : 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020
 DRAWING NUMBER:
DR-605
 SHEET
75
 OF 115

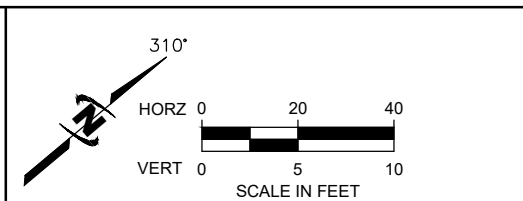
Plot Date: 2/23/2020 4:47 PM, Plotted By: Amber Morse, Date Created: 2/2/2020, P:\PROJECTS\JUB\GREELY\09-17-2006-65TH AVE - US 34 CAD\SHEET\09-17-2006-DR-409X.DWG



H ULTIMATE STORM LINE H



I ULTIMATE STORM LINE I



- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - FILL
 - CUT
 - SWALE
 - 2.0% PROPOSED SLOPES
 - (2.0%) EXISTING SLOPES
 - FG 89.56 FINISHED GRADE SPOT ELEVATION
 - EG 89.56 EXISTING GRADE SPOT ELEVATION
 - ⊙ POT HOLE - SEE UT DRAWINGS

- NOTES:**
- ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
 - INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
 - INLET DETAILS SEE DWG DT-1106
 - STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
 - RIPRAP SIZING & DETAILS SEE DWG EC-710.
 - STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

A2 - 5' TYPE R	D2 - TYPE C - MESH
A3 - 5' TYPE R	G1 - TYPE C - MESH
C2 - 10' TYPE R	
C3 - 10' TYPE R	

DR SHEET LIST:

601 - 604	--- 65TH AVENUE & POND
605 - 606	--- ULTIMATE: E. OF 65TH AVE
607	--- ULTIMATE: W. OF 65TH AVE



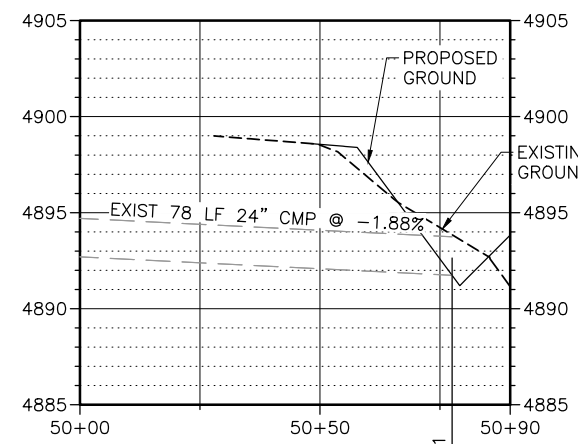
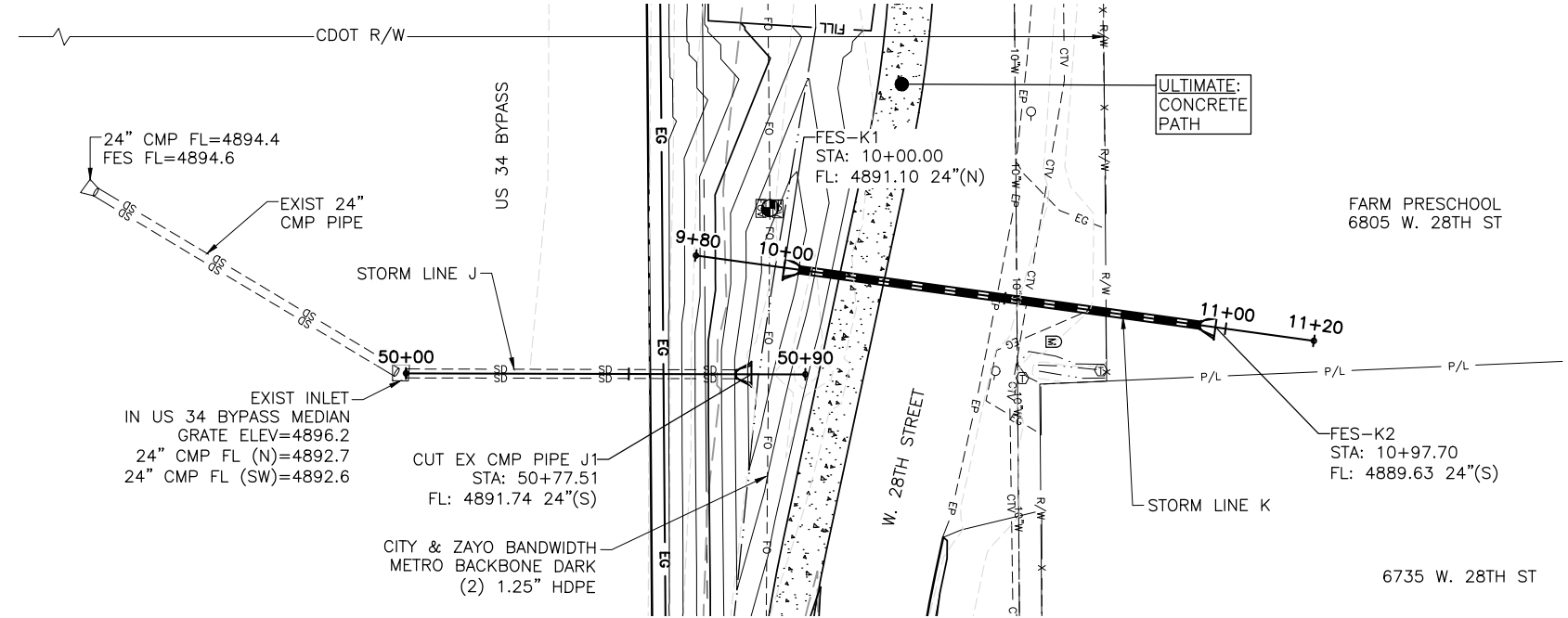
JUB
 J-U-B ENGINEERS, INC.
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 Fax: 970.377.3935
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 Greeley, CO 80631
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NO.	REVISION	DESCRIPTION	BY	DATE

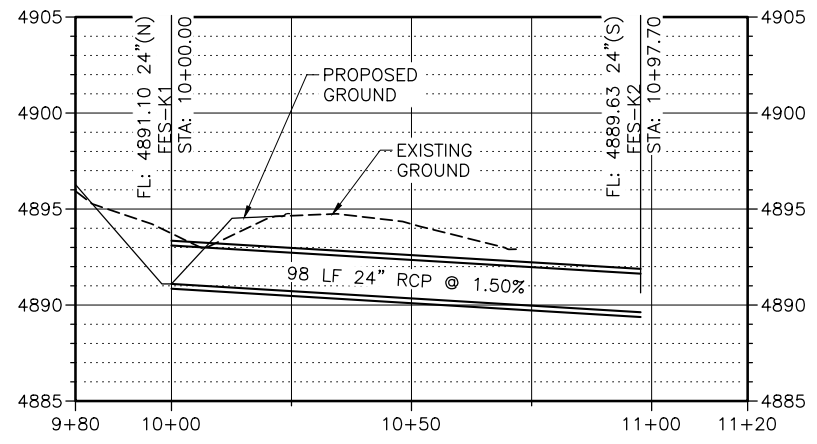
65th AVENUE ROAD WIDENING
 CITY OF GREELY
 ULTIMATE
 STORM DRAINAGE PLAN & PROFILE
 LINES H & I

FILE: 87-17-006-DR-409X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/3/2020
 DRAWING NUMBER:
DR-606
 SHEET
76
 OF
115



J ULTIMATE STORM LINE J

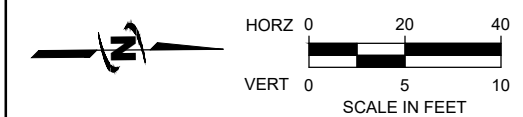
CUT EX CMP PIPE J1
STA: 50+77.51
FL: 4891.74 24"(S)



K ULTIMATE STORM LINE K

ULTIMATE STORM LINE K NOTES:

1. THE FINAL DESIGN AND CONSTRUCTION OF THIS STORM LINE MUST BE COORDINATED WITH THE PRIVATE LOT OWNER.
2. STORM LINE AS SHOWN MATCHES WHAT IS PROPOSED BY LANDONE ENGINEERING FOR THE FARM PRESCHOOL SITE IN 2019 DRAWINGS. THE SITE PLAN FOR THE FARM PRESCHOOL HAS NOT BEEN APPROVED BY THE CITY AT THE TIME OF THIS (65TH AVENUE ROAD WIDENING) CONSTRUCTION PLAN SET.



- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - FILL
 - CUT
 - SWALE
 - 2.0% PROPOSED SLOPES
 - (2.0%) EXISTING SLOPES
 - FG 89.56 FINISHED GRADE SPOT ELEVATION
 - EG 89.56 EXISTING GRADE SPOT ELEVATION
 - ⊙ POT HOLE - SEE UT DRAWINGS

- NOTES:**
1. ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
 2. INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
 3. INLET DETAILS SEE DWG DT-1106
 4. STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
 5. RIPRAP SIZING & DETAILS SEE DWG EC-710.
 6. STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

A2 - 5' TYPE R	D2 - TYPE C - MESH
A3 - 5' TYPE R	G1 - TYPE C - MESH
C2 - 10' TYPE R	
C3 - 10' TYPE R	

DR SHEET LIST:

601 - 604	--- 65TH AVENUE & POND
605 - 606	--- ULTIMATE: E. OF 65TH AVE
607	--- ULTIMATE: W. OF 65TH AVE

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Engineering Division
1001 9th Avenue
Greeley, CO 80631
Phone: 970.377.3602

BID SET

NO.	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY
ULTIMATE STORM DRAINAGE PLAN & PROFILE
LINES J & K

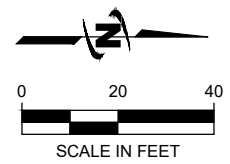
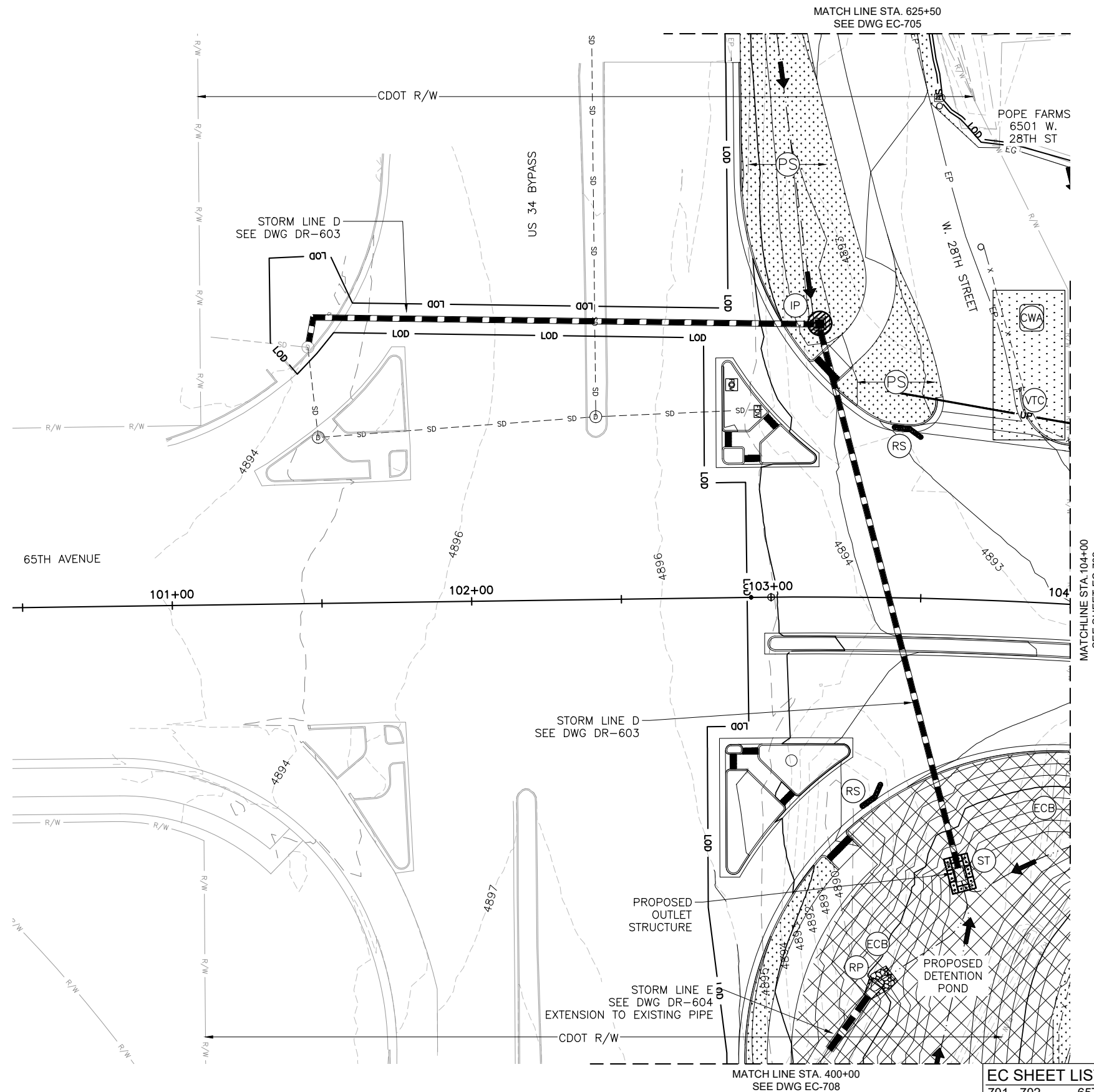
DR SHEET LIST:

601 - 604	--- 65TH AVENUE & POND
605 - 606	--- ULTIMATE: E. OF 65TH AVE
607	--- ULTIMATE: W. OF 65TH AVE

FILE: 87-17-006 DR-409
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/2/2020
DRAWING NUMBER:
DR-607
SHEET
77
OF
115



Plot Date: 2/2/2020 4:47 PM, Plotted By: Amber Morse
Date Created: 2/2/2020, Project: JUB-GREELEY-87-17-206, 65TH AVE, US&CAD/SHEET/87-17-206_DR-607.DWG



LEGEND		
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	[PS]
ROCK SOCK	(RS)	[RS]
WATTLE	(WA)	[WA]
STAGING & STOCKPILE AREA	(SSA)	[SSA]
INLET PROTECTION	(IP)	[IP]
SEDIMENT TRAP	(ST)	[ST]
VEHICLE TRACKING CONTROL	(VTC)	[VTC]
CONCRETE WASHOUT AREA	(CWA)	[CWA]
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	[ECB]
RIPRAP	(RP)	[RP]
SILT FENCE	(SF)	[SF]
LIMITS OF DISTURBANCE	(LOD)	[LOD]
ORANGE PLASTIC SAFETY FENCE	(PF)	[PF]
PROPOSED MAJOR CONTOUR		— 4900 —
PROPOSED MINOR CONTOUR		- - - 4902 - - -
EXISTING MAJOR CONTOUR		— 4900 —
EXISTING MINOR CONTOUR		- - - 4902 - - -
FLOW ARROW		[Arrow]

- NOTES:**
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
 - TOPSOIL AND PERMANENT SEEDING TO BE PLACED BEFORE INSTALLING EROSION CONTROL BLANKET.
 - IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE THEIR OWN STAGING AREA(S). THE CONTRACTOR SHALL SUPPLY THE CITY WITH WRITTEN PERMISSION FROM THE LAND OWNER ALLOWING STAGING ON THEIR LAND.
 - ALL AREAS DISTURBED OUTSIDE DESIGNATED AREAS OF DISTURBANCE, INCLUDING STAGING AREAS, SHALL BE RETURNED TO EXISTING CONDITIONS. ALL CONCRETE WASHOUT STRUCTURES MUST BE MOBILE ECO-PAN WASHOUTS OR EQUIVALENT. COST OF REPLACEMENT PAN SHALL BE INCIDENTAL TO THE COST OF THE WASHOUT.
 - CONTRACTOR TO COMPLETE AND COMPLY WITH A STORMWATER MANAGEMENT PLAN (SWMP) IN COMPLIANCE WITH CDPS GENERAL PERMIT COR400000.

EC SHEET LIST:

701 - 702	--- 65TH AVENUE & POND
703	--- INTERIM: W. OF 65TH AVE
703 - 705	--- ULTIMATE: W. OF 65TH AVE
706 - 707	--- INTERIM: W. OF 65TH AVE
708	--- INTERIM: E. OF 65TH AVE
708 - 709	--- ULTIMATE: E. OF 65TH AVE



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 PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

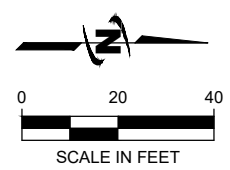
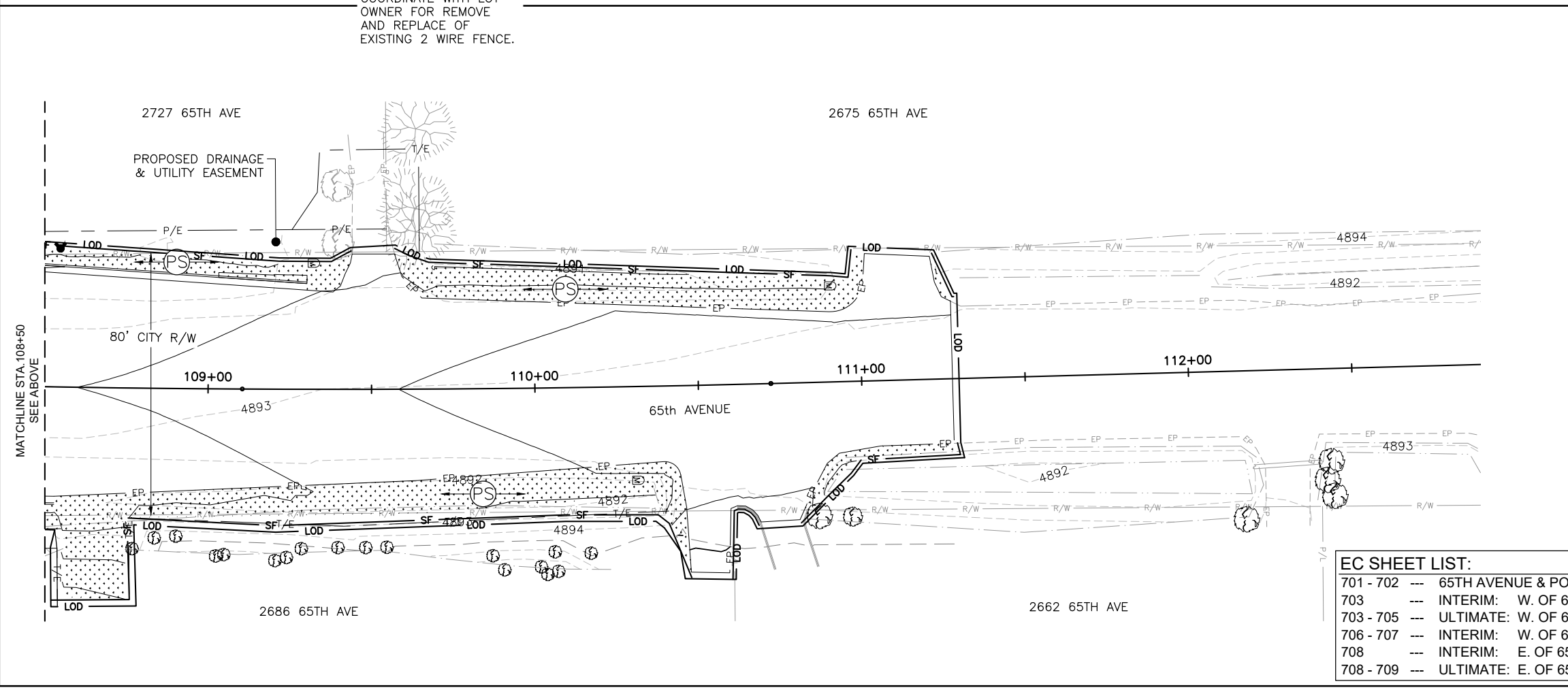
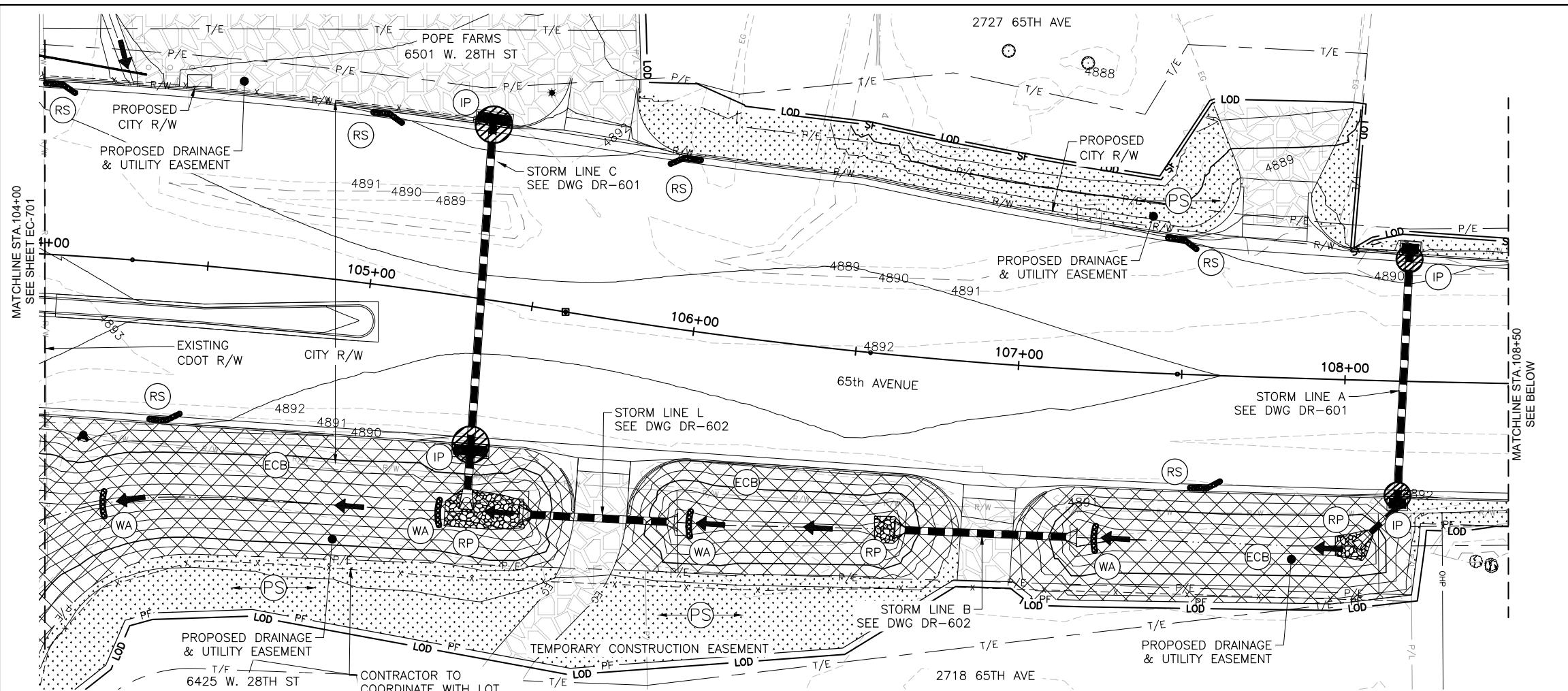
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NO.	REVISION	DESCRIPTION	BY	APPR.	DATE

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65th AVENUE ROAD WIDENING
 CITY OF GREELEY
 EROSION CONTROL PLAN

FILE: 87-17-006-EC-601X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020
 DRAWING NUMBER:
EC-701
 SHEET
78
 OF 115



LEGEND		
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	[PS]
ROCK SOCK	(RS)	[RS]
WATTLE	(WA)	[WA]
STAGING & STOCKPILE AREA	(SSA)	[SSA]
INLET PROTECTION	(IP)	[IP]
SEDIMENT TRAP	(ST)	[ST]
VEHICLE TRACKING CONTROL	(VTC)	[VTC]
CONCRETE WASHOUT AREA	(CWA)	[CWA]
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	[ECB]
RIPRAP	(RP)	[RP]
SILT FENCE	(SF)	[SF]
LIMITS OF DISTURBANCE	(LOD)	[LOD]
ORANGE PLASTIC SAFETY FENCE	(PF)	[PF]
PROPOSED MAJOR CONTOUR		— 4900 —
PROPOSED MINOR CONTOUR		- - - 4902 - - -
EXISTING MAJOR CONTOUR		— 4900 —
EXISTING MINOR CONTOUR		- - - 4902 - - -
FLOW ARROW		[Arrow]

- NOTES:**
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
 - TOPSOIL AND PERMANENT SEEDING TO BE PLACED BEFORE INSTALLING EROSION CONTROL BLANKET.
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 - ALL AREAS DISTURBED OUTSIDE DESIGNATED AREAS OF DISTURBANCE, INCLUDING STAGING AREAS, SHALL BE RETURNED TO EXISTING CONDITIONS. ALL CONCRETE WASHOUT STRUCTURES MUST BE MOBILE ECO-PAN WASHOUTS OR EQUIVALENT. COST OF REPLACEMENT PAN SHALL BE INCIDENTAL TO THE COST OF THE WASHOUT.
 - CONTRACTOR TO COMPLETE AND COMPLY WITH A STORMWATER MANAGEMENT PLAN (SWMP) IN COMPLIANCE WITH CDPS GENERAL PERMIT COR400000.

EC SHEET LIST:

701 - 702	--- 65TH AVENUE & POND
703	--- INTERIM: W. OF 65TH AVE
703 - 705	--- ULTIMATE: W. OF 65TH AVE
706 - 707	--- INTERIM: W. OF 65TH AVE
708	--- INTERIM: E. OF 65TH AVE
708 - 709	--- ULTIMATE: E. OF 65TH AVE



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 PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
 CITY OF GREELEY
 EROSION CONTROL PLAN

FILE: 87-17-006-EC-601X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020

DRAWING NUMBER:
EC-702
 SHEET
79
 OF
115



Plot Date: 2/2/2020 4:48 PM, Plotted By: Amber Morse
 Date Created: 2/2/2020, Project: JUB-GREELEY-87-17-006-65TH AVE, US4-CAD-SHEET-87-17-006-EC-601X.DWG

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NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY
INTERIM & ULTIMATE
EROSION CONTROL PLAN

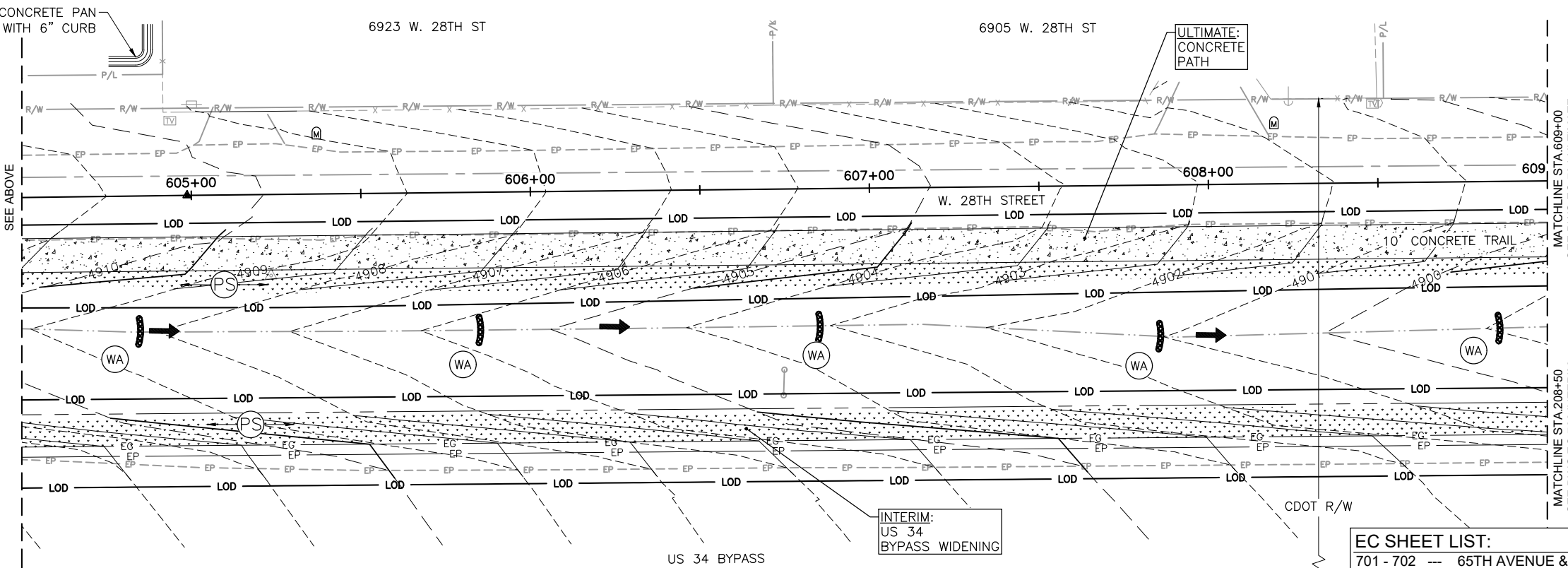
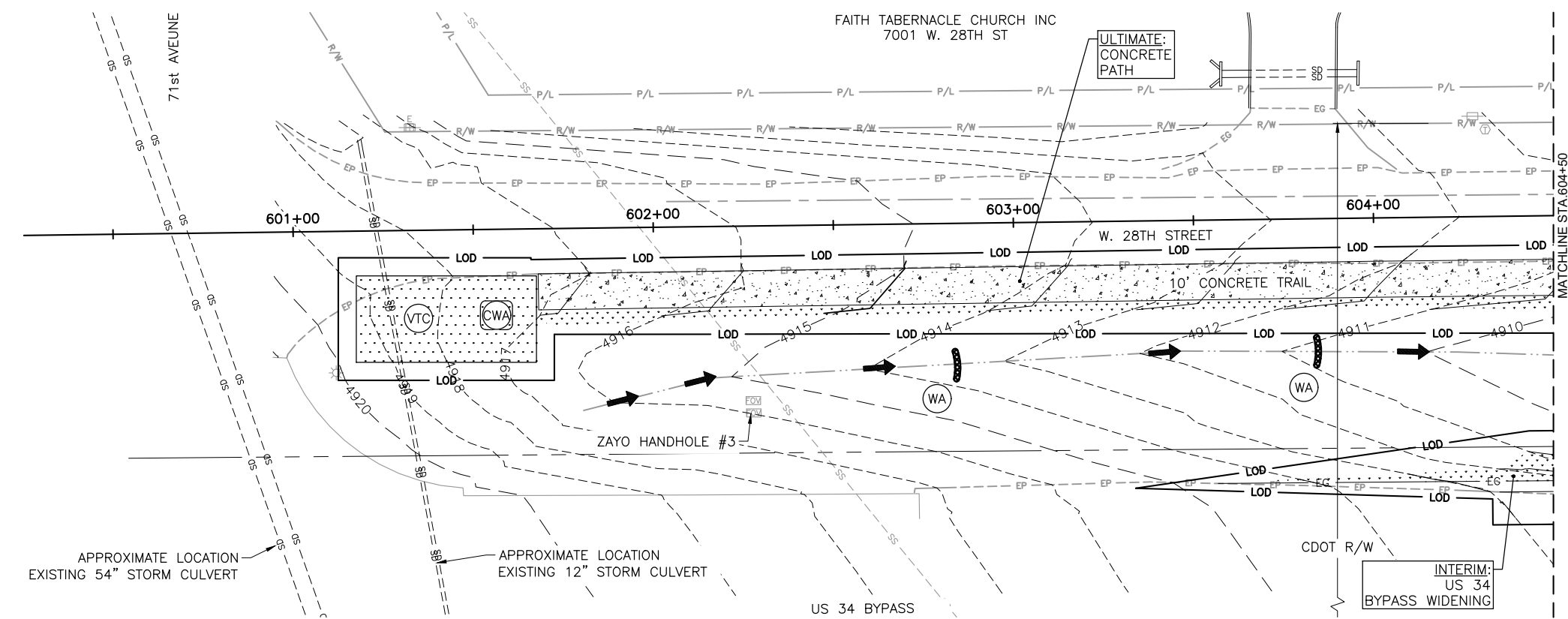
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JUB PROJ. # :	87-17-006
DRAWN BY :	BK
DESIGN BY :	BK
CHECKED BY :	ALM
SCALE :	ONE INCH = 40 FEET
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY	
LAST UPDATED :	2/3/2020

DRAWING NUMBER:
EC-703
SHEET
80
OF
115



LEGEND		
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	
ROCK SOCK	(RS)	
WATTLE	(WA)	
STAGING & STOCKPILE AREA	(SSA)	
INLET PROTECTION	(IP)	
SEDIMENT TRAP	(ST)	
VEHICLE TRACKING CONTROL	(VTC)	
CONCRETE WASHOUT AREA	(CWA)	
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	
RIPRAP	(RP)	
SILT FENCE	(SF)	
LIMITS OF DISTURBANCE	(LOD)	
ORANGE PLASTIC SAFETY FENCE	(PF)	
PROPOSED MAJOR CONTOUR	4900	
PROPOSED MINOR CONTOUR	4902	
EXISTING MAJOR CONTOUR	4900	
EXISTING MINOR CONTOUR	4902	
FLOW ARROW		

- NOTES:
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
 - TOPSOIL AND PERMANENT SEEDING TO BE PLACED BEFORE INSTALLING EROSION CONTROL BLANKET.
 - IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE THEIR OWN STAGING AREA(S). THE CONTRACTOR SHALL SUPPLY THE CITY WITH WRITTEN PERMISSION FROM THE LAND OWNER ALLOWING STAGING ON THEIR LAND.
 - ALL AREAS DISTURBED OUTSIDE DESIGNATED AREAS OF DISTURBANCE, INCLUDING STAGING AREAS, SHALL BE RETURNED TO EXISTING CONDITIONS. ALL CONCRETE WASHOUT STRUCTURES MUST BE MOBILE ECO-PAN WASHOUTS OR EQUIVALENT. COST OF REPLACEMENT PAN SHALL BE INCIDENTAL TO THE COST OF THE WASHOUT.
 - CONTRACTOR TO COMPLETE AND COMPLY WITH A STORMWATER MANAGEMENT PLAN (SWMP) IN COMPLIANCE WITH CDPS GENERAL PERMIT COR400000.



EC SHEET LIST:

701 - 702	--- 65TH AVENUE & POND
703	--- INTERIM: W. OF 65TH AVE
703 - 705	--- ULTIMATE: W. OF 65TH AVE
706 - 707	--- INTERIM: W. OF 65TH AVE
708	--- INTERIM: E. OF 65TH AVE
708 - 709	--- ULTIMATE: E. OF 65TH AVE



Plot Date: 2/3/2020 4:48 PM, Plotted By: Amber Morse
 Date Created: 2/3/2020, Project: JUB/GREELEY/87-17-006-65TH AVE US34 CAD/SHEET/87-17-006-EC-603X.DWG



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www.jub.com

CITY OF GREELEY
PUBLIC WORKS
Engineering Division
1001 9th Avenue
Greeley, CO 80631
Phone: 970.377.3602

NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY
ULTIMATE
EROSION CONTROL PLAN

FILE: 87-17-006-EC-603X
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE
INCH SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020

DRAWING NUMBER:
EC-704
SHEET
81
OF
115

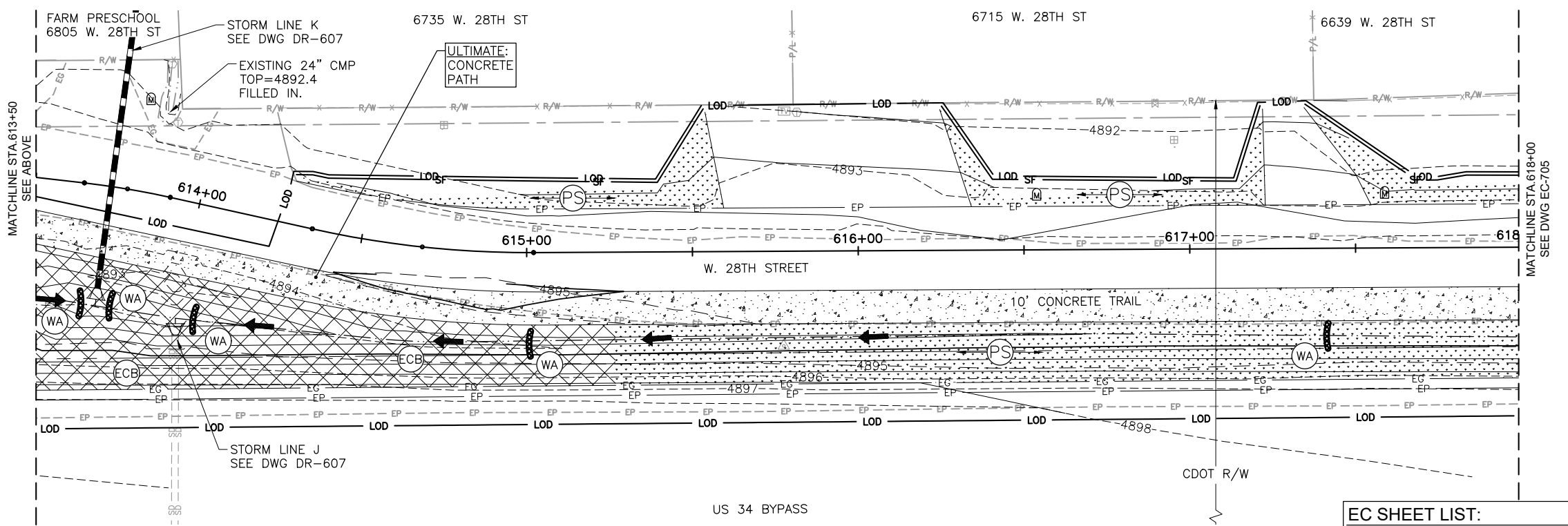
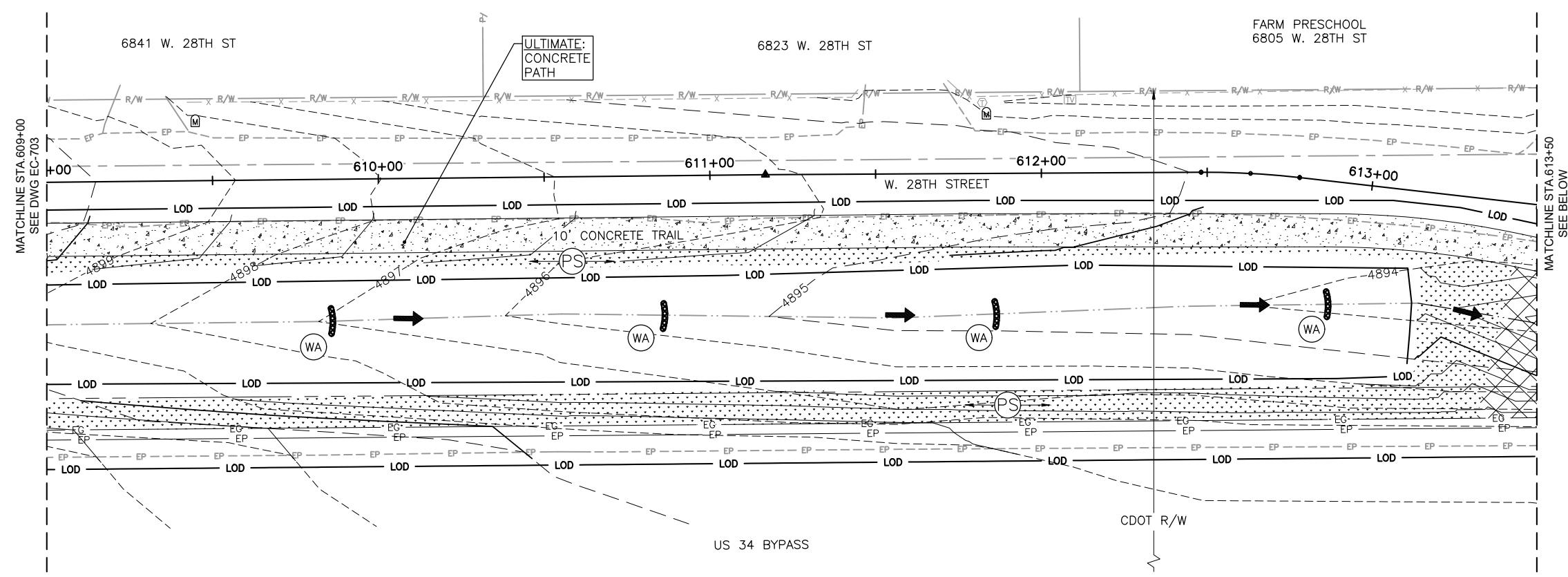


LEGEND		
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	
ROCK SOCK	(RS)	
WATTLE	(WA)	
STAGING & STOCKPILE AREA	(SSA)	
INLET PROTECTION	(IP)	
SEDIMENT TRAP	(ST)	
VEHICLE TRACKING CONTROL	(VTC)	
CONCRETE WASHOUT AREA	(CWA)	
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	
RIPRAP	(RP)	
SILT FENCE	(SF)	
LIMITS OF DISTURBANCE	(LOD)	
ORANGE PLASTIC SAFETY FENCE	(PF)	
PROPOSED MAJOR CONTOUR	— 4900 —	
PROPOSED MINOR CONTOUR	— 4902 —	
EXISTING MAJOR CONTOUR	- - - 4900 - - -	
EXISTING MINOR CONTOUR	- - - 4902 - - -	
FLOW ARROW		

- NOTES:
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
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 - CONTRACTOR TO COMPLETE AND COMPLY WITH A STORMWATER MANAGEMENT PLAN (SWMP) IN COMPLIANCE WITH CDPS GENERAL PERMIT COR400000.

EC SHEET LIST:

701 - 702	---	65TH AVENUE & POND
703	---	INTERIM: W. OF 65TH AVE
703 - 705	---	ULTIMATE: W. OF 65TH AVE
706 - 707	---	INTERIM: W. OF 65TH AVE
708	---	INTERIM: E. OF 65TH AVE
708 - 709	---	ULTIMATE: E. OF 65TH AVE



Plot Date: 2/3/2020 4:48 PM Plotted By: Amber Morse
Date Created: 2/3/2020 File Path: C:\PROJECTS\JUB\GREELEY\87-17-006-65TH AVE US 34 CAD\DWG\87-17-006-EC-603X.DWG



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CITY OF GREELEY
PUBLIC WORKS
Engineering Division
1001 9th Avenue
Greeley, CO 80631
Phone: 970.377.3602

NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY
ULTIMATE
EROSION CONTROL PLAN

FILE: 87-17-006-EC-603X
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020

DRAWING NUMBER:
EC-705
SHEET
82
OF
115

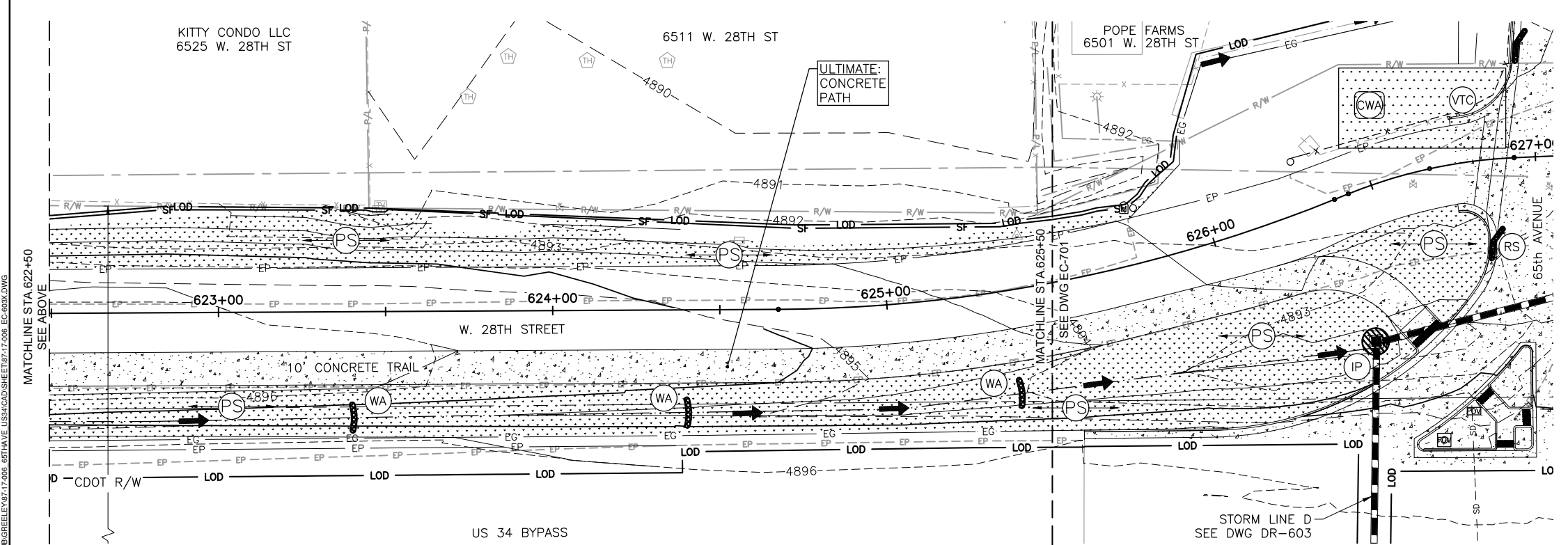
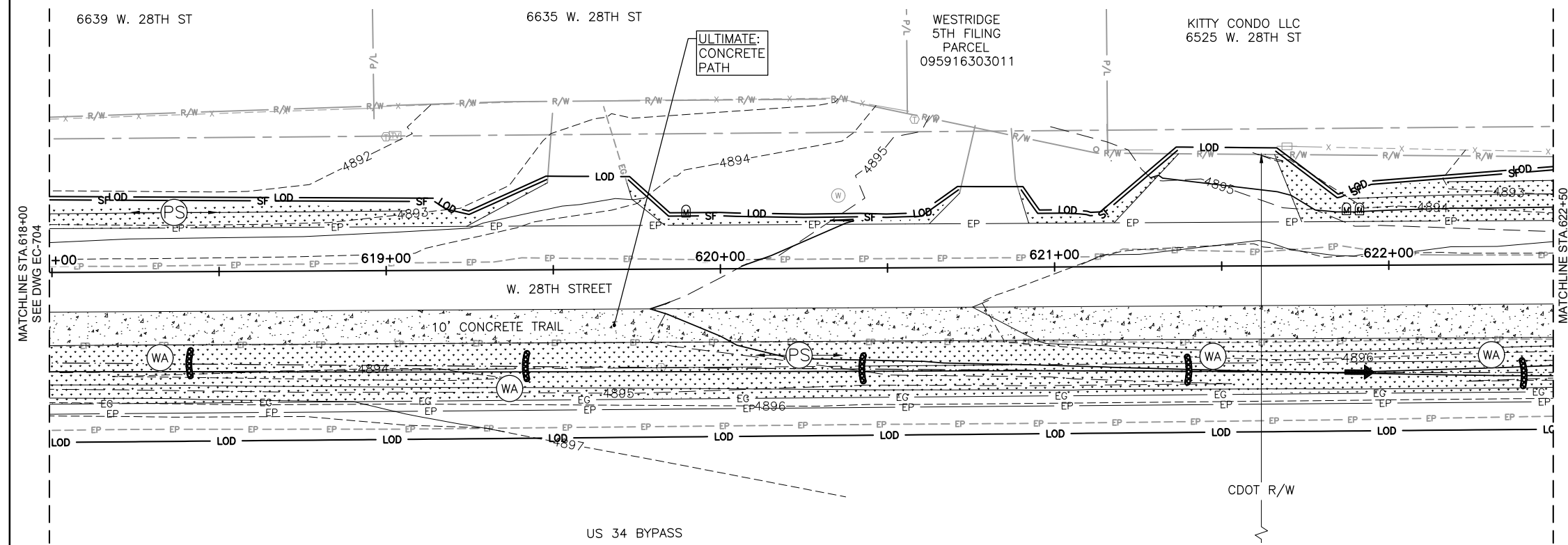


LEGEND		
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	
ROCK SOCK	(RS)	
WATTLE	(WA)	
STAGING & STOCKPILE AREA	(SSA)	
INLET PROTECTION	(IP)	
SEDIMENT TRAP	(ST)	
VEHICLE TRACKING CONTROL	(VTC)	
CONCRETE WASHOUT AREA	(CWA)	
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	
RIPRAP	(RP)	
SILT FENCE	(SF)	
LIMITS OF DISTURBANCE	(LOD)	
ORANGE PLASTIC SAFETY FENCE	(PF)	
PROPOSED MAJOR CONTOUR	— 4900 —	
PROPOSED MINOR CONTOUR	— 4902 —	
EXISTING MAJOR CONTOUR	- - - 4900 - - -	
EXISTING MINOR CONTOUR	- - - 4902 - - -	
FLOW ARROW	→	

- NOTES:
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
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 - CONTRACTOR TO COMPLETE AND COMPLY WITH A STORMWATER MANAGEMENT PLAN (SWMP) IN COMPLIANCE WITH CDPS GENERAL PERMIT COR400000.

EC SHEET LIST:

701 - 702	---	65TH AVENUE & POND
703	---	INTERIM: W. OF 65TH AVE
703 - 705	---	ULTIMATE: W. OF 65TH AVE
706 - 707	---	INTERIM: W. OF 65TH AVE
708	---	INTERIM: E. OF 65TH AVE
708 - 709	---	ULTIMATE: E. OF 65TH AVE



Plot Date: 2/3/2020 4:48 PM, Plotted By: Amber Morse, Date Created: 2/3/2020, Project: JUB/GREELEY/87-17-006-65TH AVE, US&CAD/SHEET/87-17-006-EC-603X.DWG

BID SET

NO.	REVISION	DESCRIPTION	BY	DATE

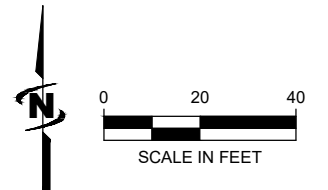
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65th AVENUE ROAD WIDENING
CITY OF GREELEY
INTERIM
EROSION CONTROL PLAN

FILE: 87-17-006-EC-604X-INT
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020

DRAWING NUMBER:
EC-706

SHEET
83
OF
115



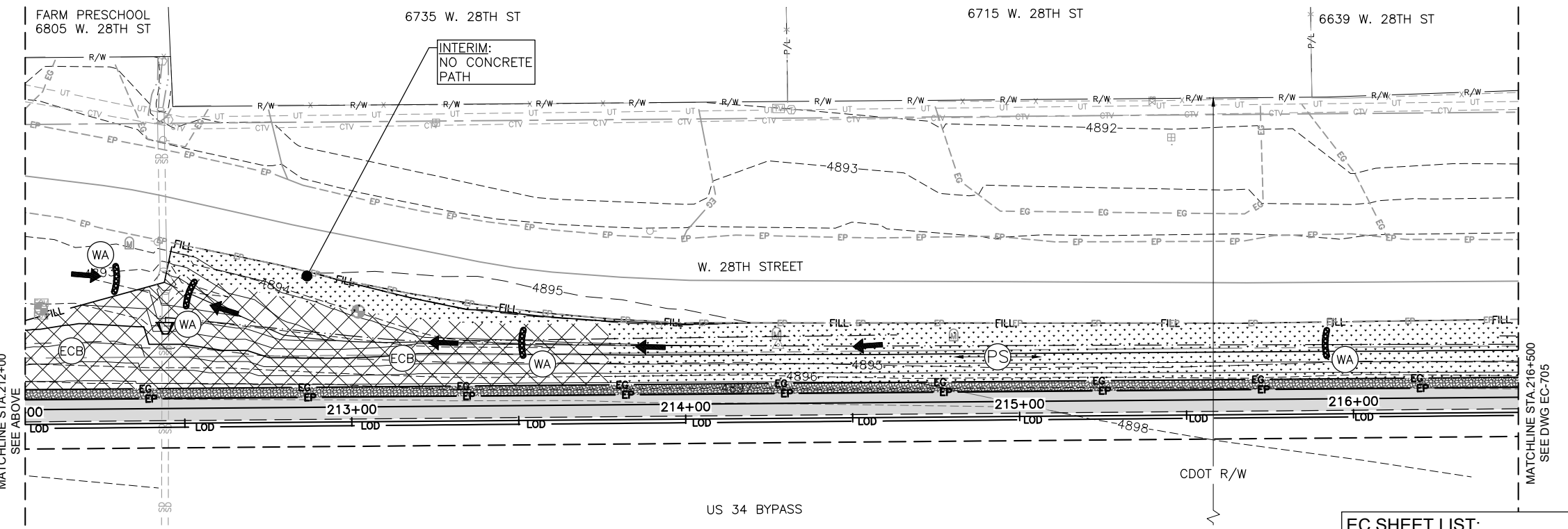
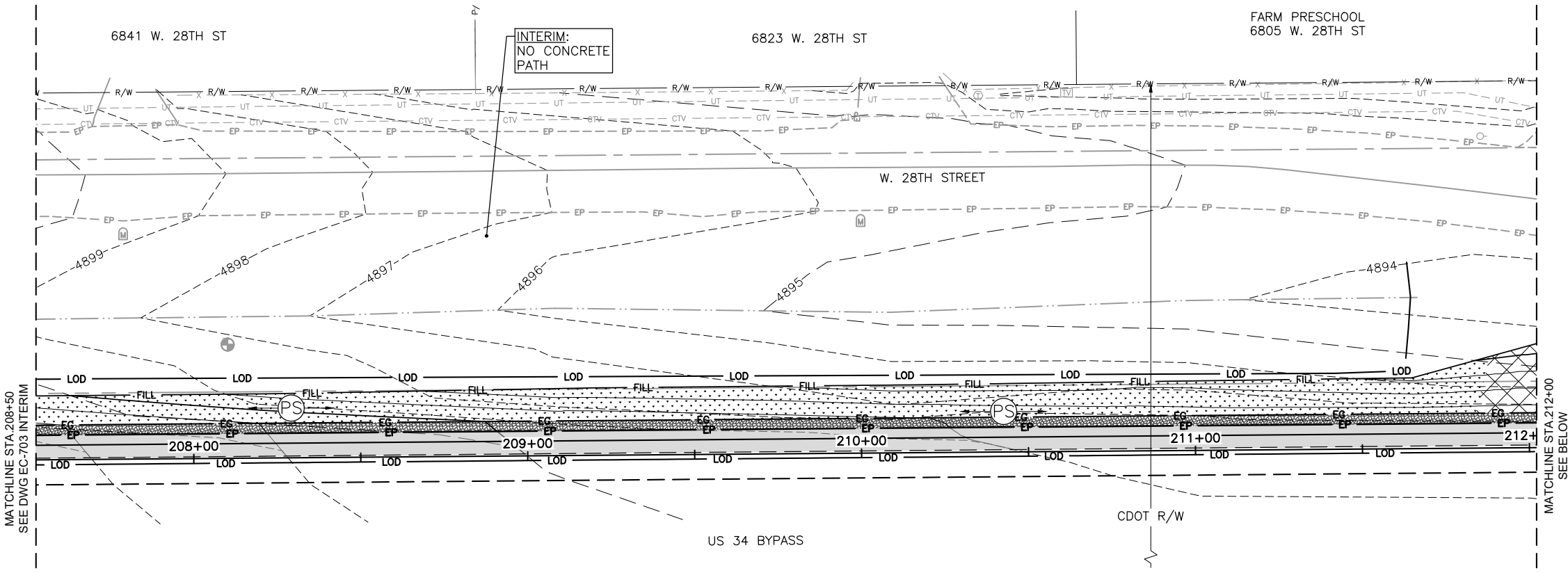
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	
ROCK SOCK	(RS)	
WATTLE	(WA)	
STAGING & STOCKPILE AREA	(SSA)	
INLET PROTECTION	(IP)	
SEDIMENT TRAP	(ST)	
VEHICLE TRACKING CONTROL	(VTC)	
CONCRETE WASHOUT AREA	(CWA)	
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	
RIPRAP	(RP)	
SILT FENCE	(SF)	
LIMITS OF DISTURBANCE	(LOD)	
ORANGE PLASTIC SAFETY FENCE	(PF)	
PROPOSED MAJOR CONTOUR	— 4900 —	
PROPOSED MINOR CONTOUR	— 4902 —	
EXISTING MAJOR CONTOUR	- - - 4900 - - -	
EXISTING MINOR CONTOUR	- - - 4902 - - -	
FLOW ARROW		

- NOTES:**
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
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EC SHEET LIST:

701 - 702	--- 65TH AVENUE & POND
703	--- INTERIM: W. OF 65TH AVE
703 - 705	--- ULTIMATE: W. OF 65TH AVE
706 - 707	--- INTERIM: W. OF 65TH AVE
708	--- INTERIM: E. OF 65TH AVE
708 - 709	--- ULTIMATE: E. OF 65TH AVE



Plot Date: 2/3/2020 4:48 PM, Plotted By: Amber Morse
 Date Created: 2/2/2020, Project: JUB/GREELEY/87-17-006-65TH AVE, US34 CAD SHEET: 87-17-006-EC-604X-INT.DWG



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Phone: 970.377.3602

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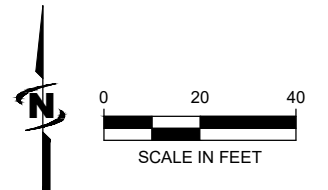
NO.	REVISION	DESCRIPTION	BY	APPR.	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY

INTERIM
EROSION CONTROL PLAN

FILE: 87-17-006-EC-604X-INT
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020

DRAWING NUMBER:
EC-707
SHEET
84
OF
115

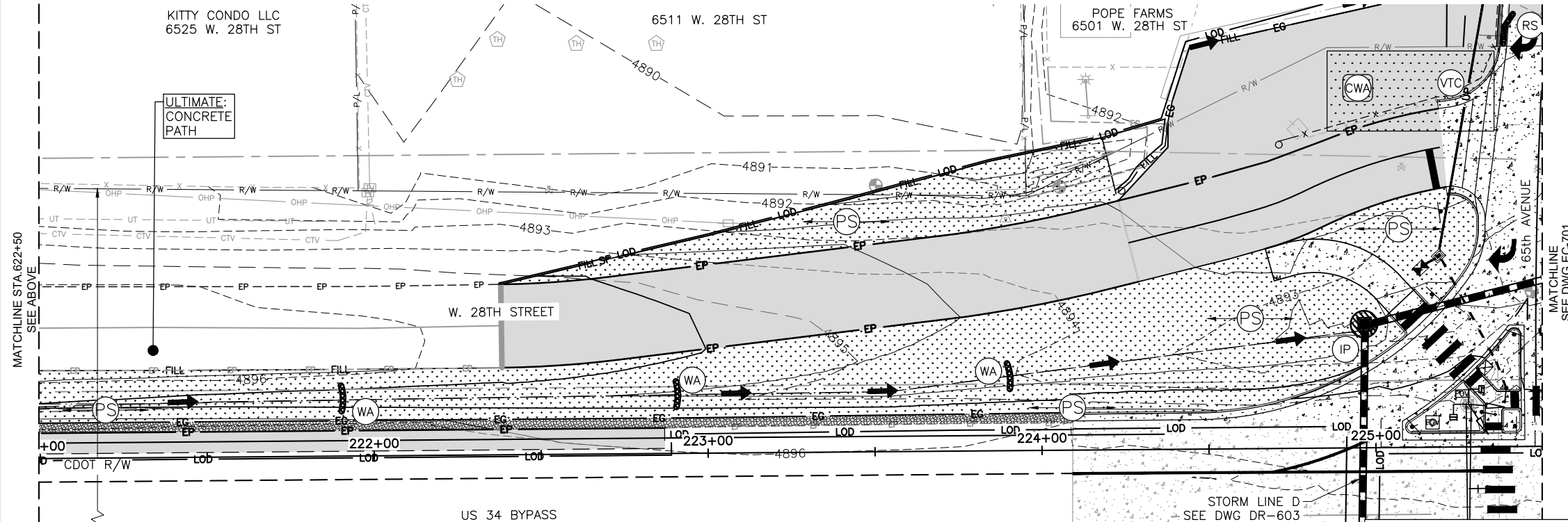
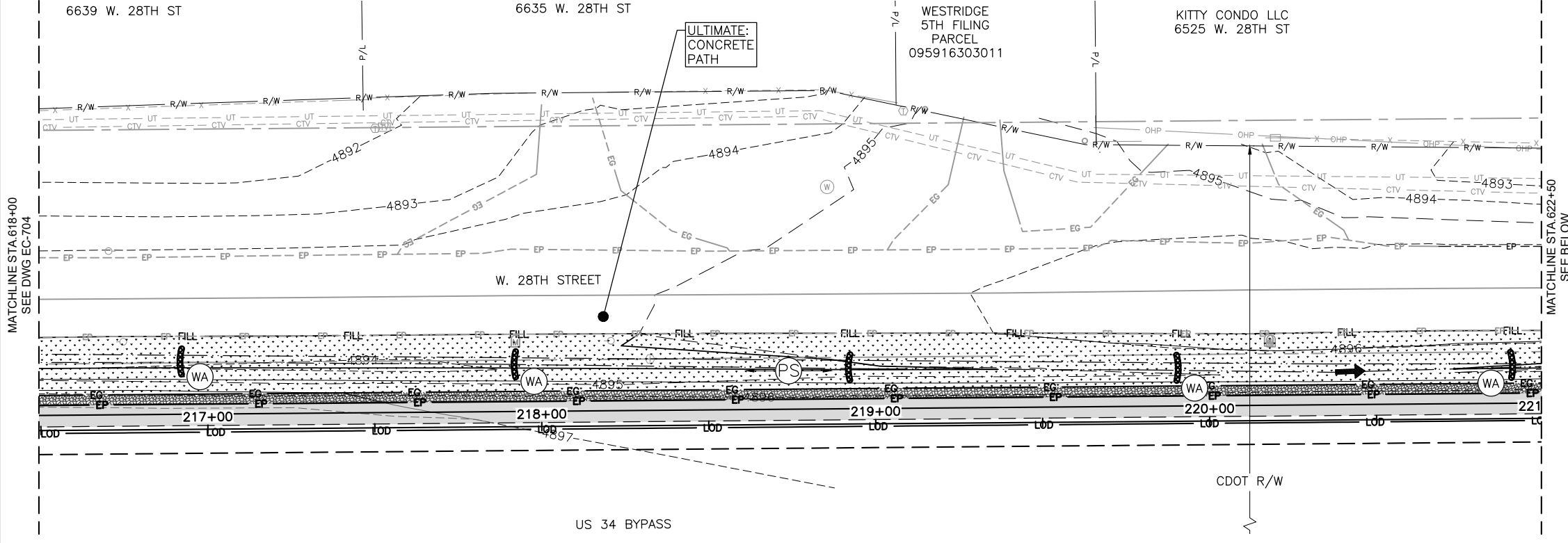


TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	(PS)
ROCK SOCK	(RS)	(RS)
WATTLE	(WA)	(WA)
STAGING & STOCKPILE AREA	(SSA)	(SSA)
INLET PROTECTION	(IP)	(IP)
SEDIMENT TRAP	(ST)	(ST)
VEHICLE TRACKING CONTROL	(VTC)	(VTC)
CONCRETE WASHOUT AREA	(CWA)	(CWA)
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	(ECB)
RIPRAP	(RP)	(RP)
SILT FENCE	(SF)	SF
LIMITS OF DISTURBANCE	(LOD)	LOD
ORANGE PLASTIC SAFETY FENCE	(PF)	PF
PROPOSED MAJOR CONTOUR	— 4900 —	— 4900 —
PROPOSED MINOR CONTOUR	— 4902 —	— 4902 —
EXISTING MAJOR CONTOUR	- - - 4900 - - -	- - - 4900 - - -
EXISTING MINOR CONTOUR	- - - 4902 - - -	- - - 4902 - - -
FLOW ARROW	→	→

- NOTES:
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
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EC SHEET LIST:

701 - 702	--- 65TH AVENUE & POND
703	--- INTERIM: W. OF 65TH AVE
703 - 705	--- ULTIMATE: W. OF 65TH AVE
706 - 707	--- INTERIM: W. OF 65TH AVE
708	--- INTERIM: E. OF 65TH AVE
708 - 709	--- ULTIMATE: E. OF 65TH AVE



Plot Date: 2/3/2020 4:48 PM, Plotted By: Amber Morse, Date Created: 2/2/2020, PROJECT: JUB/GREELEY/87-17-006-65TH AVE, USA/CAD/SHEET/87-17-006-EC-604X-INT.DWG

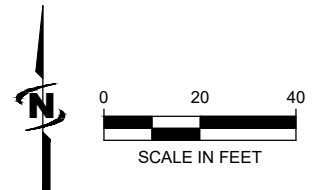
BID SET

NO.	DESCRIPTION	BY	APPR.	DATE

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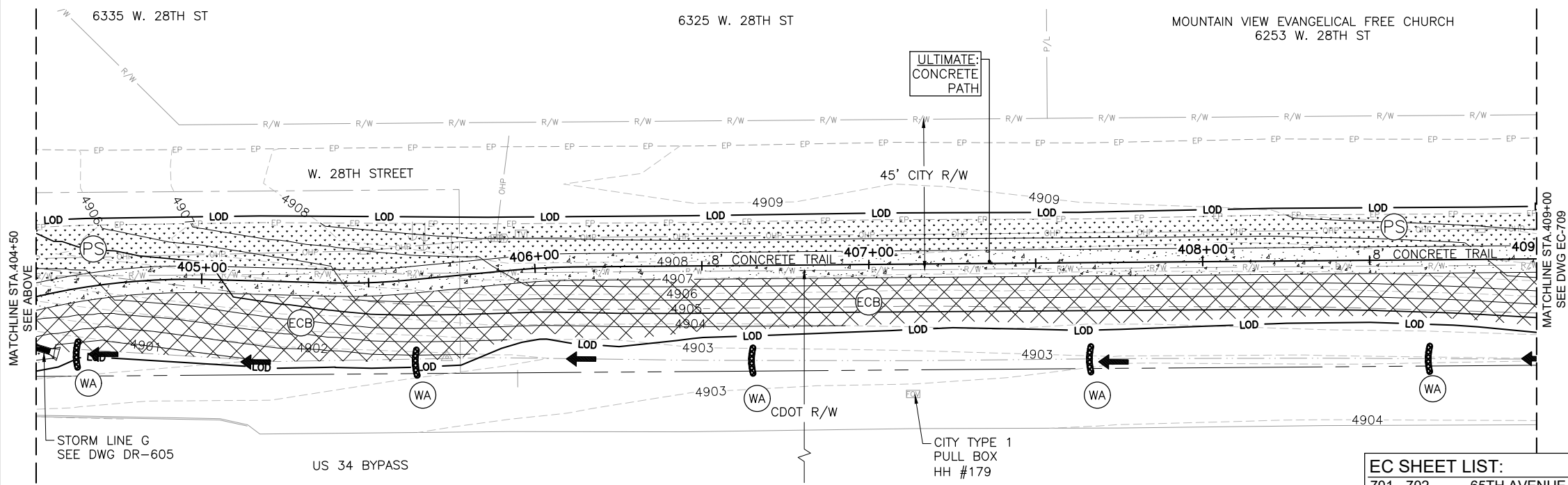
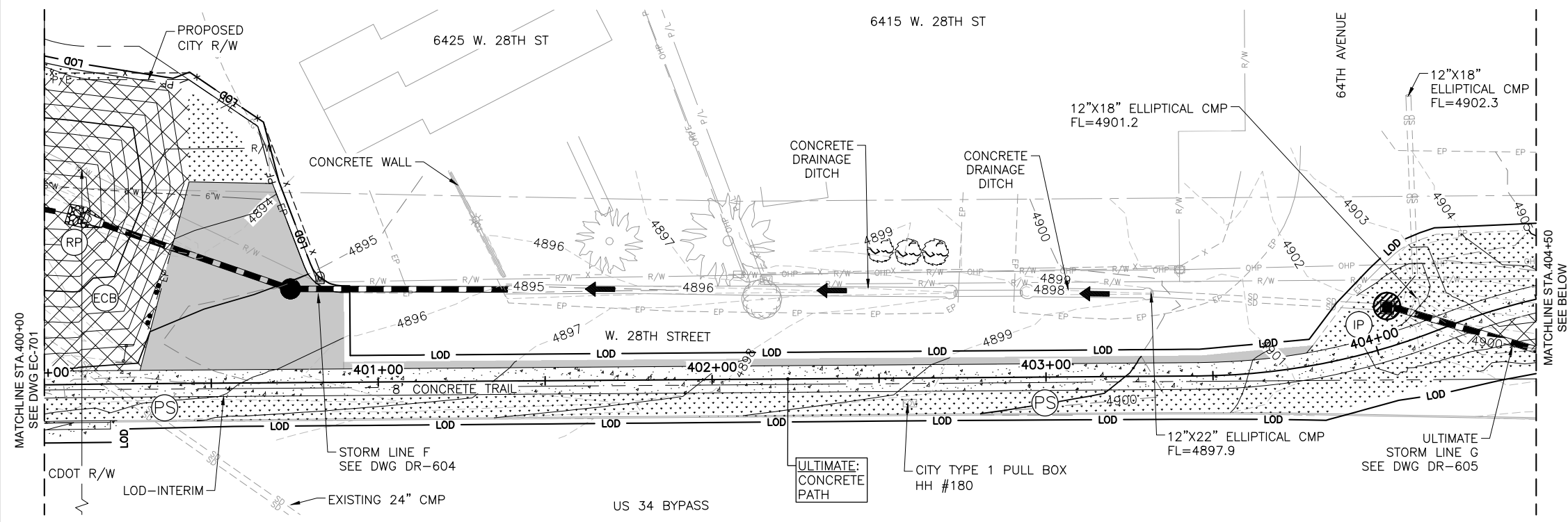
65th AVENUE ROAD WIDENING
CITY OF GREELEY
INTERIM & ULTIMATE
EROSION CONTROL PLAN

FILE: 87-17-006-EC-606X
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020
DRAWING NUMBER:
EC-708
SHEET
85
OF
115



TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	
ROCK SOCK	(RS)	
WATTLE	(WA)	
STAGING & STOCKPILE AREA	(SSA)	
INLET PROTECTION	(IP)	
SEDIMENT TRAP	(ST)	
VEHICLE TRACKING CONTROL	(VTC)	
CONCRETE WASHOUT AREA	(CWA)	
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	
RIPRAP	(RP)	
SILT FENCE	(SF)	
LIMITS OF DISTURBANCE	(LOD)	
ORANGE PLASTIC SAFETY FENCE	(PF)	
PROPOSED MAJOR CONTOUR	4900	
PROPOSED MINOR CONTOUR	4902	
EXISTING MAJOR CONTOUR	4900	
EXISTING MINOR CONTOUR	4902	
FLOW ARROW		

- NOTES:**
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
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 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
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EC SHEET LIST:

701 - 702	--- 65TH AVENUE & POND
703	--- INTERIM: W. OF 65TH AVE
703 - 705	--- ULTIMATE: W. OF 65TH AVE
706 - 707	--- INTERIM: W. OF 65TH AVE
708	--- INTERIM: E. OF 65TH AVE
708 - 709	--- ULTIMATE: E. OF 65TH AVE



Plot Date: 2/3/2020 4:48 PM, Plotted By: Amber Morse
 Date Created: 2/2/2020, P:\PROJECTS\JUB\Greeley\87-17-006-65th Ave US&CAD\SHEET\87-17-006-EC-606X.DWG

BID SET

NO.	DESCRIPTION	BY	APPR.	DATE

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65th AVENUE ROAD WIDENING
CITY OF GREELEY
**ULTIMATE
EROSION CONTROL PLAN**

FILE: 87-17-006-EC-606X
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020

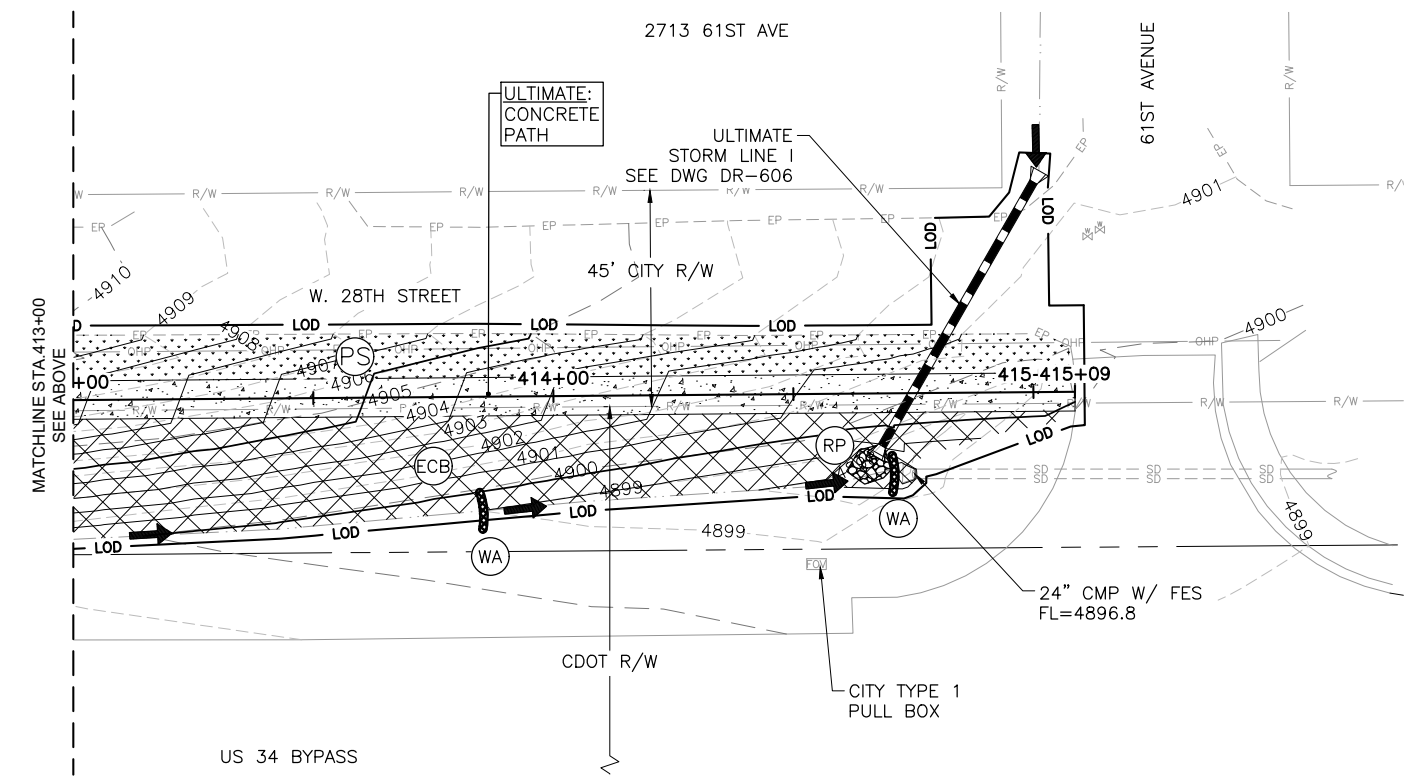
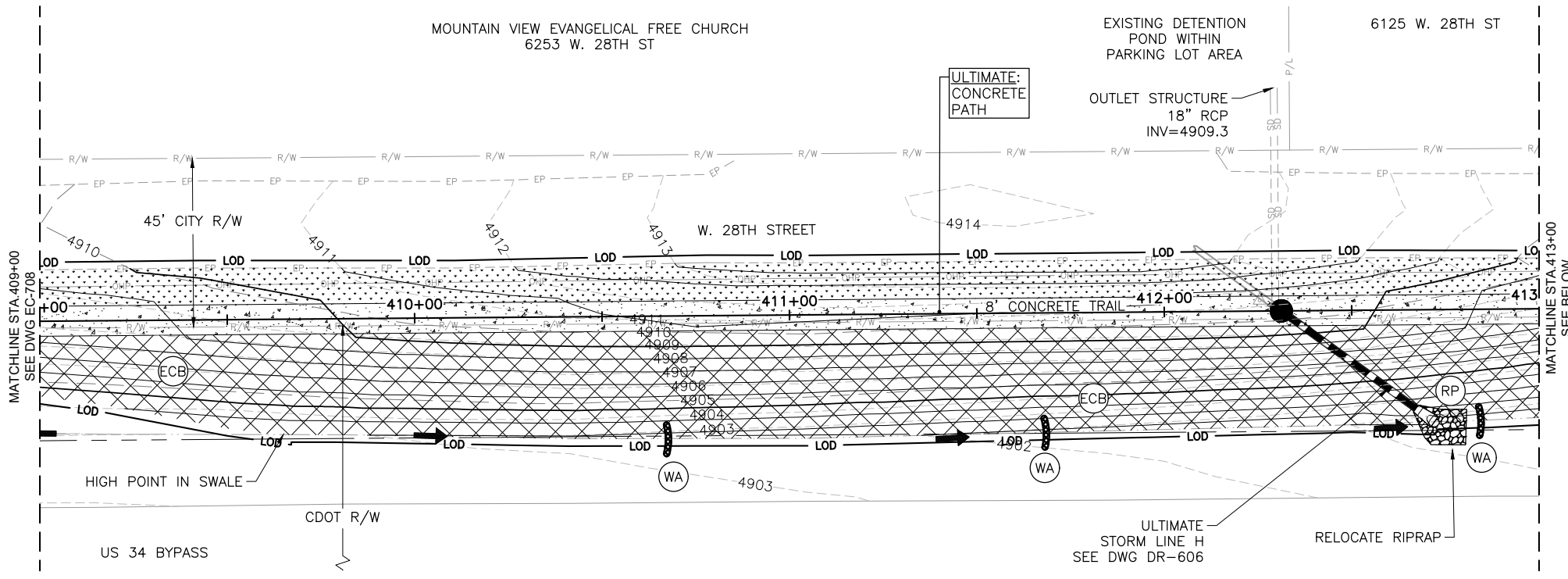
DRAWING NUMBER:
EC-709

SHEET
86
OF
115



LEGEND		
TITLE	KEY	SYMBOL
PERMANENT SEEDING	(PS)	(PS)
ROCK SOCK	(RS)	(RS)
WATTLE	(WA)	(WA)
STAGING & STOCKPILE AREA	(SSA)	(SSA)
INLET PROTECTION	(IP)	(IP)
SEDIMENT TRAP	(ST)	(ST)
VEHICLE TRACKING CONTROL	(VTC)	(VTC)
CONCRETE WASHOUT AREA	(CWA)	(CWA)
PERMANENT SEEDING & EROSION CONTROL BLANKET INCLUDES 3:1 & 4:1 SLOPES	(ECB)	(ECB)
RIPRAP	(RP)	(RP)
SILT FENCE	(SF)	SF
LIMITS OF DISTURBANCE	(LOD)	LOD
ORANGE PLASTIC SAFETY FENCE	(PF)	PF
PROPOSED MAJOR CONTOUR	— 4900 —	— 4900 —
PROPOSED MINOR CONTOUR	— 4902 —	— 4902 —
EXISTING MAJOR CONTOUR	- - - 4900 - - -	- - - 4900 - - -
EXISTING MINOR CONTOUR	- - - 4902 - - -	- - - 4902 - - -
FLOW ARROW		→

- NOTES:**
- SEE EC-710 TO EC-711 FOR EROSION CONTROL DETAILS AND NOTES.
 - SEE EC-710 FOR RIPRAP TABLE.
 - ROCK SOCKS TO BE USED ON PAVEMENT AND WATTLE TO BE USED IN GRASSY SWALES.
 - SOIL RETENTION BLANKET SHALL BE BIODEGRADABLE STRAW/COCONUT AND SHALL MEET THE LATEST REVISION (STANDARD SPECIAL PROVISION) OF CDOT SECTION 216 AND INCLUDE SEEDING.
 - TOPSOIL AND PERMANENT SEEDING TO BE PLACED BEFORE INSTALLING EROSION CONTROL BLANKET.
 - IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE THEIR OWN STAGING AREA(S). THE CONTRACTOR SHALL SUPPLY THE CITY WITH WRITTEN PERMISSION FROM THE LAND OWNER ALLOWING STAGING ON THEIR LAND.
 - ALL AREAS DISTURBED OUTSIDE DESIGNATED AREAS OF DISTURBANCE, INCLUDING STAGING AREAS, SHALL BE RETURNED TO EXISTING CONDITIONS. ALL CONCRETE WASHOUT STRUCTURES MUST BE MOBILE ECO-PAN WASHOUTS OR EQUIVALENT. COST OF REPLACEMENT PAN SHALL BE INCIDENTAL TO THE COST OF THE WASHOUT.
 - CONTRACTOR TO COMPLETE AND COMPLY WITH A STORMWATER MANAGEMENT PLAN (SWMP) IN COMPLIANCE WITH CDPS GENERAL PERMIT COR400000.



EC SHEET LIST:

701 - 702	---	65TH AVENUE & POND
703	---	INTERIM: W. OF 65TH AVE
703 - 705	---	ULTIMATE: W. OF 65TH AVE
706 - 707	---	INTERIM: W. OF 65TH AVE
708	---	INTERIM: E. OF 65TH AVE
708 - 709	---	ULTIMATE: E. OF 65TH AVE



APPENDIX C – HYDROLOGIC CALCULATIONS

EXISTING SITE HYDROLOGY

65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Updated By: A Morse
Updated Date: 10.17.2019

Basins within CDOT R/W

Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
H1	0.16	0.70	0.81	0.65	1.22
H2	0.22	0.79	0.86	1.00	1.76
H3	2.62	0.20	0.52	1.20	6.51
H4	0.38	0.57	0.73	1.22	2.59
H5	1.43	0.19	0.51	0.59	3.56
H6	1.25	0.16	0.49	0.40	2.99
H7	0.57	0.53	0.71	1.08	2.41
H8	0.35	0.78	0.85	1.60	2.82
H9	12.79	0.25	0.54	7.90	34.08
H10	0.69	0.13	0.47	0.15	1.69
H11	0.09	0.64	0.77	0.30	0.60
H12	2.16	0.54	0.71	4.86	10.65
H13	0.56	0.28	0.56	0.50	1.92
H14	1.28	0.37	0.61	1.63	4.78
H15	0.45	0.46	0.67	1.13	2.80
H16	0.85	0.59	0.74	2.26	4.70
H17	0.09	0.07	0.44	0.00	0.34
H18	0.48	0.46	0.67	1.24	3.06
H19	1.11	0.45	0.66	2.70	6.87
H20	4.55	0.48	0.67	6.76	17.32
H21	1.35	0.15	0.49	0.26	4.05
H22	4.71	0.47	0.67	7.32	19.08
Combined Basins to Design Point (DP)					
H12	22.50	0.28	0.56	15.61	60.31
H20	10.61	0.41	0.64	12.82	35.02
H20	Add 7-cfs for offsite Storm Line A in Basin OS →				42.02
<p>Basin DP H12 is made up of the combined areas of Basins H3 and H5 to H13. It is used for routing flows to the existing storm line system that routes south to St. Michael's detention pond.</p> <p>Basin DP H20 is made up of the combined areas of Basins H20 to H22 and OS.</p> <p>Basin H16 and Combined Basins to DP H12 route to existing storm line system that routes south to St. Michael's detention pond. A Maximum of 12.7-cfs can route in this existing storm line.</p>					

EXISTING WEIGHTED RUNOFF COEFFICIENTS
 65th Avenue Road Widening at 65th Ave.& US 34 Bypass
 87-17-006

Updated By: A Morse
 Updated Date: 12.05.2019

Basins within CDOT R/W

1 acre= 43,560

Basin	Total Area ft ²	Total Area acres	Paved Area (100% Impervious) acres	Gravel (40% Impervious) acres	Concrete (90% Impervious) acres	Roof Area (90% Impervious) acres	Historic Area and Lawns (2% Impervious) acres	Composite				Notes	Imperviousness
								"C2"	"C5"	"C10"	"C100"		
H1	6,982	0.16	0.12	0.00	0.00	0.00	0.04	0.65	0.68	0.70	0.81	Soil Type B	73%
H2	9,466	0.22	0.18	0.00	0.00	0.00	0.04	0.74	0.77	0.79	0.86	Soil Type B	83%
H3	114,000	2.62	0.06	0.36	0.04	0.23	1.93	0.14	0.15	0.20	0.52	Soil Type B	18%
H4	16,358	0.38	0.20	0.05	0.00	0.00	0.13	0.52	0.54	0.57	0.73	Soil Type B	59%
H5	62,420	1.43	0.03	0.03	0.04	0.14	1.19	0.13	0.13	0.19	0.51	Soil Type B	16%
H6	54,353	1.25	0.03	0.09	0.01	0.07	1.05	0.10	0.10	0.16	0.49	Soil Type B	13%
H7	24,667	0.57	0.20	0.13	0.04	0.02	0.17	0.48	0.50	0.53	0.71	Soil Type B	56%
H8	15,327	0.35	0.18	0.07	0.10	0.00	0.00	0.73	0.76	0.78	0.85	Soil Type B	85%
H9	557,179	12.79	1.34	1.04	0.42	0.73	9.26	0.19	0.20	0.25	0.54	Soil Type B	23%
H10	29,944	0.69	0.00	0.13	0.00	0.00	0.56	0.06	0.07	0.13	0.47	Soil Type B	9%
H11	3,879	0.09	0.06	0.00	0.00	0.00	0.03	0.59	0.61	0.64	0.77	Soil Type B	67%
H12	94,140	2.16	0.29	0.01	1.09	0.00	0.77	0.50	0.51	0.54	0.71	Soil Type B	60%
H13	24,242	0.56	0.00	0.00	0.16	0.00	0.39	0.22	0.23	0.28	0.56	Soil Type B	28%
H14	55,705	1.28	0.00	0.00	0.55	0.00	0.73	0.32	0.33	0.37	0.61	Soil Type B	40%
H15	19,385	0.45	0.20	0.00	0.00	0.00	0.24	0.41	0.42	0.46	0.67	Soil Type B	46%
H16	36,986	0.85	0.35	0.05	0.17	0.00	0.28	0.54	0.56	0.59	0.74	Soil Type B	63%
H17	4,032	0.09	0.00	0.00	0.00	0.00	0.09	0.01	0.01	0.07	0.44	Soil Type B	2%
H18	21,089	0.48	0.22	0.00	0.00	0.00	0.26	0.41	0.43	0.46	0.67	Soil Type B	47%
H19	48,173	1.11	0.41	0.21	0.00	0.00	0.49	0.39	0.41	0.45	0.66	Soil Type B	45%
H20	198,078	4.55	1.82	0.04	0.26	0.00	2.43	0.38	0.41	0.48	0.67	Soil Type C/D	47%
H21	58,668	1.35	0.00	0.00	0.00	0.00	1.35	0.01	0.05	0.15	0.49	Soil Type C/D	2%
H22	205,369	4.71	2.00	0.24	0.00	0.00	2.48	0.37	0.40	0.47	0.67	Soil Type C/D	45%
Combined Basins to Design Point (DP)													
H12	980,151	22.50	2.17	1.87	1.91	1.19	15.35	0.22	0.23	0.28	0.56	Soil Type B	27%
H20	462,115	10.61	3.82	0.28	0.26	0.00	6.26	0.35	0.37	0.41	0.64	Soil Type B	40%
CDOT	497,618	11.42	3.33	0.37	2.34	0.00	5.39	0.42	0.44	0.48	0.67	Soil Type B	50%
DP H12 is combined basins 3 and 5 to 13													
DP H20 is combined basins 20 to 22 & OS													
CDOT is combined basins within the CDOT Right-of-Way: 8, 11 to 14, 16, and 18 to 20. Used to compare increased Imperviousness of the site.													

Soil Type A

Year	Percentage Impervious	Percentage Impervious (40%) Gravel	Percentage Impervious (90%) Roofs	Percentage Impervious	Percentage Impervious
C2	0.84	0.25	0.73	0.73	0.01
C5	0.86	0.27	0.75	0.75	0.01
C10	0.87	0.28	0.77	0.77	0.01
C100	0.88	0.42	0.81	0.81	0.13

Soil Type B

Year	Percentage Impervious	Percentage Impervious (40%) Gravel	Percentage Impervious (90%) Roofs	Percentage Impervious	Percentage Impervious
C2	0.89	0.29	0.74	0.74	0.01
C5	0.93	0.32	0.76	0.76	0.01
C10	0.94	0.38	0.78	0.78	0.07
C100	0.94	0.61	0.84	0.84	0.44

Soil Type C/D

Year	Percentage Impervious	Percentage Impervious (40%) Gravel	Percentage Impervious (90%) Roofs	Percentage Impervious	Percentage Impervious
C2	0.83	0.30	0.74	0.74	0.01
C5	0.85	0.36	0.77	0.77	0.05
C10	0.87	0.43	0.79	0.79	0.15
C100	0.89	0.65	0.85	0.85	0.49

Refer to Table 6-3 Recommended Percentage Imperviousness Values
 Refer to Table 6-5 "Runoff Coefficients" in Urban Storm Drainage Criteria Manual
 NRCS Hydrology Soils-Refer to notes
 Refer to Table 6-3 Recommended Percentage Imperviousness Values
 Refer to Table 6-5 "Runoff Coefficients" in Urban Storm Drainage Criteria Manual
 NRCS Hydrology Soils-Refer to notes

EXISTING TIME OF CONCENTRATION

65th Avenue Road Widening at 65th Ave. & US 34 Bypass
87-17-006

Basins within CDOT R/W

Updated By: A Morse
Updated Date: 10.14.2019

BASIN DATA			INITIAL/OVERLAND FLOW TIME			CHANNELIZED FLOW TIME					t _c CHECK	FINAL
Basin	Total Area acres	C5	Length (L _i) ft	Slope %	t _i min	Length (L _i) ft	Channel Type	Slope (S _o) %	Velocity (V _i) ft/s	t _t min	t _c min	t _c min
H1	0.16	0.68	45	1.89	4.15	22	PA	5.49	4.69	0.08	13.58	5.00
H2	0.22	0.77	44	2.66	2.84	28	PA	6.68	5.17	0.09	11.86	5.00
H3	2.62	0.15	300	2.02	23.56	83	GW	0.05	0.33	4.20	25.18	25.18
H4	0.38	0.54	44	2.86	4.71	55	GW	3.73	2.90	0.32	15.95	5.03
H5	1.43	0.13	300	2.18	23.42	113	GW	0.49	1.05	1.80	24.39	24.39
H6	1.25	0.10	300	2.05	24.62	87	GW	1.23	1.66	0.87	24.51	24.51
H7	0.57	0.50	149	0.26	20.78	93	GW	4.08	3.03	0.51	16.54	16.54
H8	0.35	0.76	189	2.25	6.41	0	PA	0.00	0.00	0.00	0.00	5.00
H9	12.79	0.20	300	2.11	22.03	395	PA	0.69	1.66	3.97	24.39	24.39
H10	0.69	0.07	195	2.13	20.29	105	GW	0.60	1.16	1.50	26.09	21.79
H11	0.09	0.61	102	4.64	5.34	38	GW	0.13	0.54	1.16	14.87	6.50
H12	2.16	0.51	55.8	2.13	6.18	869	PA	1.49	2.44	5.93	17.28	12.11
H13	0.56	0.23	26	1.16	7.63	682	GW	0.91	1.43	7.95	24.27	15.58
H14	1.28	0.33	55.6	2.16	8.04	644	GW	0.81	1.35	7.97	21.39	16.02
H15	0.45	0.42	12.25	3.51	2.82	16	PA	16.67	8.16	0.03	18.17	5.00
H16	0.85	0.56	37.3	2.09	4.64	489	GW	0.96	1.47	5.54	16.25	10.18
H17	0.09	0.01	5	2.00	3.50	268	GW	0.52	1.08	4.12	40.02	7.62
H18	0.48	0.43	60	6.58	5.04	0	PA	0.00	0.00	0.00	0.00	5.00
H19	1.11	0.41	68	4.66	6.19	0	PA	0.00	0.00	0.00	0.00	5.00
H20	4.55	0.41	146.9	4.24	9.32	1212	GW	2.08	2.16	9.34	20.18	18.66
H21	1.35	0.05	20	2.00	6.74	1161	GW	2.00	2.12	9.12	57.48	15.87
H22	4.71	0.40	50	2.00	7.06	1177	GW	2.00	2.12	9.25	20.41	16.31
Combined Basins to Design Point (DP)												
H12	22.50	0.23	925	2.00	38.09	1415	GW	2.37	2.31	10.21	25.38	25.38
H20	10.61	0.37	134	2.00	12.18	1856	GW	3.37	2.75	11.23	22.03	22.03
DP H12 is combined basins 3 and 5 to 13												
DP H20 is combined basins 20 to 22 & OS												

Note:

1) Codes for Figure RO-1, the channel type for velocity calculations:

Type of Land Surface		Conveyance Factor (K _o)
Heavy meadow	HM	2.5
Tillage/field	TF	5
Short pasture and lawns	PL	7
Nearly bare ground	BG	10
Grassed waterway	GW	15
Paved areas and shallow paved swales	PA	20

$$2) \quad t_i = \frac{0.395(1.1 - C_s)\sqrt{L_i}}{S_o^{0.33}} \quad t_t = \frac{L_i}{60K_o\sqrt{S_o}} = \frac{L_i}{60V_t} \quad \text{OR} \quad t_c = (26 - 17i) + \frac{L_i}{60(14i + 9)\sqrt{S_o}}$$

$$t_c = t_i + t_t$$

3) The velocity for the travel time was determined using Table 6-2 and the equation: $V=K\sqrt{S_o}$.

4) The minimum t_c for non-urban watershed is 10 minutes and 5 minutes for urban watersheds

5) Initial/Overland Length is 500 feet maximum for non-urban watersheds and 300 feet maximum for urban watersheds.

RATIONAL METHOD
EXISTING 2-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
H1	0.16	0.65	0.10	5.0	3.53	0.37
H2	0.22	0.74	0.16	5.0	3.53	0.57
H3	2.62	0.14	0.37	25.2	1.81	0.67
H4	0.38	0.52	0.19	5.0	3.52	0.68
H5	1.43	0.13	0.18	24.4	1.84	0.34
H6	1.25	0.10	0.12	24.5	1.83	0.22
H7	0.57	0.48	0.27	16.5	2.25	0.61
H8	0.35	0.73	0.26	5.0	3.53	0.91
H9	12.79	0.19	2.43	24.4	1.84	4.47
H10	0.69	0.06	0.04	21.8	1.95	0.08
H11	0.09	0.59	0.05	6.5	3.27	0.17
H12	2.16	0.50	1.07	12.1	2.60	2.79
H13	0.56	0.22	0.12	15.58	2.32	0.29
H14	1.28	0.32	0.41	16.0	2.29	0.94
H15	0.45	0.41	0.18	5.0	3.53	0.64
H16	0.85	0.54	0.46	10.2	2.79	1.28
H17	0.09	0.01	0.00	7.6	3.11	0.00
H18	0.48	0.41	0.20	5.0	3.53	0.70
H19	1.11	0.39	0.43	5.0	3.53	1.51
H20	4.55	0.38	1.74	18.7	2.12	3.69
H21	1.35	0.01	0.01	15.87	2.30	0.03
H22	4.71	0.37	1.75	16.31	2.27	3.98
Combined Basins to Design Point (DP)						
H12	22.50	0.22	4.93	25.38	1.80	8.85
H20	10.61	0.35	3.73	22.03	1.94	7.25
DP H12 is combined basins 3 and 5 to 13						
DP H20 is combined basins 20 to 22 & OS						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 2 year storm:

$$P_1 = 1.04$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

RATIONAL METHOD
EXISTING 5-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
H1	0.16	0.68	0.11	5.0	5.05	0.55
H2	0.22	0.77	0.17	5.0	5.05	0.85
H3	2.62	0.15	0.39	25.2	2.59	1.01
H4	0.38	0.54	0.20	5.0	5.05	1.03
H5	1.43	0.13	0.19	24.4	2.63	0.50
H6	1.25	0.10	0.13	24.5	2.63	0.34
H7	0.57	0.50	0.28	16.5	3.23	0.91
H8	0.35	0.76	0.27	5.0	5.05	1.36
H9	12.79	0.20	2.54	24.4	2.63	6.69
H10	0.69	0.07	0.05	21.8	2.80	0.13
H11	0.09	0.61	0.05	6.5	4.69	0.26
H12	2.16	0.51	1.11	12.1	3.73	4.12
H13	0.56	0.23	0.13	15.58	3.32	0.42
H14	1.28	0.33	0.42	16.0	3.28	1.38
H15	0.45	0.42	0.19	5.0	5.05	0.95
H16	0.85	0.56	0.48	10.2	4.00	1.91
H17	0.09	0.01	0.00	7.62	4.45	0.00
H18	0.48	0.43	0.21	5.00	5.05	1.05
H19	1.11	0.41	0.45	5.0	5.05	2.28
H20	4.55	0.41	1.88	18.7	3.04	5.72
H21	1.35	0.05	0.07	15.9	3.29	0.22
H22	4.71	0.40	1.91	16.31	3.25	6.20
Combined Basins to Design Point (DP)						
H12	22.50	0.23	5.13	25.38	2.57	13.21
H20	10.61	0.37	3.90	22.03	2.78	10.85
DP H12 is combined basins 3 and 5 to 13						
DP H20 is combined basins 20 to 22 & OS						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 5 year storm:

$$P_1 = 1.49$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

RATIONAL METHOD
EXISTING 10-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
H1	0.16	0.68	0.11	5.0	5.97	0.65
H2	0.22	0.77	0.17	5.0	5.97	1.00
H3	2.62	0.15	0.39	25.2	3.05	1.20
H4	0.38	0.54	0.20	5.0	5.96	1.22
H5	1.43	0.13	0.19	24.4	3.11	0.59
H6	1.25	0.10	0.13	24.5	3.10	0.40
H7	0.57	0.50	0.28	16.5	3.81	1.08
H8	0.35	0.76	0.27	5.0	5.97	1.60
H9	12.79	0.20	2.54	24.4	3.11	7.90
H10	0.69	0.07	0.05	21.8	3.31	0.15
H11	0.09	0.61	0.05	6.5	5.54	0.30
H12	2.16	0.51	1.11	12.1	4.40	4.86
H13	0.56	0.23	0.13	15.58	3.92	0.50
H14	1.28	0.33	0.42	16.0	3.87	1.63
H15	0.45	0.42	0.19	5.0	5.97	1.13
H16	0.85	0.56	0.48	10.2	4.73	2.26
H17	0.09	0.01	0.00	7.6	5.26	0.00
H18	0.48	0.43	0.21	5.0	5.97	1.24
H19	1.11	0.41	0.45	5.0	5.97	2.70
H20	4.55	0.41	1.88	18.7	3.59	6.76
H21	1.35	0.05	0.07	15.9	3.89	0.26
H22	4.71	0.40	1.91	16.31	3.84	7.32
Combined Basins to Design Point (DP)						
H12	22.50	0.23	5.13	25.38	3.04	15.61
H20	10.61	0.37	3.90	22.03	3.29	12.82
DP H12 is combined basins 3 and 5 to 13						
DP H20 is combined basins 20 to 22 & OS						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 10 year storm:

$$P_1 = 1.76$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

RATIONAL METHOD
EXISTING 100-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF						REMARKS
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs	
H1	0.16	0.81	0.13	5.0	9.43	1.22	
H2	0.22	0.86	0.19	5.0	9.43	1.76	
H3	2.62	0.52	1.35	25.2	4.83	6.51	
H4	0.38	0.73	0.27	5.0	9.41	2.59	
H5	1.43	0.51	0.72	24.4	4.91	3.56	
H6	1.25	0.49	0.61	24.5	4.90	2.99	
H7	0.57	0.71	0.40	16.5	6.02	2.41	
H8	0.35	0.85	0.30	5.0	9.43	2.82	
H9	12.79	0.54	6.94	24.4	4.91	34.08	
H10	0.69	0.47	0.32	21.8	5.22	1.69	
H11	0.09	0.77	0.07	6.5	8.75	0.60	
H12	2.16	0.71	1.53	12.1	6.95	10.65	
H13	0.56	0.56	0.31	15.58	6.20	1.92	
H14	1.28	0.61	0.78	16.0	6.12	4.78	
H15	0.45	0.67	0.30	5.0	9.43	2.80	
H16	0.85	0.74	0.63	10.2	7.47	4.70	
H17	0.09	0.44	0.04	7.62	8.31	0.34	
H18	0.48	0.67	0.32	5.00	9.43	3.06	
H19	1.11	0.66	0.73	5.0	9.43	6.87	
H20	4.55	0.67	3.06	18.7	5.67	17.32	
H21	1.35	0.49	0.66	15.9	6.14	4.05	
H22	4.71	0.67	3.15	16.31	6.06	19.08	
Combined Basins to Design Point (DP)							
H12	22.50	0.56	12.56	25.38	4.80	60.31	Add 7-cfs for offsite flows
H20	10.61	0.64	6.74	22.03	5.19	35.02	
DP H12 is combined basins 3 and 5 to 13							
DP H20 is combined basins 20 to 22 & OS							

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 100 year storm:

$$P_1 = 2.78$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

PROPOSED SITE HYDROLOGY

65th Avenue Road Widening at 65th Ave. & US 34 Bypass
87-17-006

Updated By: A Morse

Basins within CDOT R/W

Updated Date: 10.17.2019

Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
P1	0.12	0.67	0.79	0.48	0.92
P2	1.27	0.32	0.58	1.12	3.82
P3	0.28	0.94	0.94	1.55	2.49
P4	1.09	0.35	0.60	1.15	3.54
P5	1.92	0.16	0.49	0.63	4.59
P6	0.48	0.77	0.83	1.97	3.47
P7	0.16	0.66	0.78	0.62	1.19
P8	0.11	0.62	0.75	0.32	0.64
P9	0.52	0.76	0.84	2.24	4.02
P10	0.95	0.78	0.84	3.72	6.50
P11	0.19	0.94	0.94	1.07	1.72
P12	14.38	0.22	0.52	7.09	36.03
P13	0.72	0.37	0.61	1.01	2.97
P14	0.26	0.57	0.73	0.82	1.75
P15	0.58	0.42	0.64	1.15	3.06
P16	0.56	0.28	0.56	0.50	1.92
P17	1.28	0.39	0.62	1.73	4.88
P18	0.45	0.61	0.75	1.56	3.16
P19	0.58	0.60	0.75	1.47	3.03
P20	0.46	0.60	0.75	1.58	3.25
P21	1.12	0.53	0.70	3.31	7.44
P22	4.54	0.52	0.70	7.56	17.96

Combined Basins to Design Point (DP)

P5	3.29	0.29	0.57	2.60	9.56
P7	0.64	0.74	0.82	2.48	4.46
P8	0.64	0.74	0.82	2.44	4.40
P9	1.27	0.74	0.82	5.44	9.87
P11a	1.14	0.81	0.86	4.52	7.76
P11b	5.70	0.49	0.68	4.52	20.97
P13	0.98	0.42	0.64	1.63	4.31
P15	22.20	0.30	0.57	13.32	47.15
P17	1.72	0.45	0.65	2.80	7.07

DP P5 is combined basins P3 to P5 for sizing of Culvert.

DP P7 is combined basins P6 and P7 for routing of CDOT R/W.

DP P8 is combined basins P7 to P8 for design check at Curb Cut.

DP P9 is combined basins P6 to P9 for Inlet sizing.

DP P11a is combined basins P10 to P11 for Inlet sizing.

DP P11b is combined basins P3 to P11 for Swale sizing.

DP P13 is combined basins P13 to P14 for Culvert sizing.

DP P15 is combined basins P3 to P16 for Detention Pond sizing.

DP P17 is combined basins P17 to P18 for Existing Culvert design check.

PROPOSED WEIGHTED RUNOFF COEFFICIENTS
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Updated By: A Morse
Updated Date: 12.05.2019

Basins within CDOT R/W

1 acre= 43,560

Basin	Total Area ft ²	Total Area acres	Paved Area (100% Impervious) acres	Gravel (40% Impervious) acres	Concrete (90% Impervious) acres	Roof Area (90% Impervious) acres	Historic Area and Lawns (2% Impervious) acres	Composite				Notes	Imperviousness
								"C2"	"C5"	"C10"	"C100"		
P1	5,369	0.12	0.09	0.00	0.00	0.00	0.04	0.62	0.65	0.67	0.79	Soil Type B	70%
P2	55,152	1.27	0.11	0.31	0.03	0.15	0.67	0.25	0.27	0.32	0.58	Soil Type B	32%
P3	12,164	0.28	0.28	0.00	0.00	0.00	0.00	0.89	0.93	0.94	0.94	Soil Type B	100%
P4	47,526	1.09	0.27	0.04	0.01	0.08	0.69	0.30	0.31	0.35	0.60	Soil Type B	35%
P5	83,432	1.92	0.04	0.03	0.04	0.14	1.66	0.10	0.11	0.16	0.49	Soil Type B	13%
P6	20,858	0.48	0.01	0.00	0.46	0.00	0.01	0.73	0.75	0.77	0.83	Soil Type B	89%
P7	7,067	0.16	0.07	0.05	0.03	0.00	0.01	0.61	0.64	0.66	0.78	Soil Type B	72%
P8	4,857	0.11	0.00	0.05	0.04	0.03	0.00	0.56	0.58	0.62	0.75	Soil Type B	70%
P9	22,736	0.52	0.36	0.16	0.00	0.00	0.01	0.70	0.74	0.76	0.84	Soil Type B	81%
P10	41,453	0.95	0.00	0.00	0.95	0.00	0.00	0.74	0.76	0.78	0.84	Soil Type B	90%
P11	8,416	0.19	0.19	0.00	0.00	0.00	0.00	0.89	0.93	0.94	0.94	Soil Type B	100%
P12	626,527	14.38	0.98	1.20	0.43	0.80	10.97	0.16	0.16	0.22	0.52	Soil Type B	19%
P13	31,425	0.72	0.00	0.00	0.30	0.00	0.42	0.32	0.33	0.37	0.61	Soil Type B	39%
P14	11,110	0.26	0.12	0.00	0.04	0.00	0.10	0.52	0.54	0.57	0.73	Soil Type B	59%
P15	25,411	0.58	0.17	0.00	0.08	0.00	0.33	0.37	0.38	0.42	0.64	Soil Type B	43%
P16	24,242	0.56	0.00	0.00	0.16	0.00	0.39	0.22	0.23	0.28	0.56	Soil Type B	28%
P17	55,694	1.28	0.00	0.00	0.58	0.00	0.70	0.34	0.35	0.39	0.62	Soil Type B	42%
P18	19,385	0.45	0.20	0.00	0.10	0.00	0.15	0.56	0.59	0.61	0.75	Soil Type B	65%
P19	25,082	0.58	0.34	0.02	0.00	0.00	0.21	0.55	0.57	0.60	0.75	Soil Type B	62%
P20	20,064	0.46	0.22	0.00	0.08	0.00	0.16	0.55	0.57	0.60	0.75	Soil Type B	64%
P21	48,785	1.12	0.43	0.12	0.15	0.00	0.42	0.47	0.50	0.53	0.70	Soil Type B	55%
P22	197,762	4.54	1.79	0.12	0.57	0.00	2.06	0.43	0.46	0.52	0.70	Soil Type C/D	53%
Combined Basins to Design Point (DP)													
P5	143,122	3.29	0.59	0.07	0.05	0.22	2.35	0.23	0.24	0.29	0.57	Soil Type B	28%
P7	27,925	0.64	0.08	0.05	0.49	0.00	0.02	0.70	0.72	0.74	0.82	Soil Type B	84%
P8	27,925	0.64	0.08	0.05	0.49	0.00	0.02	0.70	0.72	0.74	0.82	Soil Type B	84%
P9	55,518	1.27	0.44	0.25	0.53	0.03	0.03	0.69	0.72	0.74	0.82	Soil Type B	82%
P11a	49,869	1.14	0.19	0.00	0.95	0.00	0.00	0.77	0.79	0.81	0.86	Soil Type B	92%
P11b	248,509	5.70	1.21	0.32	1.54	0.25	2.38	0.44	0.46	0.49	0.68	Soil Type B	53%
P13	42,535	0.98	0.12	0.00	0.34	0.00	0.52	0.37	0.38	0.42	0.64	Soil Type B	44%
P15	967,224	22.20	2.48	1.53	2.55	1.05	14.60	0.25	0.26	0.30	0.57	Soil Type B	30%
P17	75,079	1.72	0.20	0.00	0.67	0.00	0.85	0.40	0.41	0.45	0.65	Soil Type B	48%
CDOT	497,843	11.43	3.02	0.31	3.37	0.00	4.72	0.47	0.48	0.52	0.70	Soil Type B	55%
DP P5 is combined basins P3 to P5 for sizing of Culvert. DP P7 is combined basins P6 and P7 for routing of CDOT R/W. DP P8 is combined basins P7 to P8 for design check at Curb Cut. DP P9 is combined basins P6 to P9 for Inlet sizing. DP P11a is combined basins P10 to P11 for Inlet sizing. DP P11b is combined basins P3 to P11 for Swale sizing. DP P13 is combined basins P13 to P14 for Culvert sizing. DP P15 is combined basins P3 to P16 for Detention Pond sizing. DP P17 is combined basins P17 to P18 for Existing Culvert design check. CDOT is combined basins within the CDOT Right-of-Way: P6, P7, P10, P13, P15 to P17 and P19 to P22. Used to compare increased Imperviousness of the site.													

Soil Type A						
Year	Percentage Impervious	Percentage Impervious (40%) Gravel	Percentage Impervious (90%) Roofs	Percentage Impervious	Percentage Impervious (2%)	
C2	0.84	0.25	0.73	0.73	0.01	
C5	0.86	0.27	0.75	0.75	0.01	
C10	0.87	0.28	0.77	0.77	0.01	
C50	0.88	0.37	0.79	0.79	0.04	
C100	0.89	0.42	0.81	0.81	0.13	
Soil Type B						
Year	Percentage Impervious	Percentage Impervious (40%) Gravel	Percentage Impervious (90%) Roofs	Percentage Impervious	Percentage Impervious (2%)	
C2	0.89	0.29	0.74	0.74	0.01	
C5	0.93	0.32	0.76	0.76	0.01	
C10	0.94	0.38	0.78	0.78	0.07	
C50	0.89	0.55	0.83	0.83	0.34	
C100	0.94	0.61	0.84	0.84	0.44	
Soil Type C/D						
Year	Percentage Impervious	Percentage Impervious (40%) Gravel	Percentage Impervious (90%) Roofs	Percentage Impervious	Percentage Impervious (2%)	
C2	0.83	0.30	0.74	0.74	0.01	
C5	0.85	0.36	0.77	0.77	0.05	
C10	0.87	0.43	0.79	0.79	0.15	
C50	0.89	0.59	0.84	0.84	0.40	
C100	0.89	0.65	0.85	0.85	0.49	

Refer to Table 6-3 Recommended Percentage Imperviousness Values
Refer to Table 6-5 "Runoff Coefficients" in Urban Storm Drainage Criteria Manual
NRCS Hydrology Soils-Refer to notes

PROPOSED TIME OF CONCENTRATION
65th Avenue Road Widening at 65th Ave. & US 34 Bypass
87-17-006

Updated By: A Morse
Updated Date: 10.10.2019

Basins within CDOT R/W

BASIN DATA			INITIAL/OVERLAND FLOW TIME			CHANNELIZED FLOW TIME					t _c CHECK	FINAL
Basin	Total Area acres	C5	Length (L _i) ft	Slope %	t _i min	Length (L _i) ft	Channel Type	Slope (S _o) %	Velocity (V _i) ft/s	t _t min	t _c min	t _c min
P1	0.12	0.65	35	1.94	3.90	12	PA	8.00	5.66	0.04	14.12	5.00
P2	1.27	0.27	300	2.02	20.63	83	GW	0.05	0.33	4.20	21.96	21.96
P3	0.28	0.93	52	2.29	1.68	167	PA	0.40	1.26	2.21	9.31	5.00
P4	1.09	0.31	300	1.85	20.22	128	GW	0.90	1.42	1.50	20.56	20.56
P5	1.92	0.11	300	2.04	24.58	86	GW	0.51	1.08	1.32	24.77	24.77
P6	0.48	0.75	141	1.77	6.22	91	PA	2.66	3.26	0.47	11.00	6.68
P7	0.16	0.64	105	2.25	6.59	0	PA	0.00	0.00	0.00	0.00	5.00
P8	0.11	0.58	60	0.62	8.50	94	PA	0.71	1.69	0.93	14.33	9.43
P9	0.52	0.74	64	2.37	3.94	139	PA	0.54	1.47	1.57	12.52	5.51
P10	0.95	0.76	55	2.17	3.53	674	PA	1.50	2.45	4.58	11.42	8.11
P11	0.19	0.93	30	2.57	1.24	129	PA	1.22	2.21	0.97	9.14	5.00
P12	14.38	0.16	300	2.11	22.91	395	PA	0.69	1.66	3.97	25.49	25.49
P13	0.72	0.33	56	2.13	8.14	363	GW	0.73	1.28	4.72	20.64	12.86
P14	0.26	0.54	60	3.10	5.41	0	PA	0.00	0.00	0.00	0.00	5.00
P15	0.58	0.38	45	2.75	6.21	398	PA	3.20	3.58	1.85	19.31	8.06
P16	0.56	0.23	26	1.16	7.60	682	GW	0.91	1.43	7.94	24.27	15.55
P17	1.28	0.35	56	2.16	7.86	644	GW	0.81	1.35	7.97	20.93	15.83
P18	0.45	0.59	28	12.07	2.16	0	PA	0.00	0.00	0.00	0.00	5.00
P19	0.58	0.57	50	3.02	4.66	459	GW	0.51	1.07	7.18	16.63	11.85
P20	0.46	0.57	60	6.58	3.94	0	PA	0.00	0.00	0.00	0.00	5.00
P21	1.12	0.50	68	4.66	5.41	0	PA	0.00	0.00	0.00	0.00	5.00
P22	4.54	0.46	147	4.24	8.64	1213	GW	1.83	2.03	9.97	19.04	18.62

Combined Basins to Design Point (DP)

P5	3.29	0.24	300	2.04	21.18	86	GW	0.51	1.08	1.32	21.79	22.51
P7	0.64	0.72	141	1.77	6.74	91	PA	2.66	3.26	0.47	11.74	7.20
P8	0.64	0.72	141	1.77	6.74	127	PA	1.89	2.75	0.77	11.79	7.51
P9	1.27	0.72	11	1.77	1.91	230	PA	1.38	2.35	1.63	12.40	3.54
P11a	1.14	0.79	55	2.17	3.23	803	PA	1.46	2.41	5.54	11.27	8.78
P11b	5.70	0.46	300	2.04	15.87	275	GW	0.42	0.97	4.70	18.00	20.58
P13	0.98	0.38	56	2.13	7.55	363	GW	0.73	1.28	4.72	19.58	12.27
P15	22.20	0.26	300	1.85	21.57	1550	GW	0.95	1.47	17.62	27.04	39.20
P17	1.72	0.41	56	2.16	7.22	644	GW	0.81	1.35	7.97	19.65	15.19

DP P5 is combined basins P3 to P5 for sizing of Culvert.
 DP P7 is combined basins P6 and P7 for routing of CDOT R/W.
 DP P8 is combined basins P7 to P8 for design check at Curb Cut.
 DP P9 is combined basins P6 to P9 for Inlet sizing.
 DP P11a is combined basins P10 to P11 for Inlet sizing.
 DP P11b is combined basins P3 to P11 for Swale sizing.
 DP P13 is combined basins P13 to P14 for Culvert sizing.
 DP P15 is combined basins P3 to P16 for Detention Pond sizing.
 DP P17 is combined basins P17 to P18 for Existing Culvert design check.

Note:
1) Codes for Figure RO-1, the channel type for velocity calculations:

Type of Land Surface		Conveyance Factor (K _c)
Heavy meadow	HM	2.5
Tillage/field	TF	5
Short pasture and lawns	PL	7
Nearly bare ground	BG	10
Grassed waterway	GW	15
Paved areas and shallow paved swales	PA	20

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L_i}}{S_o^{0.33}} \quad t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t} \quad t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_o}}$$

$$t_c = t_i + t_t$$

- 3) The velocity for the travel time was determined using Table 6-2 and the equation: $V=K\sqrt{S_o}$.
 4) The minimum t_c for non-urban watershed is 10 minutes and 5 minutes for urban watersheds
 5) Initial/Overland Length is 500 feet maximum for non-urban watersheds and 300 feet maximum for urban watersheds.

RATIONAL METHOD
PROPOSED 2-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave. & US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
P1	0.12	0.62	0.08	5.0	3.53	0.27
P2	1.27	0.25	0.32	22.0	1.95	0.63
P3	0.28	0.89	0.25	5.0	3.53	0.88
P4	1.09	0.30	0.32	20.6	2.02	0.65
P5	1.92	0.10	0.20	24.8	1.82	0.36
P6	0.48	0.73	0.35	6.7	3.24	1.13
P7	0.16	0.61	0.10	5.0	3.53	0.35
P8	0.11	0.56	0.06	9.4	2.88	0.18
P9	0.52	0.70	0.37	5.5	3.44	1.26
P10	0.95	0.74	0.70	8.1	3.04	2.14
P11	0.19	0.89	0.17	5.0	3.53	0.61
P12	14.38	0.16	2.24	25.5	1.79	4.01
P13	0.72	0.32	0.23	12.9	2.53	0.58
P14	0.26	0.52	0.13	5.0	3.53	0.46
P15	0.58	0.37	0.22	8.1	3.05	0.66
P16	0.56	0.22	0.12	15.5	2.32	0.29
P17	1.28	0.34	0.43	15.8	2.30	1.00
P18	0.45	0.56	0.25	5.0	3.53	0.88
P19	0.58	0.55	0.32	11.8	2.62	0.83
P20	0.46	0.55	0.25	5.0	3.53	0.90
P21	1.12	0.47	0.53	5.0	3.53	1.87
P22	4.54	0.43	1.96	18.6	2.12	4.17
Combined Basins to Design Point (DP)						
P5	3.29	0.23	0.77	22.5	1.92	1.48
P7	0.64	0.70	0.45	7.2	3.17	1.42
P8	0.64	0.70	0.45	7.5	3.12	1.40
P9	1.27	0.69	0.88	5.0	3.53	3.09
P11a	1.14	0.77	0.88	8.8	2.96	2.59
P11b	5.70	0.44	2.52	20.6	2.02	5.08
P13	0.98	0.37	0.36	12.3	2.59	0.93
P15	22.20	0.25	5.46	39.2	1.39	7.57
P17	1.72	0.40	0.68	15.2	2.35	1.60
DP P5 is combined basins P3 to P5 for sizing of Culvert. DP P7 is combined basins P6 and P7 for routing of CDOT R/W. DP P8 is combined basins P7 to P8 for design check at Curb Cut. DP P9 is combined basins P6 to P9 for Inlet sizing. DP P11a is combined basins P10 to P11 for Inlet sizing. DP P11b is combined basins P3 to P11 for Swale sizing. DP P13 is combined basins P13 to P14 for Culvert sizing. DP P15 is combined basins P3 to P16 for Detention Pond sizing. DP P17 is combined basins P17 to P18 for Existing Culvert design check.						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 2 year storm:

$$P_1 = 1.04$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

RATIONAL METHOD
PROPOSED 5-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
P1	0.12	0.65	0.08	5.0	5.05	0.40
P2	1.27	0.27	0.34	22.0	2.79	0.95
P3	0.28	0.93	0.26	5.0	5.05	1.31
P4	1.09	0.31	0.34	20.6	2.89	0.97
P5	1.92	0.11	0.20	24.8	2.61	0.53
P6	0.48	0.75	0.36	6.7	4.65	1.67
P7	0.16	0.64	0.10	5.0	5.05	0.52
P8	0.11	0.58	0.06	9.4	4.12	0.27
P9	0.52	0.74	0.38	5.5	4.92	1.89
P10	0.95	0.76	0.72	8.1	4.36	3.15
P11	0.19	0.93	0.18	5.0	5.05	0.91
P12	14.38	0.16	2.34	25.5	2.57	6.01
P13	0.72	0.33	0.23	12.9	3.63	0.85
P14	0.26	0.54	0.14	5.0	5.05	0.69
P15	0.58	0.38	0.22	8.1	4.37	0.98
P16	0.56	0.23	0.13	15.5	3.33	0.42
P17	1.28	0.35	0.44	15.8	3.30	1.46
P18	0.45	0.59	0.26	5.0	5.05	1.32
P19	0.58	0.57	0.33	11.8	3.76	1.24
P20	0.46	0.57	0.26	5.0	5.05	1.34
P21	1.12	0.50	0.56	5.0	5.05	2.81
P22	4.54	0.46	2.10	18.6	3.04	6.40
Combined Basins to Design Point (DP)						
P5	3.29	0.24	0.80	22.5	2.75	2.20
P7	0.64	0.72	0.46	7.2	4.54	2.10
P8	0.64	0.72	0.46	7.5	4.48	2.07
P9	1.27	0.72	0.91	5.0	5.05	4.61
P11a	1.14	0.79	0.90	8.8	4.24	3.83
P11b	5.70	0.46	2.61	20.6	2.89	7.55
P13	0.98	0.38	0.37	12.3	3.70	1.38
P15	22.20	0.26	5.68	39.2	1.99	11.28
P17	1.72	0.41	0.70	15.2	3.36	2.37
DP P5 is combined basins P3 to P5 for sizing of Culvert. DP P7 is combined basins P6 and P7 for routing of CDOT R/W. DP P8 is combined basins P7 to P8 for design check at Curb Cut. DP P9 is combined basins P6 to P9 for Inlet sizing. DP P11a is combined basins P10 to P11 for Inlet sizing. DP P11b is combined basins P3 to P11 for Swale sizing. DP P13 is combined basins P13 to P14 for Culvert sizing. DP P15 is combined basins P3 to P16 for Detention Pond sizing. DP P17 is combined basins P17 to P18 for Existing Culvert design check.						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 5 year storm:

$$P_1 = 1.49$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

RATIONAL METHOD
PROPOSED 10-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
P1	0.12	0.65	0.08	5.0	5.97	0.48
P2	1.27	0.27	0.34	22.0	3.29	1.12
P3	0.28	0.93	0.26	5.0	5.97	1.55
P4	1.09	0.31	0.34	20.6	3.41	1.15
P5	1.92	0.11	0.20	24.8	3.08	0.63
P6	0.48	0.75	0.36	6.7	5.49	1.97
P7	0.16	0.64	0.10	5.0	5.97	0.62
P8	0.11	0.58	0.06	9.4	4.87	0.32
P9	0.52	0.74	0.38	5.5	5.81	2.24
P10	0.95	0.76	0.72	8.1	5.15	3.72
P11	0.19	0.93	0.18	5.0	5.97	1.07
P12	14.38	0.16	2.34	25.5	3.03	7.09
P13	0.72	0.33	0.23	12.9	4.29	1.01
P14	0.26	0.54	0.14	5.0	5.97	0.82
P15	0.58	0.38	0.22	8.1	5.16	1.15
P16	0.56	0.23	0.13	15.5	3.93	0.50
P17	1.28	0.35	0.44	15.8	3.89	1.73
P18	0.45	0.59	0.26	5.0	5.97	1.56
P19	0.58	0.57	0.33	11.8	4.44	1.47
P20	0.46	0.57	0.26	5.0	5.97	1.58
P21	1.12	0.50	0.56	5.0	5.97	3.31
P22	4.54	0.46	2.10	18.6	3.59	7.56
Combined Basins to Design Point (DP)						
P5	3.29	0.24	0.80	22.5	3.25	2.60
P7	0.64	0.72	0.46	7.2	5.36	2.48
P8	0.64	0.72	0.46	7.5	5.29	2.44
P9	1.27	0.72	0.91	5.0	5.97	5.44
P11a	1.14	0.79	0.90	8.8	5.00	4.52
P11b	5.70	0.46	2.61	20.6	3.41	8.92
P13	0.98	0.38	0.37	12.3	4.38	1.63
P15	22.20	0.26	5.68	39.2	2.35	13.32
P17	1.72	0.41	0.70	15.2	3.97	2.80
DP P5 is combined basins P3 to P5 for sizing of Culvert. DP P7 is combined basins P6 and P7 for routing of CDOT R/W. DP P8 is combined basins P7 to P8 for design check at Curb Cut. DP P9 is combined basins P6 to P9 for Inlet sizing. DP P11a is combined basins P10 to P11 for Inlet sizing. DP P11b is combined basins P3 to P11 for Swale sizing. DP P13 is combined basins P13 to P14 for Culvert sizing. DP P15 is combined basins P3 to P16 for Detention Pond sizing. DP P17 is combined basins P17 to P18 for Existing Culvert design check.						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 10 year storm:

$$P_1 = 1.76$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

RATIONAL METHOD
PROPOSED 100-YEAR DESIGN STORM
65th Avenue Road Widening at 65th Ave.& US 34 Bypass
87-17-006

Basin	DIRECT RUNOFF					
	Area acres	Runoff Coeff. -	C*A acres	tc min	I in/hr	Q cfs
P1	0.12	0.79	0.10	5.0	9.43	0.92
P2	1.27	0.58	0.73	22.0	5.20	3.82
P3	0.28	0.94	0.26	5.0	9.43	2.49
P4	1.09	0.60	0.66	20.6	5.39	3.54
P5	1.92	0.49	0.94	24.8	4.87	4.59
P6	0.48	0.83	0.40	6.7	8.67	3.47
P7	0.16	0.78	0.13	5.0	9.43	1.19
P8	0.11	0.75	0.08	9.4	7.69	0.64
P9	0.52	0.84	0.44	5.5	9.18	4.02
P10	0.95	0.84	0.80	8.1	8.13	6.50
P11	0.19	0.94	0.18	5.0	9.43	1.72
P12	14.38	0.52	7.52	25.5	4.79	36.03
P13	0.72	0.61	0.44	12.9	6.77	2.97
P14	0.26	0.73	0.19	5.0	9.43	1.75
P15	0.58	0.64	0.38	8.1	8.15	3.06
P16	0.56	0.56	0.31	15.5	6.20	1.92
P17	1.28	0.62	0.79	15.8	6.15	4.88
P18	0.45	0.75	0.34	5.0	9.43	3.16
P19	0.58	0.75	0.43	11.8	7.02	3.03
P20	0.46	0.75	0.34	5.0	9.43	3.25
P21	1.12	0.70	0.79	5.0	9.43	7.44
P22	4.54	0.70	3.16	18.6	5.68	17.96
Combined Basins to Design Point (DP)						
P5	3.29	0.57	1.86	22.5	5.13	9.56
P7	0.64	0.82	0.53	7.2	8.47	4.46
P8	0.64	0.82	0.53	7.5	8.35	4.40
P9	1.27	0.82	1.05	5.0	9.43	9.87
P11a	1.14	0.86	0.98	8.8	7.90	7.76
P11b	5.70	0.68	3.89	20.6	5.39	20.97
P13	0.98	0.64	0.62	12.3	6.91	4.31
P15	22.20	0.57	12.72	39.2	3.71	47.15
P17	1.72	0.65	1.13	15.2	6.27	7.07
DP P5 is combined basins P3 to P5 for sizing of Culvert. DP P7 is combined basins P6 and P7 for routing of CDOT R/W. DP P8 is combined basins P7 to P8 for design check at Curb Cut. DP P9 is combined basins P6 to P9 for Inlet sizing. DP P11a is combined basins P10 to P11 for Inlet sizing. DP P11b is combined basins P3 to P11 for Swale sizing. DP P13 is combined basins P13 to P14 for Culvert sizing. DP P15 is combined basins P3 to P16 for Detention Pond sizing. DP P17 is combined basins P17 to P18 for Existing Culvert design check.						

Notes:

Basins within CDOT R/W

1) 1 hour rainfall depth for 100 year storm:

$$P_1 = 2.78$$

2) DRF Correction factors for watersheds less than 2 sqmi = 1

$$I = \frac{28.5 P_1}{(10 + T_d)^{0.786}}$$

APPENDIX D – RIPRAP CALCULATIONS

CALCULATIONS FOR RIPRAP PROTECTION AT PIPE OUTLETS

65th Avenue Road Widening - Greeley, CO

Project: 87-17-006
Date: January 31, 2020
Calculation by: ALM

INPUT							CALCULATE										OUTPUT				NOTES
Storm Line/Culvert Label	Design Discharge (cfs)	Number of Barrels	Flow through each Barrel (cfs)	Culvert Parameters			Y _t Tailwater Depth (ft)	Circular Pipe (Figure MD-21)			Rectangular Pipe (Figure MD-22)		Expansion Factor 1/(2tanθ) (From Figure MD-23 or MD-24)	Froude Parameter Q/D ^{2.5} Max 6.0 or Q/WH ^{1.5} Max 8.0	Urban Drainage pg MD-107		Riprap Type (From Figure MD-21 or MD-22)	Spec Length of Riprap (ft)	Spec Width of Riprap (ft)	2*d ₅₀ Depth of Riprap (ft) for L/2	
				D or D _a Pipe Diameter (ft)	H or H _a Culvert Height (ft)	W, Culvert Width (ft)		Y _t /D	Q/D ^{1.5}	Q/D ^{2.5}	Y/H	Q/WH ^{0.5}			A _v =Q/V (ft ²)	L= 1/(2tanθ)* [A _v /Y _t]-W] (ft)					
Storm A	6.03	1	6.03	1.50			0.60	0.40	3.28	2.19	N/A	N/A	5.60	2.19	1.01	0.98	Type L	5.00	6.00	1.5	Proposed Flows
Storm B + Upstream	9.56	1	9.56	2.00			0.80	0.40	3.38	1.69	N/A	N/A	6.30	1.69	1.59	-0.05	Type L	6.00	8.00	1.5	Proposed Flows
Storm C	17.63	1	17.63	2.00			0.80	0.40	6.23	3.12	N/A	N/A	4.20	3.12	2.94	7.03	Type L	8.00	8.00	1.5	Proposed Flows
Storm E	2.00	1	2.00	2.00			0.80	0.40	0.71	0.35	N/A	N/A	6.50	0.35	0.33	-10.29	Type L	5.00	6.00	1.5	Basin P16
Storm F	6.52	1	6.52	1.50			0.60	0.40	3.55	2.37	N/A	N/A	5.30	2.37	1.09	1.65	Type L	5.00	6.00	1.5	Existing Pipe Max Capacity
Storm H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Re-Use Existing Riprap
Storm I	10.53	1	10.53	1.50			0.60	0.40	5.73	3.82	N/A	N/A	3.80	3.82	1.76	5.42	Type L	6.00	6.00	1.5	Existing Pipe 80% Max Capacity
Storm L	9.56	1	9.56	2.00			0.80	0.40	3.38	1.69	N/A	N/A	6.30	1.69	1.59	-0.05	Type L	6.00	8.00	1.5	Proposed Flows

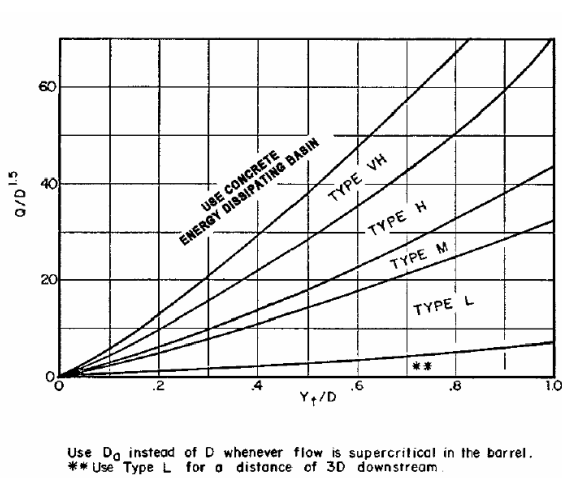


Figure MD-21—Riprap Erosion Protection at Circular Conduit Outlet Valid for $Q/D^{2.5} \leq 6.0$

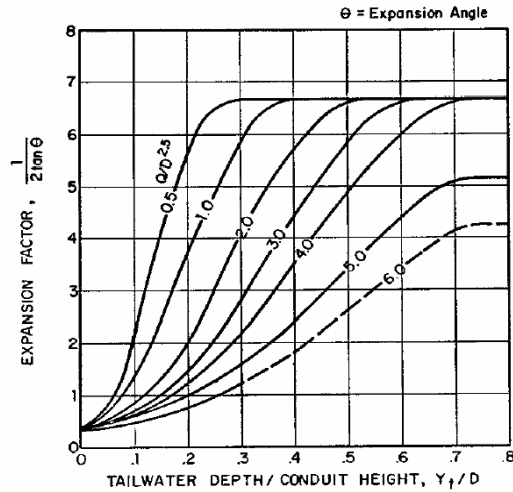


Figure MD-23—Expansion Factor for Circular Conduits

**APPENDIX E – EXISTING AND PROPOSED DRAINAGE
BASINS**

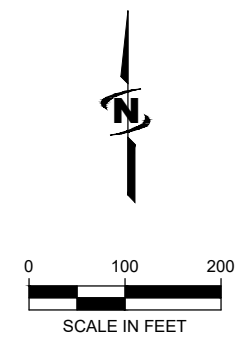
Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
H1	0.16	0.70	0.81	0.65	1.22
H2	0.22	0.79	0.86	1.00	1.76
H3	2.62	0.20	0.52	1.20	6.51
H4	0.38	0.57	0.73	1.22	2.59
H5	1.43	0.19	0.51	0.59	3.56
H6	1.25	0.16	0.49	0.40	2.99
H7	0.57	0.53	0.71	1.08	2.41
H8	0.35	0.78	0.85	1.60	2.82
H9	12.79	0.25	0.54	7.90	34.08
H10	0.69	0.13	0.47	0.15	1.69
H11	0.09	0.64	0.77	0.30	0.60
H12	2.16	0.54	0.71	4.86	10.65
H13	0.56	0.28	0.56	0.50	1.92
H14	1.28	0.37	0.61	1.63	4.78
H15	0.45	0.46	0.67	1.13	2.80
H16	0.85	0.59	0.74	2.26	4.70
H17	0.09	0.07	0.44	0.00	0.34
H18	0.48	0.46	0.67	1.24	3.06
H19	1.11	0.45	0.66	2.70	6.87
H20	4.55	0.48	0.67	6.76	17.32
H21	1.35	0.15	0.49	0.26	4.05
H22	4.71	0.47	0.67	7.32	19.08
Combined Basins to Design Point (DP)					
H12	22.50	0.28	0.56	15.61	60.31
H20	10.61	0.41	0.64	12.82	35.02
H20	Add 7-cfs for offsite Storm Line A in Basin OS → 42.02				

BASIN H17 NOTE:
 THIS BASIN IS DELINEATED TO SHOW THE MAXIMUM AMOUNT OF AREA THAT MAY HAVE HISTORICALLY DRAINED TO THE EXISTING INLET IN THE LANDSCAPE AREA. AS SHOWN THIS BASIN HAS A MAXIMUM FLOW RATE OF 0.39-CFS IN A 100-YEAR EVENT. THE EASTBOUND AND WESTBOUND LANES DRAIN AWAY FROM THE MEDIAN IN THIS AREA. BASED ON SITE VISITS IT APPEARS THAT THE MAJORITY OF STORMWATER THAT FALLS WITHIN THIS BASIN LIKELY INFILTRATES INTO THE LANDSCAPE AREA DURING MINOR STORM EVENTS AND ROUTES NORTH AND SOUTH IN MAJOR STORM EVENTS. THE EXISTING INLET IS PART OF PROPOSED STORM SYSTEM ABANDONMENT.

EXISTING 24" CMP
 14" FILL MATERIAL IN PIPE
 ~4891.5 INV
 4890.4' BOTTOM OF PIPE

FARM PRESCHOOL DEVELOPMENT
 INCLUDES REMOVAL OF FILL MATERIAL
 AT NORTH END OF PIPE AND
 CONSTRUCTION OF STORM PIPE
 NETWORK AND DRAINAGE SWALE
 ROUTING NORTH ALONG THE LOT LINE.

- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - 4902 — PROPOSED STORM PIPE
 - - - SD - - - EXISTING STORM PIPE
 - — — BASIN BOUNDARY
 - — — R/W BOUNDARY BETWEEN CDOT AND CITY
 - (A1 / 1.23) BASIN NUMBER ACRES
 - △ DESIGN POINT
 - ← FLOW ARROW
 - (HP) HIGH POINT
 - (LP) LOW POINT



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EXHIBIT - NOT FOR CONSTRUCTION

CITY OF GREELEY
 PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

NO.	DESCRIPTION	BY	DATE

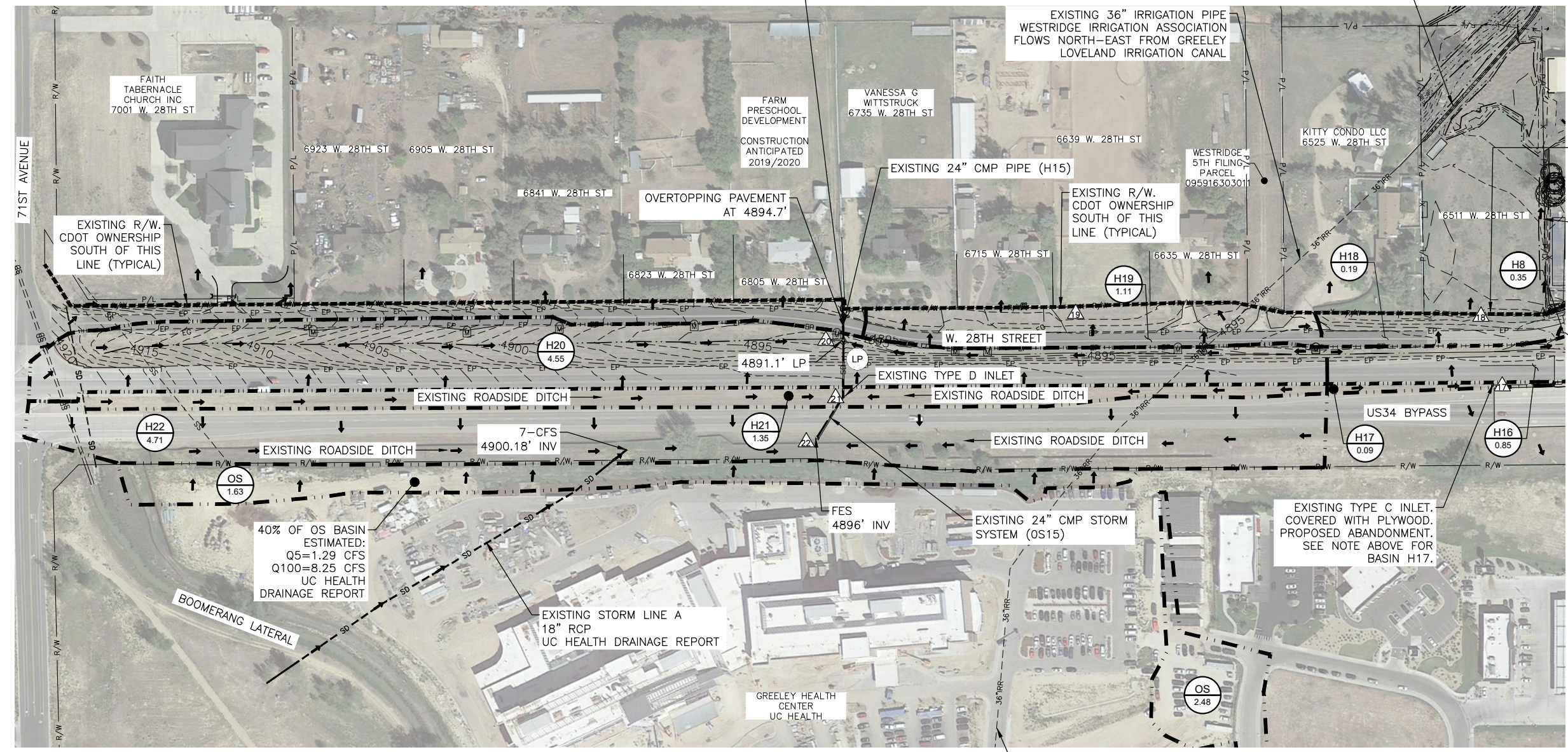
65TH AVENUE ROAD WIDENING
 CITY OF GREELEY

EXISTING BASINS

FILE: 87-17-006-EXISTING-DRAINAGE
 JUB PROJ #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE
 INCH, SCALE ACCORDINGLY
 LAST UPDATED: 10/24/2019

DRAWING NUMBER:
DR-451

SHEET
 1
 OF
 5



EXISTING R/W. CDOT OWNERSHIP SOUTH OF THIS LINE (TYPICAL)

HISTORIC ROUTING OF MAJOR EVENT STORMWATER FLOWS: FROM THE NORTH-WEST CORNER OF THE INTERSECTION OF 65TH AVENUE AND US34 BYPASS ROUTES WEST ALONG THE FRONT OF POPE PROPERTY, THEN NORTH IN THE KOPONEN LOT TO NEIL BROTHERS RESERVOIR.

SEE DR-452 FOR EASTERN BASIN DETAILS

APPROXIMATE LOCATION OF EXISTING 36" IRRIGATION PIPE WESTRIDGE IRRIGATION ASSOCIATION FLOWS NORTH-EAST FROM GREELEY LOVELAND IRRIGATION CANAL

Plot Date: 2/24/2020 11:31 AM Plotted By: Amber Moore
 Date Created: 10/28/2019 10:20:19 AM Project: SUBJ: GREELEY 87-17-006 - 05THAVE US34 CDOT EXISTING DRAINAGE 87-17-006- EXISTING-DRAINAGE.DWG

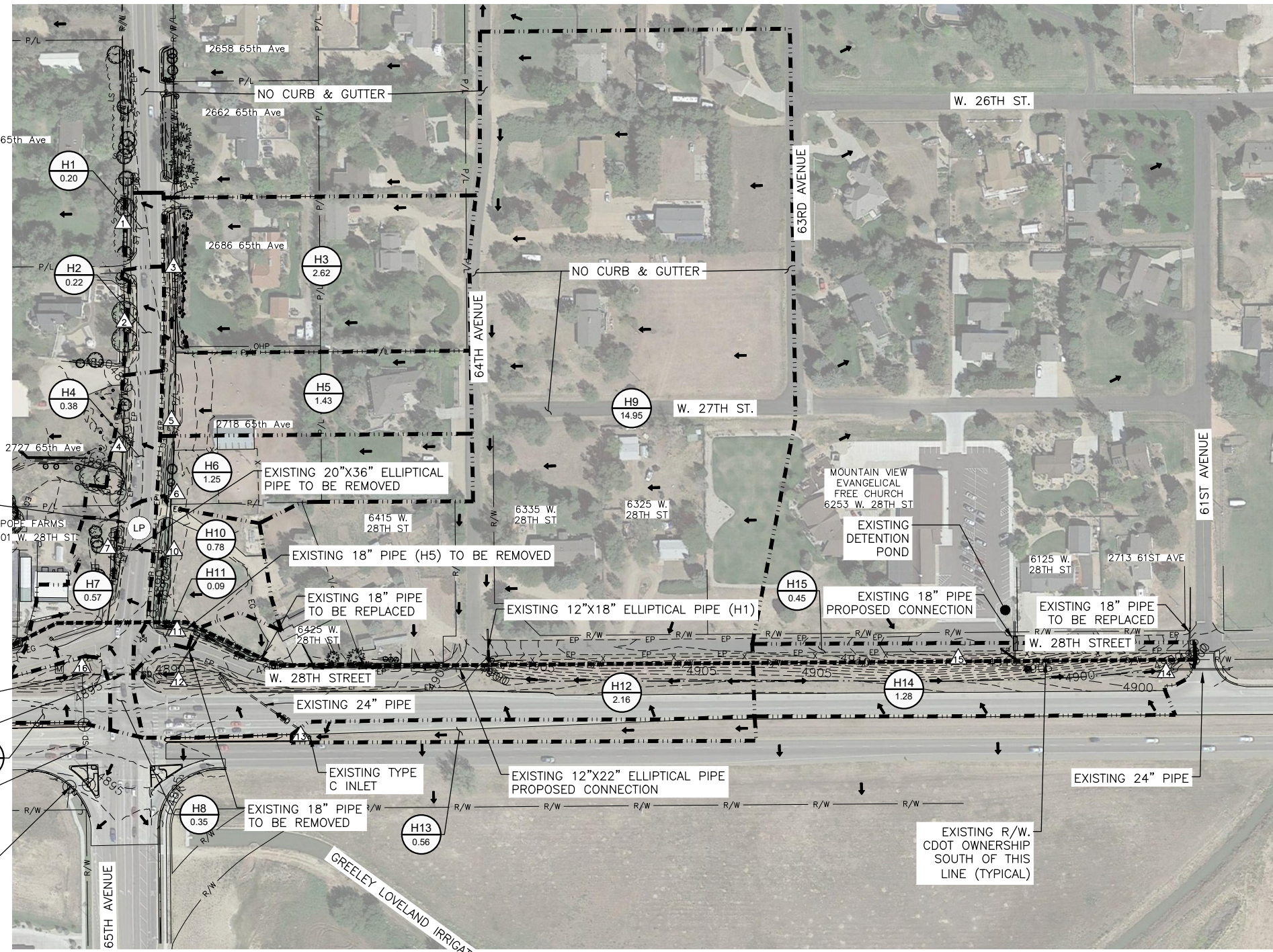
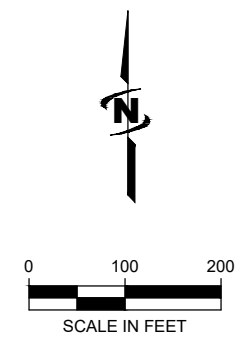
Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
H1	0.16	0.70	0.81	0.65	1.22
H2	0.22	0.79	0.86	1.00	1.76
H3	2.62	0.20	0.52	1.20	6.51
H4	0.38	0.57	0.73	1.22	2.59
H5	1.43	0.19	0.51	0.59	3.56
H6	1.25	0.16	0.49	0.40	2.99
H7	0.57	0.53	0.71	1.08	2.41
H8	0.35	0.78	0.85	1.60	2.82
H9	12.79	0.25	0.54	7.90	34.08
H10	0.69	0.13	0.47	0.15	1.69
H11	0.09	0.64	0.77	0.30	0.60
H12	2.16	0.54	0.71	4.86	10.65
H13	0.56	0.28	0.56	0.50	1.92
H14	1.28	0.37	0.61	1.63	4.78
H15	0.45	0.46	0.67	1.13	2.80
H16	0.85	0.59	0.74	2.26	4.70
H17	0.09	0.07	0.44	0.00	0.34
H18	0.48	0.46	0.67	1.24	3.06
H19	1.11	0.45	0.66	2.70	6.87
H20	4.55	0.48	0.67	6.76	17.32
H21	1.35	0.15	0.49	0.26	4.05
H22	4.71	0.47	0.67	7.32	19.08
Combined Basins to Design Point (DP)					
H12	22.50	0.28	0.56	15.61	60.31
H20	10.61	0.41	0.64	12.82	35.02
H20	Add 7-cfs for offsite Storm Line A in Basin OS → 42.02				

COMBINED BASINS TO DESIGN POINTS H12 & H16:

COMBINED FLOWS:
 10-YR EVENT = 17.87-CFS
 100-YR EVENT = 65.01-CFS

MAXIMUM ALLOWABLE FLOW OF 12.7-CFS INTO EXISTING STORM SYSTEM THAT ROUTES SOUTH INTO ST. MICHAEL'S DETENTION POND. EXISTING CONDITION IS NOT DETAINED.

- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - 4902 — PROPOSED STORM PIPE
 - - - SD - - - EXISTING STORM PIPE
 - — — BASIN BOUNDARY
 - — — R/W BOUNDARY BETWEEN CDOT AND CITY
 - (A1 / 1.23) BASIN NUMBER ACRES
 - (3) DESIGN POINT
 - ← FLOW ARROW
 - (HP) HIGH POINT
 - (LP) LOW POINT



HISTORIC ROUTING OF MAJOR EVENT STORMWATER FLOWS: FROM THE NORTH-EAST CORNER OF THE INTERSECTION OF 65TH AVENUE AND US34 BYPASS ROUTES WEST ACROSS THE LOW POINT ON 65TH AVENUE INTO POPE PROPERTY, CONTINUING WEST THROUGH THE LOT AND NORTH TO NEIL BROTHERS RESERVOIR.

SEE DR-451 FOR WESTERN BASIN DETAILS

EXISTING MH SDMH-5 PROPOSED STORM IMPROVEMENTS CONNECT TO THE THIS EXISTING MANHOLE. PROPOSED ABANDONMENT/REMOVAL OF ENTIRE EXISTING STORM SYSTEM UPSTREAM FROM THIS MH LOCATION.

EXISTING TYPE-C INLET TO BE REPLACED

EXISTING 18" PIPE TO BE REMOVED

EXISTING 15"x22" ELLIPTICAL PIPE (H12) FLOWS TO ST. MICHAEL'S SOUTH DETENTION POND TO BE ABANDONED,

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REVISIONS

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NO.	DESCRIPTION	BY	DATE

65TH AVENUE ROAD WIDENING
 CITY OF GREELEY

EXISTING BASINS

FILE : 87-17-006-EXISTING-DRAINAGE
 JUB PROJ. # : 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 10/24/2019

DRAWING NUMBER:
DR-452

SHEET
2
 OF
5

Plot Date: 24/2020 11:31 AM Plotted By: Amber Moore
 Date Created: 10/28/2019 10:52:17 AM Project: S:\JUB\PROJECTS\JUB\Greeley\87-17-006-EXISTING-DRAINAGE.DWG

Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
P1	0.12	0.67	0.79	0.48	0.92
P2	1.27	0.32	0.58	1.12	3.82
P3	0.28	0.94	0.94	1.55	2.49
P4	1.09	0.35	0.60	1.15	3.54
P5	1.92	0.16	0.49	0.63	4.59
P6	0.48	0.77	0.83	1.97	3.47
P7	0.16	0.66	0.78	0.62	1.19
P8	0.11	0.62	0.75	0.32	0.64
P9	0.52	0.76	0.84	2.24	4.02
P10	0.95	0.78	0.84	3.72	6.50
P11	0.19	0.94	0.94	1.07	1.72
P12	14.38	0.22	0.52	7.09	36.03
P13	0.72	0.37	0.61	1.01	2.97
P14	0.26	0.57	0.73	0.82	1.75
P15	0.58	0.42	0.64	1.15	3.06
P16	0.56	0.28	0.56	0.50	1.92
P17	1.28	0.39	0.62	1.73	4.88
P18	0.45	0.61	0.75	1.56	3.16
P19	0.58	0.60	0.75	1.47	3.03
P20	0.46	0.60	0.75	1.58	3.25
P21	1.12	0.53	0.70	3.31	7.44
P22	4.54	0.52	0.70	7.56	17.96
Combined Basins to Design Point (DP)					
P5	3.29	0.29	0.57	2.60	9.56
P7	0.64	0.74	0.82	2.48	4.46
P8	0.64	0.74	0.82	2.44	4.40
P9	1.27	0.74	0.82	5.44	9.87
P11a	1.14	0.81	0.86	4.52	7.76
P11b	5.70	0.49	0.68	4.52	20.97
P13	0.98	0.42	0.64	1.63	4.31
P15	22.20	0.30	0.57	13.32	47.15
P17	1.72	0.45	0.65	2.80	7.07

DP15 (BASINS P3 TO P16)
 22.20 ACRES, 29.82% IMP
 Q2=9.65, Q10=16.98, Q100=60.11
 C2=0.25, C5=0.26, C100=0.57

PROPOSED DETENTION POND
 RELEASE RATE = 9.70-CFS
 100-YR DESIGN VOLUME = 0.861 AC-FT
 100-YR WSE = 4891.24' WITH 0.39' FREEBOARD
 SPILLWAY ELEV = 4891.63' AT TOP OF CURB (0.97 AC-FT)

- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - 4902 — PROPOSED STORM PIPE
 - - - SD - - - EXISTING STORM PIPE
 - — — BASIN BOUNDARY
 - - - R/W BOUNDARY BETWEEN CDOT AND CITY
 - (A1 / 1.23) BASIN NUMBER ACRES
 - (Δ) DESIGN POINT
 - ← FLOW ARROW
 - (HP) HIGH POINT
 - (LP) LOW POINT

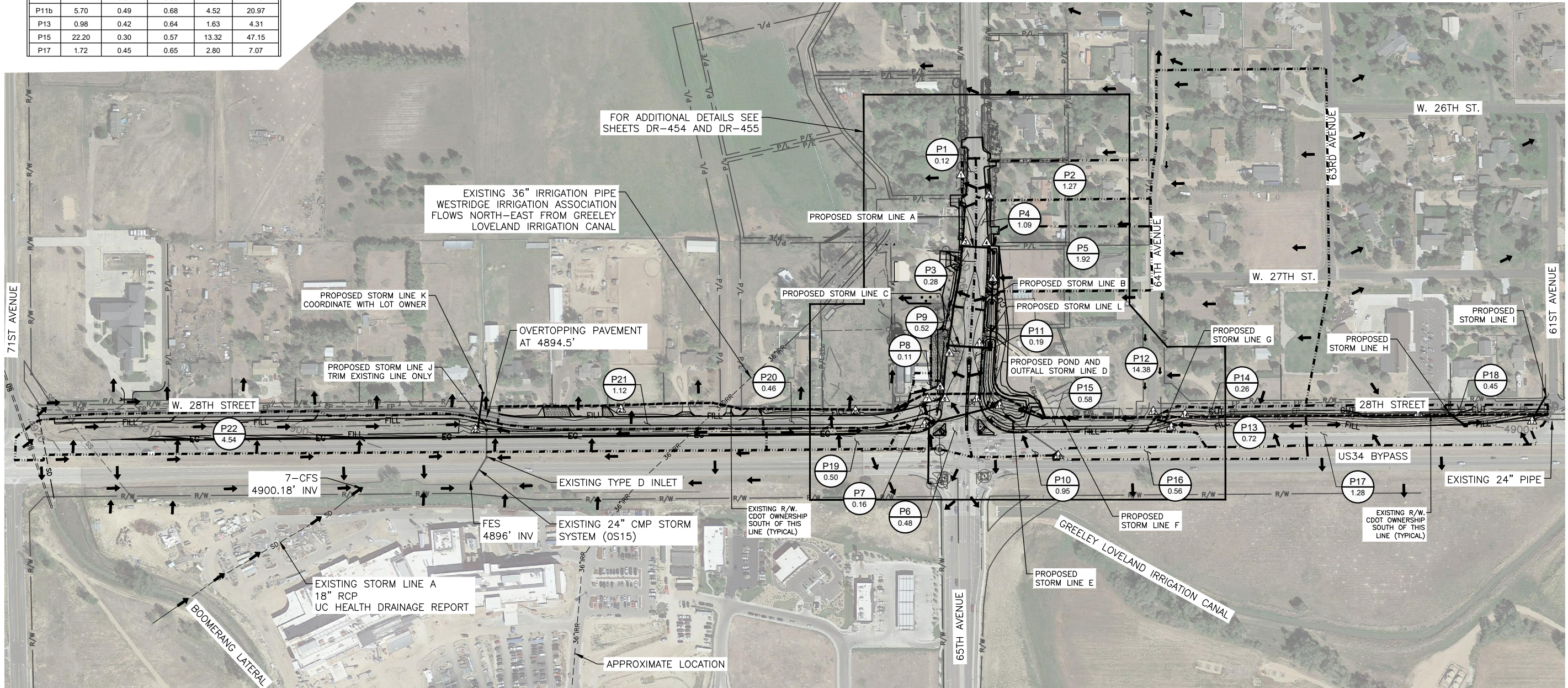
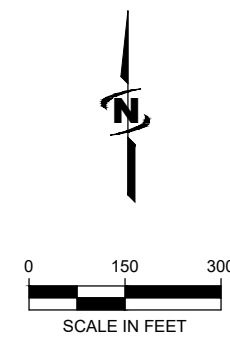


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JUB
 J-U-B ENGINEERS, INC.
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 Fort Collins, CO 80525
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 Fax: 970.377.3935
 www.jub.com

CITY OF GREELEY
 PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

NO.	REVISION	DESCRIPTION	BY	DATE

65TH AVENUE ROAD WIDENING
 CITY OF GREELEY

PROPOSED - OVERALL

FILE : 87-17-006_PROPOSED DRAINAGE_1
 JUB PROJ. # : 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/4/2020
 DRAWING NUMBER:
DR-453
 SHEET
3
 OF
5

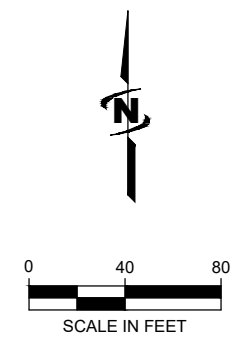
Plot Date: 2/4/2020 12:30 PM Plotted By: Amber Moore
 Date Created: 1/30/2020 11:58:15 AM Project: 87-17-006 - 65TH AVENUE ROAD WIDENING - 1.DWG PROPOSED DRAINAGE - 1.DWG

Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
P1	0.12	0.67	0.79	0.48	0.92
P2	1.27	0.32	0.58	1.12	3.82
P3	0.28	0.94	0.94	1.55	2.49
P4	1.09	0.35	0.60	1.15	3.54
P5	1.92	0.16	0.49	0.63	4.59
P6	0.48	0.77	0.83	1.97	3.47
P7	0.16	0.66	0.78	0.62	1.19
P8	0.11	0.62	0.75	0.32	0.64
P9	0.52	0.76	0.84	2.24	4.02
P10	0.95	0.78	0.84	3.72	6.50
P11	0.19	0.94	0.94	1.07	1.72
P12	14.38	0.22	0.52	7.09	36.03
P13	0.72	0.37	0.61	1.01	2.97
P14	0.26	0.57	0.73	0.82	1.75
P15	0.58	0.42	0.64	1.15	3.06
P16	0.56	0.28	0.56	0.50	1.92
P17	1.28	0.39	0.62	1.73	4.88
P18	0.45	0.61	0.75	1.56	3.16
P19	0.58	0.60	0.75	1.47	3.03
P20	0.46	0.60	0.75	1.58	3.25
P21	1.12	0.53	0.70	3.31	7.44
P22	4.54	0.52	0.70	7.56	17.96

Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
Combined Basins to Design Point (DP)					
P5	3.29	0.29	0.57	2.60	9.56
P7	0.64	0.74	0.82	2.48	4.46
P8	0.64	0.74	0.82	2.44	4.40
P9	1.27	0.74	0.82	5.44	9.87
P11a	1.14	0.81	0.86	4.52	7.76
P11b	5.70	0.49	0.68	4.52	20.97
P13	0.98	0.42	0.64	1.63	4.31
P15	22.20	0.30	0.57	13.32	47.15
P17	1.72	0.45	0.65	2.80	7.07

DP15 (BASINS P3 TO P16)
 22.20 ACRES, 29.82% IMP
 Q2=9.65, Q10=16.98, Q100=60.11
 C2=0.25, C5=0.26, C100=0.57

PROPOSED DETENTION POND
 RELEASE RATE = 9.70-CFS
 100-YR DESIGN VOLUME = 0.861 AC-FT
 100-YR WSE = 4891.24' WITH 0.39' FREEBOARD
 SPILLWAY ELEV = 4891.63' AT TOP OF CURB (0.97 AC-FT)



- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - 4902 — PROPOSED STORM PIPE
 - - - SD - - - EXISTING STORM PIPE
 - — — BASIN BOUNDARY
 - — — R/W BOUNDARY BETWEEN CDOT AND CITY
 - (A1 / 1.23) BASIN NUMBER ACRES
 - (9) DESIGN POINT
 - ← FLOW ARROW
 - (HP) HIGH POINT
 - (LP) LOW POINT

SEE DR-455 FOR NORTHERN BASIN DETAILS

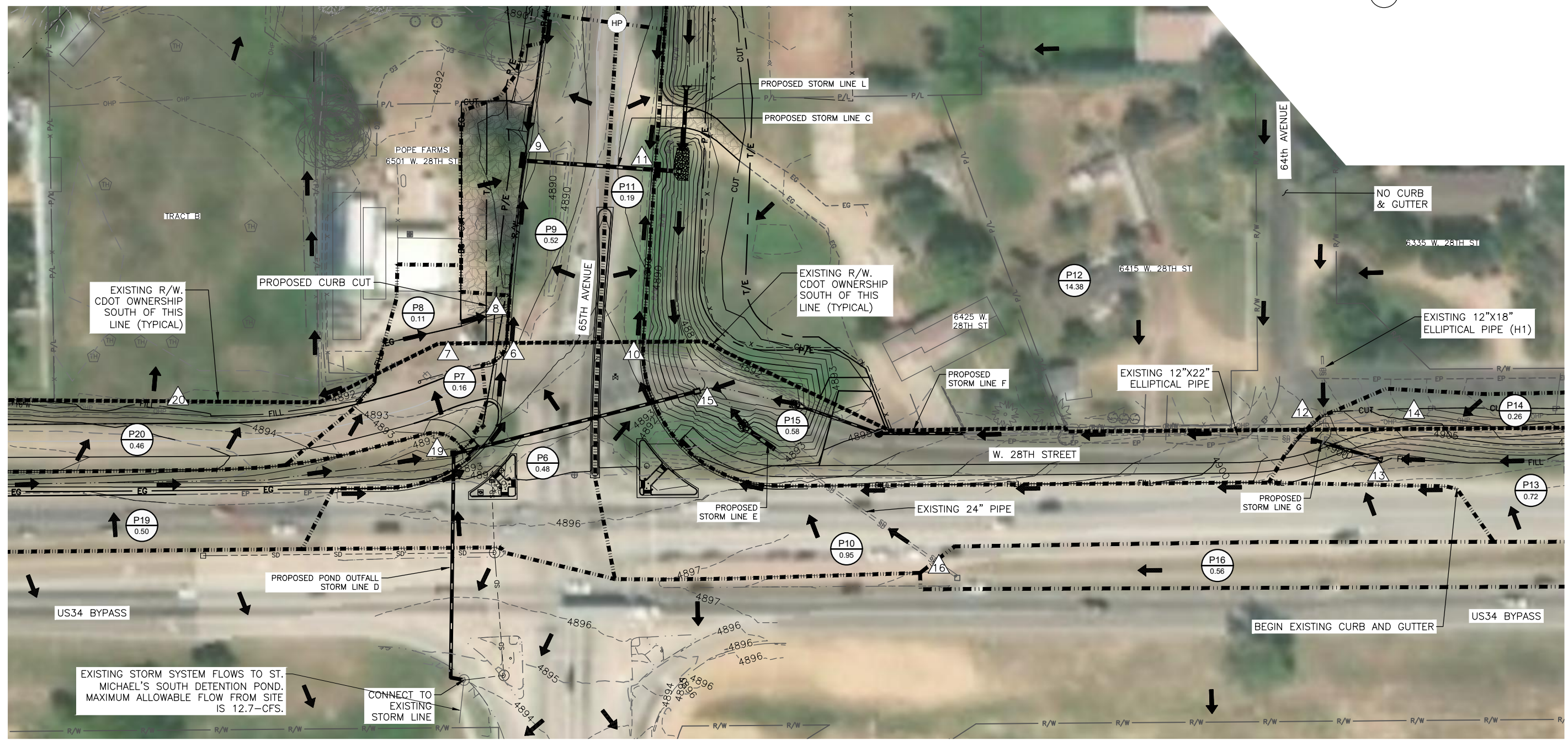


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NO.	REVISION	DESCRIPTION	BY	DATE

65TH AVENUE ROAD WIDENING
 CITY OF GREELEY
 PROPOSED BASINS

FILE: 87-17-006_PROPOSED DRAINAGE 2
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/4/2020
 DRAWING NUMBER:
DR-454
 SHEET
 4
 OF
 5

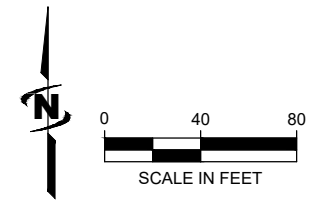
Plot Date: 2/5/2020 7:30 AM Plotted By: Amber Moran
 Date Created: 2/4/2020 File Path: \\PUBLIC\PROJECTS\JUB\Greeley\87-17-006\8717-006_PROPOSED DRAINAGE 2.DWG

Basin	Total Area acres	Composite "C10"	Composite "C100"	Q10 cfs	Q100 cfs
P1	0.12	0.67	0.79	0.48	0.92
P2	1.27	0.32	0.58	1.12	3.82
P3	0.28	0.94	0.94	1.55	2.49
P4	1.09	0.35	0.60	1.15	3.54
P5	1.92	0.16	0.49	0.63	4.59
P6	0.48	0.77	0.83	1.97	3.47
P7	0.16	0.66	0.78	0.62	1.19
P8	0.11	0.62	0.75	0.32	0.64
P9	0.52	0.76	0.84	2.24	4.02
P10	0.95	0.78	0.84	3.72	6.50
P11	0.19	0.94	0.94	1.07	1.72
P12	14.38	0.22	0.52	7.09	36.03
P13	0.72	0.37	0.61	1.01	2.97
P14	0.26	0.57	0.73	0.82	1.75
P15	0.58	0.42	0.64	1.15	3.06
P16	0.56	0.28	0.56	0.50	1.92
P17	1.28	0.39	0.62	1.73	4.88
P18	0.45	0.61	0.75	1.56	3.16
P19	0.58	0.60	0.75	1.47	3.03
P20	0.46	0.60	0.75	1.58	3.25
P21	1.12	0.53	0.70	3.31	7.44
P22	4.54	0.52	0.70	7.56	17.96
Combined Basins to Design Point (DP)					
P5	3.29	0.29	0.57	2.60	9.56
P7	0.64	0.74	0.82	2.48	4.46
P8	0.64	0.74	0.82	2.44	4.40
P9	1.27	0.74	0.82	5.44	9.87
P11a	1.14	0.81	0.86	4.52	7.76
P11b	5.70	0.49	0.68	4.52	20.97
P13	0.98	0.42	0.64	1.63	4.31
P15	22.20	0.30	0.57	13.32	47.15
P17	1.72	0.45	0.65	2.80	7.07



SEE DR-454 FOR SOUTHERN BASIN DETAILS

- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
 - 4902 — PROPOSED STORM PIPE
 - - - SD - - - EXISTING STORM PIPE
 - — — BASIN BOUNDARY
 - — — R/W BOUNDARY BETWEEN CDOT AND CITY
 - (A1 / 1.23) BASIN NUMBER ACRES
 - (3) DESIGN POINT
 - ← FLOW ARROW
 - (HP) HIGH POINT
 - (LP) LOW POINT



Plot Date: 2/25/2020 7:36 AM Plotted By: Amber Morse
 Date Created: 2/4/2020 11:58:15 AM Project: JUB-GREELEY-17-006-65THAVE_US34CAD/EXHIBIT/DRAINAGE/87-17-006_PROPOSED-DRAINAGE-2.DWG

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 CITY OF GREELEY
 PUBLIC WORKS
 Engineering Division
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 Phone: 970.377.3602
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 www.jub.com

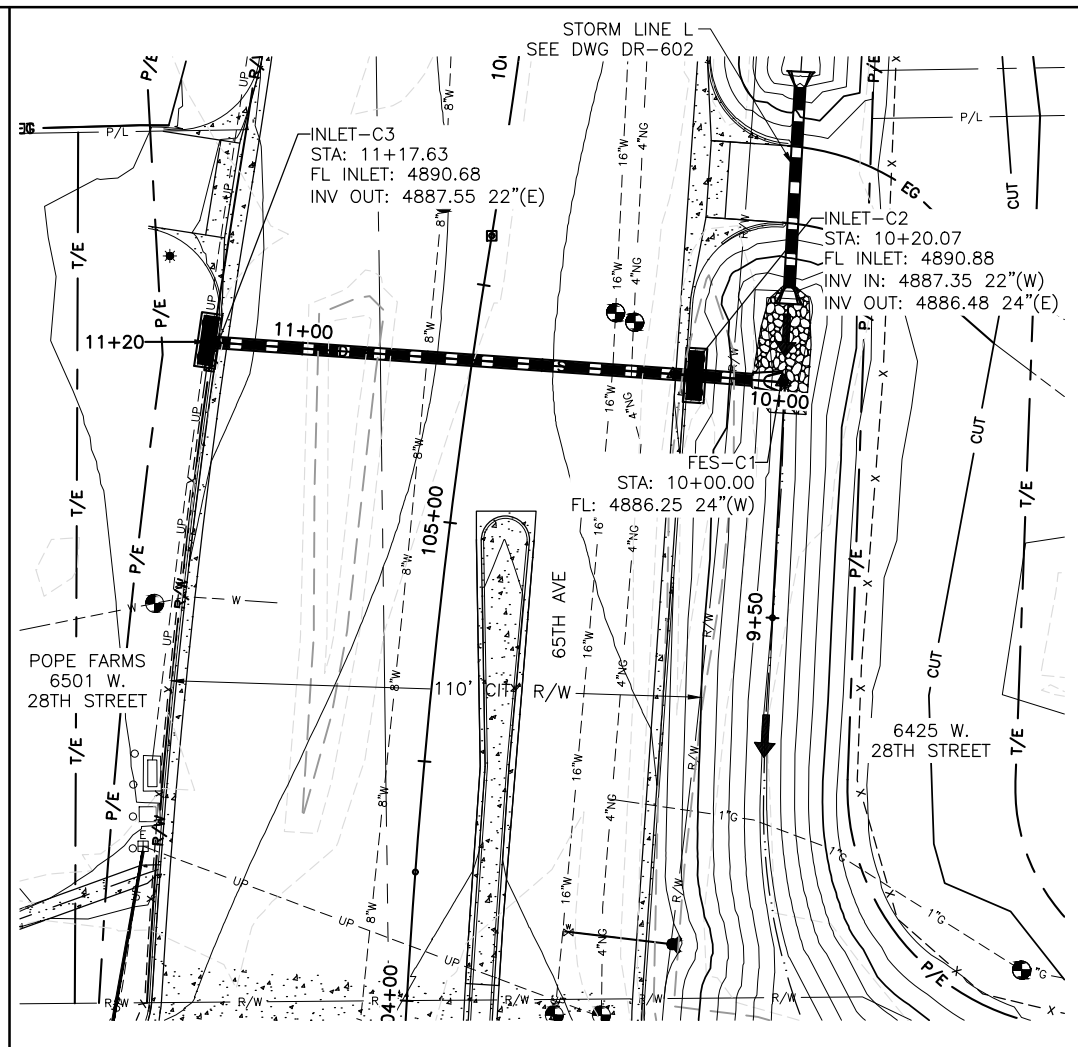
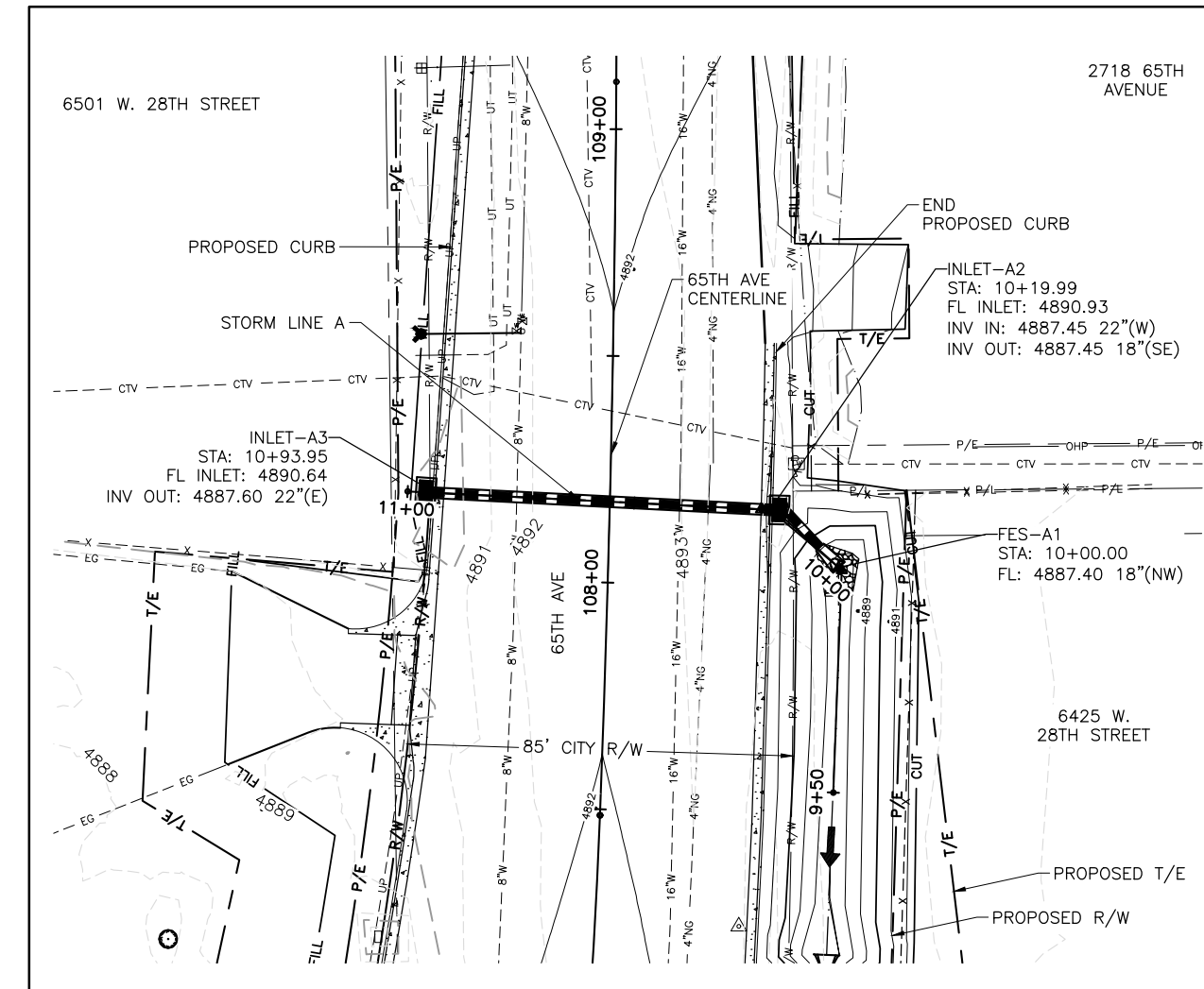
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NO.	REVISION	DESCRIPTION	BY	DATE

65TH AVENUE ROAD WIDENING
 CITY OF GREELEY
 PROPOSED BASINS

FILE: 87-17-006_PROPOSED-DRAINAGE-2
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/4/2020
 DRAWING NUMBER:
DR-455
 SHEET
 5
 OF 5

APPENDIX F – STORM CULVERT PLAN AND PRFOFILES



HORZ 0 20 40
VERT 0 5 10
SCALE IN FEET

LEGEND:

- 4900 PROPOSED MAJOR CONTOUR
- 4902 PROPOSED MINOR CONTOUR
- 4900 EXISTING MAJOR CONTOUR
- 4902 EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- POTHOLE - SEE UT DRAWINGS

NOTES:

- ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
- INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
- INLET DETAILS SEE DWG DT-1106
- STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
- RIPRAP SIZING & DETAILS SEE DWG EC-710.
- STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

A2 - 5' TYPE R	D2 - TYPE C - MESH
A3 - 5' TYPE R	G1 - TYPE C - MESH
C2 - 10' TYPE R	
C3 - 10' TYPE R	

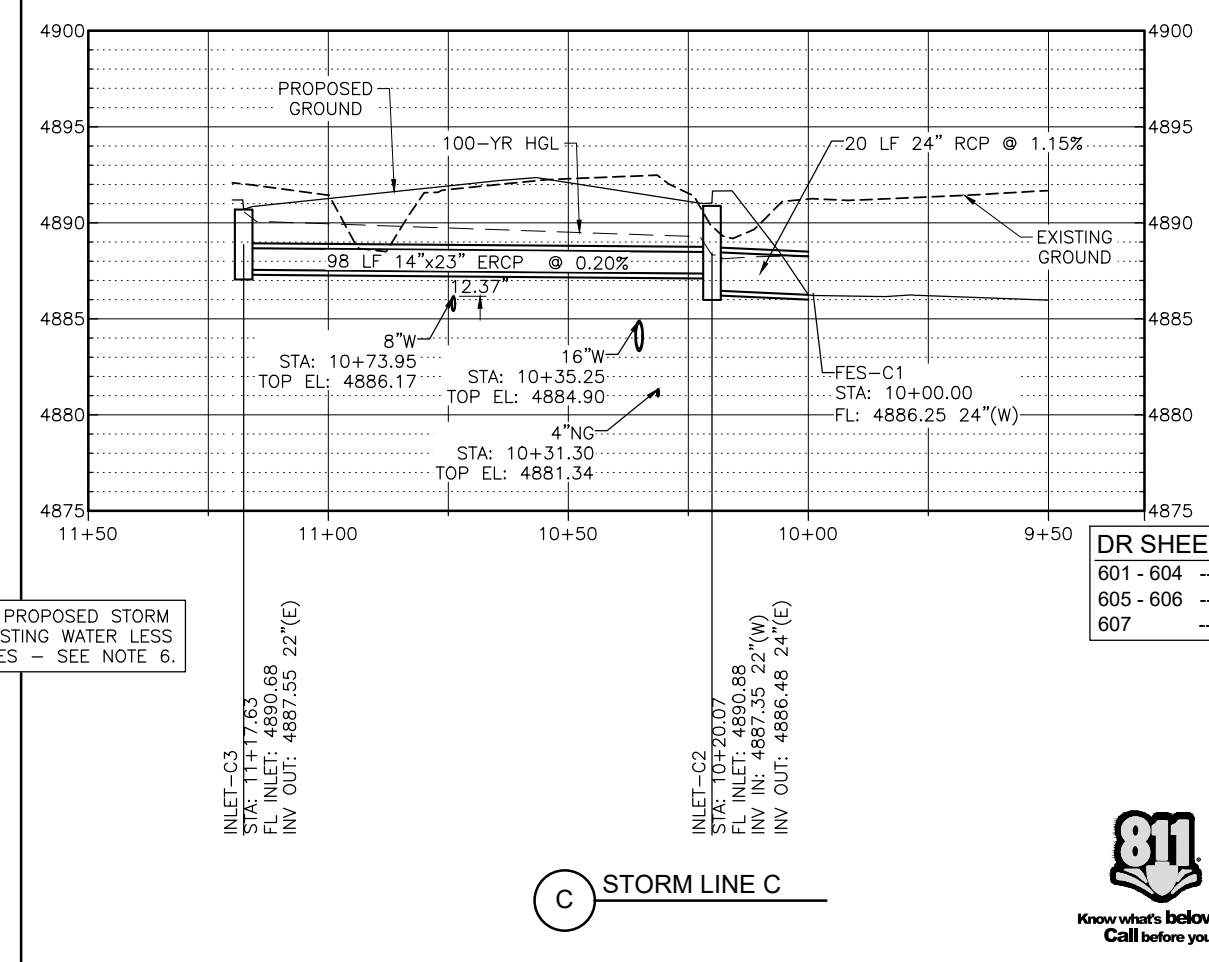
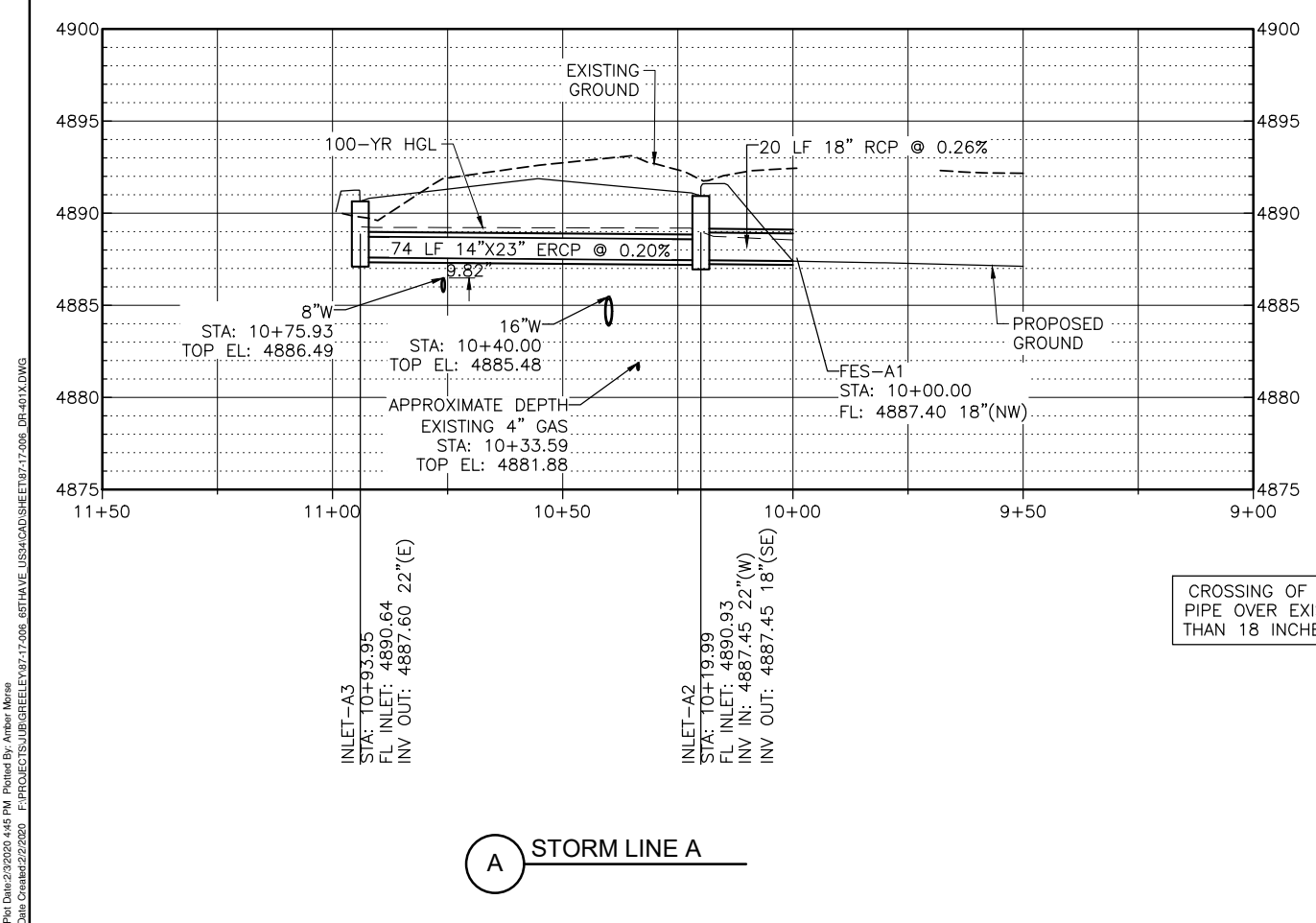
JUB
J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.
4745 Boardwalk Drive
Building D Suite #200
Fort Collins, CO 80525
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CITY OF GREELEY
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Greeley, CO 80631
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NO.	REVISION	DESCRIPTION	BY	APPR.	DATE



CROSSING OF PROPOSED STORM PIPE OVER EXISTING WATER LESS THAN 18 INCHES - SEE NOTE 6.

DR SHEET LIST:

601 - 604	-- 65TH AVENUE & POND
605 - 606	-- ULTIMATE: E. OF 65TH AVE
607	-- ULTIMATE: W. OF 65TH AVE



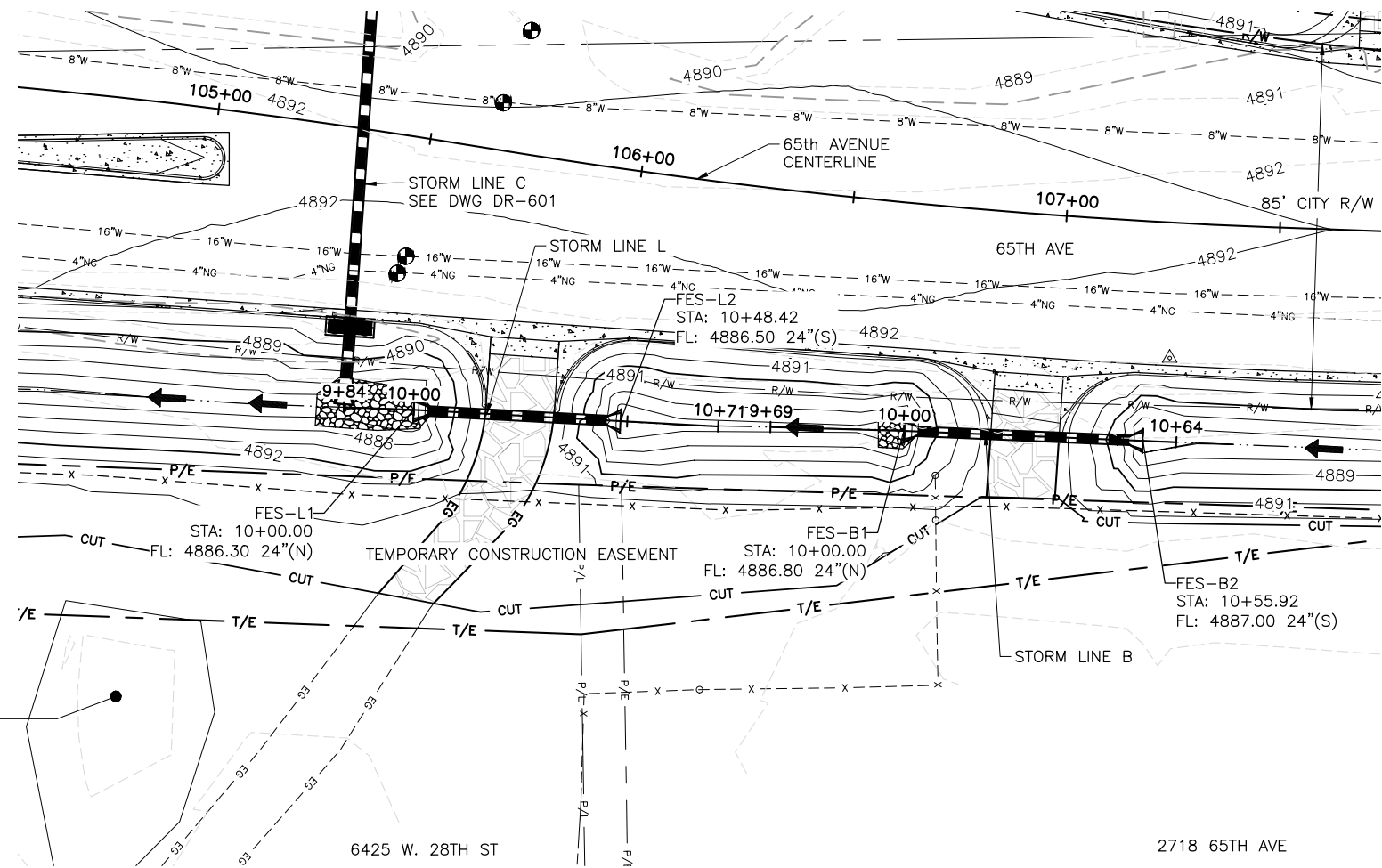
65th AVENUE ROAD WIDENING
CITY OF GREELEY

STORM DRAINAGE PLAN & PROFILE
LINES A & C

FILE: 87-17-006 DR-401X
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/2/2020
DRAWING NUMBER:
DR-601
SHEET
71
OF
115

Plot Date: 2/2/2020 4:45 PM, Plotted By: Amber Morse, Date Created: 2/2/2020, P:\PROJECTS\JUB\GREELEY\87-17-006_65TH AVE_US4\CAD\SHEET\87-17-006_DR-401X.DWG

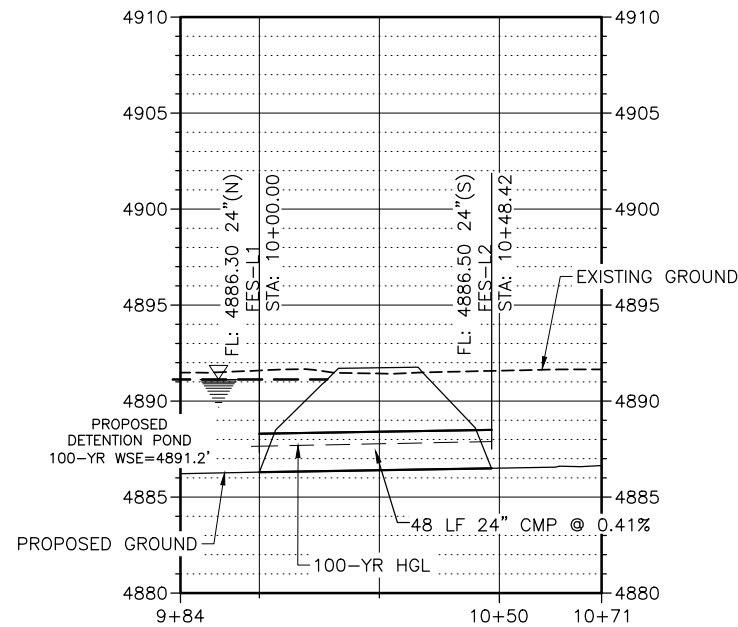
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 Date Created: 2/2/2020 P:\PROJECTS\JUB\Greeley\07-17-206-65TH AVE - US&CAD\SHEET\07-17-206-DR-402X.DWG



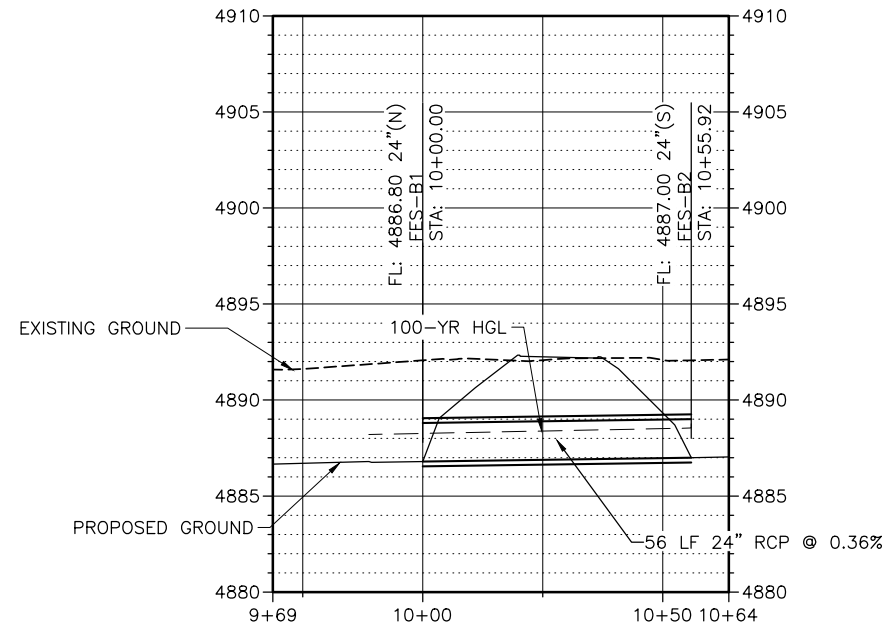
SEPTIC LEACH FIELD (SEE NOTE)

6425 W. 28TH ST

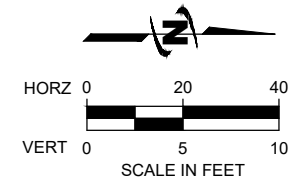
2718 65TH AVE



L STORM LINE L



B STORM LINE B



LEGEND:

- 4900 — PROPOSED MAJOR CONTOUR
- 4902 — PROPOSED MINOR CONTOUR
- - - 4900 - - - EXISTING MAJOR CONTOUR
- - - 4902 - - - EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- ⊙ POTHOLE - SEE UT DRAWINGS

NOTES:

1. ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
2. INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
3. INLET DETAILS SEE DWG DT-1106
4. STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
5. RIPRAP SIZING & DETAILS SEE DWG EC-710.
6. STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

INLET SCHEDULE:

- A2 - 5' TYPE R
- A3 - 5' TYPE R
- C2 - 10' TYPE R
- C3 - 10' TYPE R
- D2 - TYPE C - MESH
- G1 - TYPE C - MESH

LEACH FIELD NOTES

1. ALL PRIVATE LOTS WITHIN AND NEAR THE SITE HAVE A PRIVATE SEPTIC SYSTEM. UNDERGROUND GRAVITY SEWER DOES NOT EXIST IN THIS AREA.
2. CONTRACTOR SHALL USE CAUTION WHEN WORKING ON ALL PRIVATE LOTS WITHIN THE SITE TO NOT DAMAGE ANY PRIVATE SEPTIC SYSTEM. LOTS THAT HAVE BEEN IDENTIFIED TO HAVE A SEPTIC SYSTEM COMPONENT THAT MAY BE CLOSE TO CONSTRUCTION ACTIVITY ARE 6501 W. 28TH STREET AND 6425 W. 28TH STREET. SEPTIC SYSTEM HAVE BEEN LOCATED AT THE BACK OF BUILDING ON 6501 W. 28TH STREET AND IN THE SOUTHWEST OPEN SPACE AREA OF 6425 W. 28TH STREET. CAUTION SHALL BE USED WHEN WORKING ON UTILITIES AND PROPOSED DETENTION POND ON AND NEAR 6425 W. 28TH STREET.

DR SHEET LIST:

- 601 - 604 --- 65TH AVENUE & POND
- 605 - 606 --- ULTIMATE: E. OF 65TH AVE
- 607 --- ULTIMATE: W. OF 65TH AVE



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 PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
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 Phone: 970.377.3602

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NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
 CITY OF GREELEY

STORM DRAINAGE PLAN & PROFILE
 LINES B & L

FILE: 87-17-006-DR-402X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020

DRAWING NUMBER:
DR-602
 SHEET
72
 OF
115

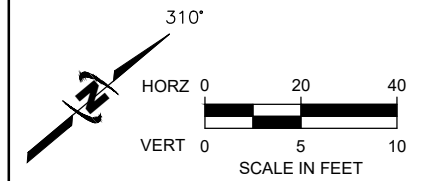
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NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY
STORM DRAINAGE PLAN & PROFILE
LINE D

FILE: 87-17-006-DR-404X
JUB PROJ. #: 87-17-006
DRAWN BY: BK
DESIGN BY: BK
CHECKED BY: ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 2/3/2020

DRAWING NUMBER:
DR-603
SHEET
73
OF
115



LEGEND:

- 4900 — PROPOSED MAJOR CONTOUR
- 4902 — PROPOSED MINOR CONTOUR
- - - 4900 - - - EXISTING MAJOR CONTOUR
- - - 4902 - - - EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- POT HOLE - SEE UT DRAWINGS

NOTES:

1. ELEVATIONS SHOWN ARE TRUNCATED. ELEVATIONS ARE 48XX.XX' TO 49XX.XX'.
2. INLET STATIONING & FL ELEVATION IS TO CENTER OF INLET AT FLOWLINE OF CURB. SEE INLET DETAILS FOR GUTTER TRANSITION & ADJUSTMENT TO FLOWLINE.
3. INLET DETAILS SEE DWG DT-1106
4. STORM MANHOLES ARE 4' DIAMETER FLAT TOP MANHOLE UNLESS OTHERWISE NOTED (SEE DETAIL 6-9, DWG DT-1105).
5. RIPRAP SIZING & DETAILS SEE DWG EC-710.
6. STORM PIPE JOINTS ABOVE WATERLINES SHALL BE WRAPPED WITH J-K POLYSOURCE EXTERNAL JOINT WRAP M-860 OR EQUIVALENT 10' EITHER SIDE OF CROSSING. JOINT WRAP SHALL BE INCIDENTAL TO THE COST OF THE RCP PIPE.

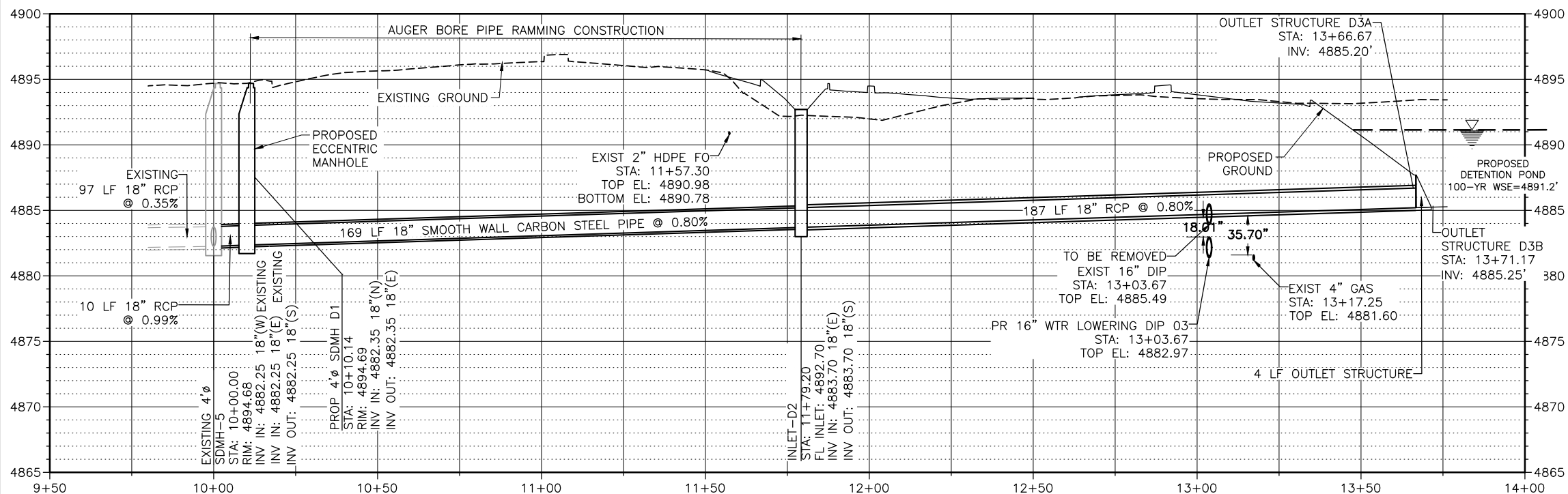
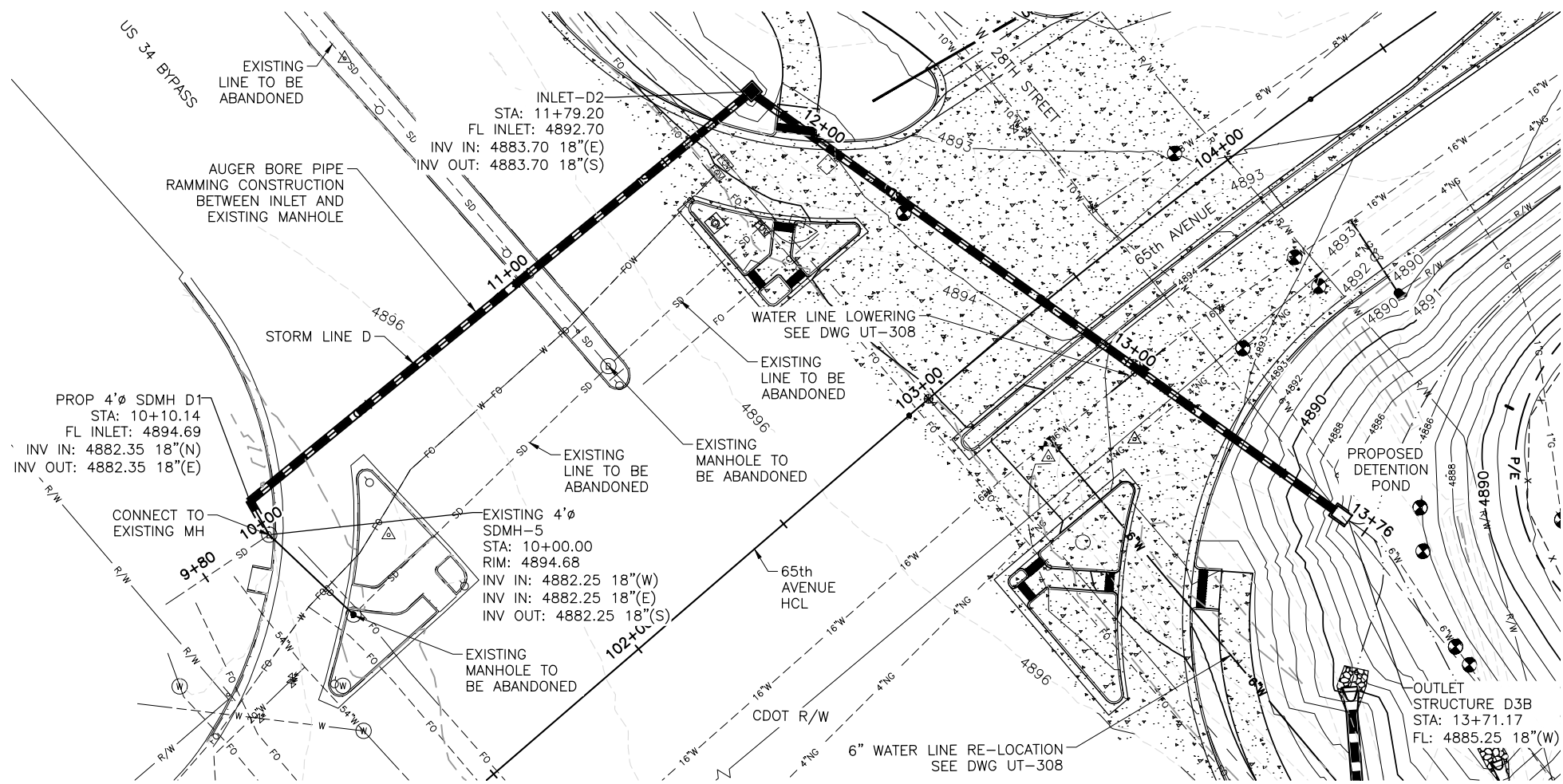
INLET SCHEDULE:

- A2 - 5' TYPE R
- A3 - 5' TYPE R
- C2 - 10' TYPE R
- C3 - 10' TYPE R
- D2 - TYPE C - MESH
- G1 - TYPE C - MESH

OUTLET STRUCTURE WITH ORIFICE PLATE DETAIL ON SHEET DT-1106

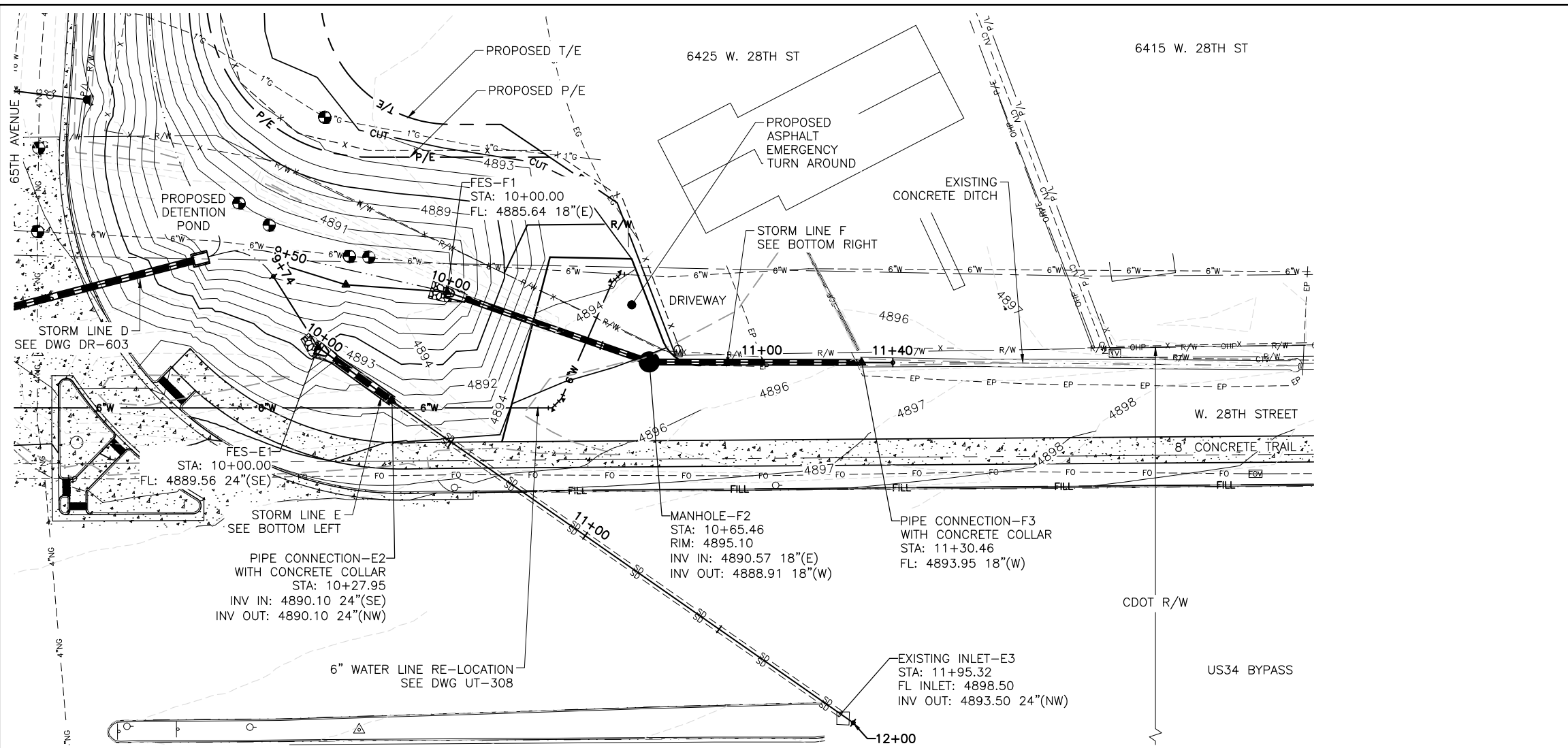
DR SHEET LIST:

- 601 - 604 --- 65TH AVENUE & POND
- 605 - 606 --- ULTIMATE: E. OF 65TH AVE
- 607 --- ULTIMATE: W. OF 65TH AVE



D STORM LINE D

CROSSING OF PROPOSED STORM PIPE OVER EXISTING WATER LESS THAN 18 INCHES SEE NOTE 6.



LEGEND:

- 4900 — PROPOSED MAJOR CONTOUR
- 4902 — PROPOSED MINOR CONTOUR
- - - 4900 - - - EXISTING MAJOR CONTOUR
- - - 4902 - - - EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- ⊙ POTHOLE - SEE UT DRAWINGS

NOTES:

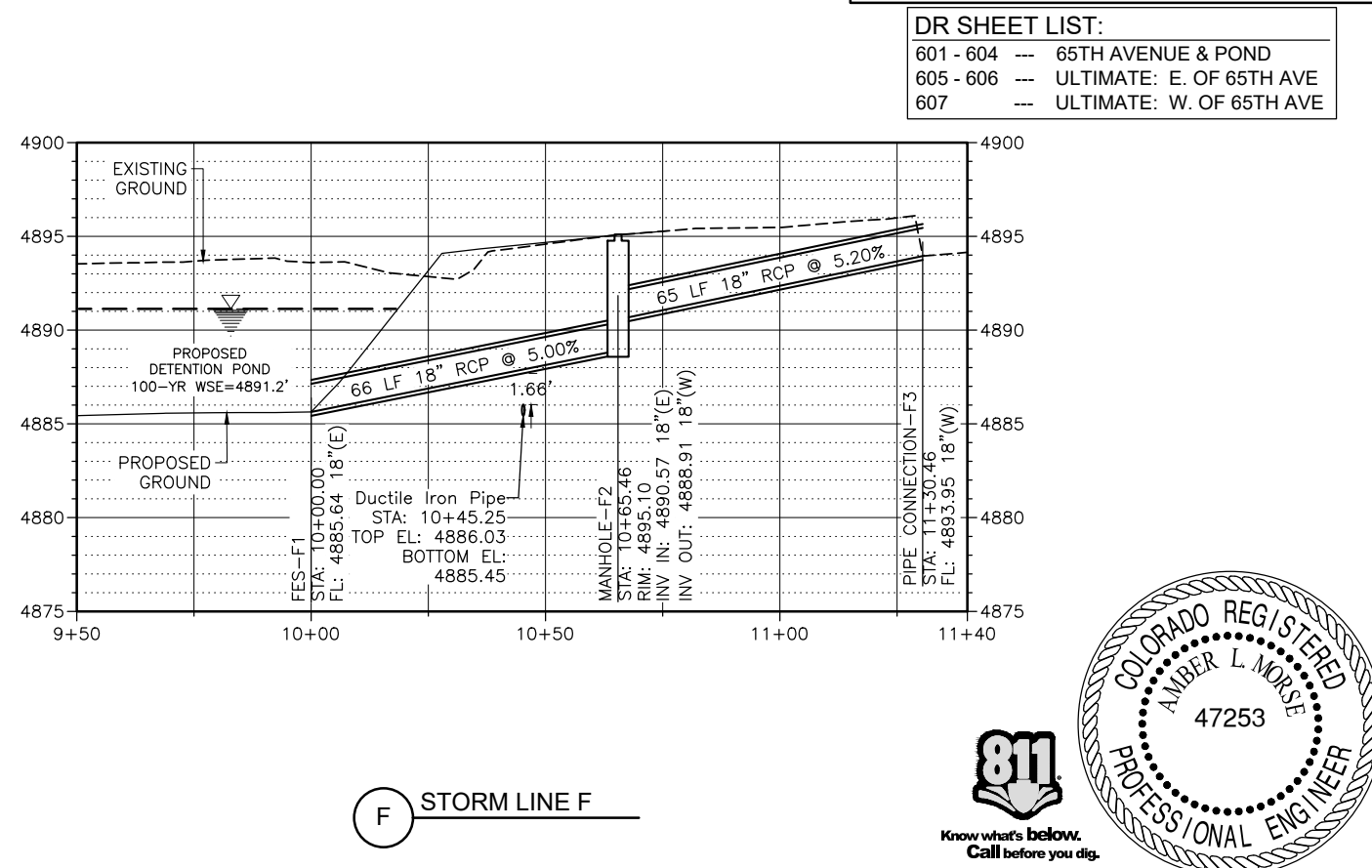
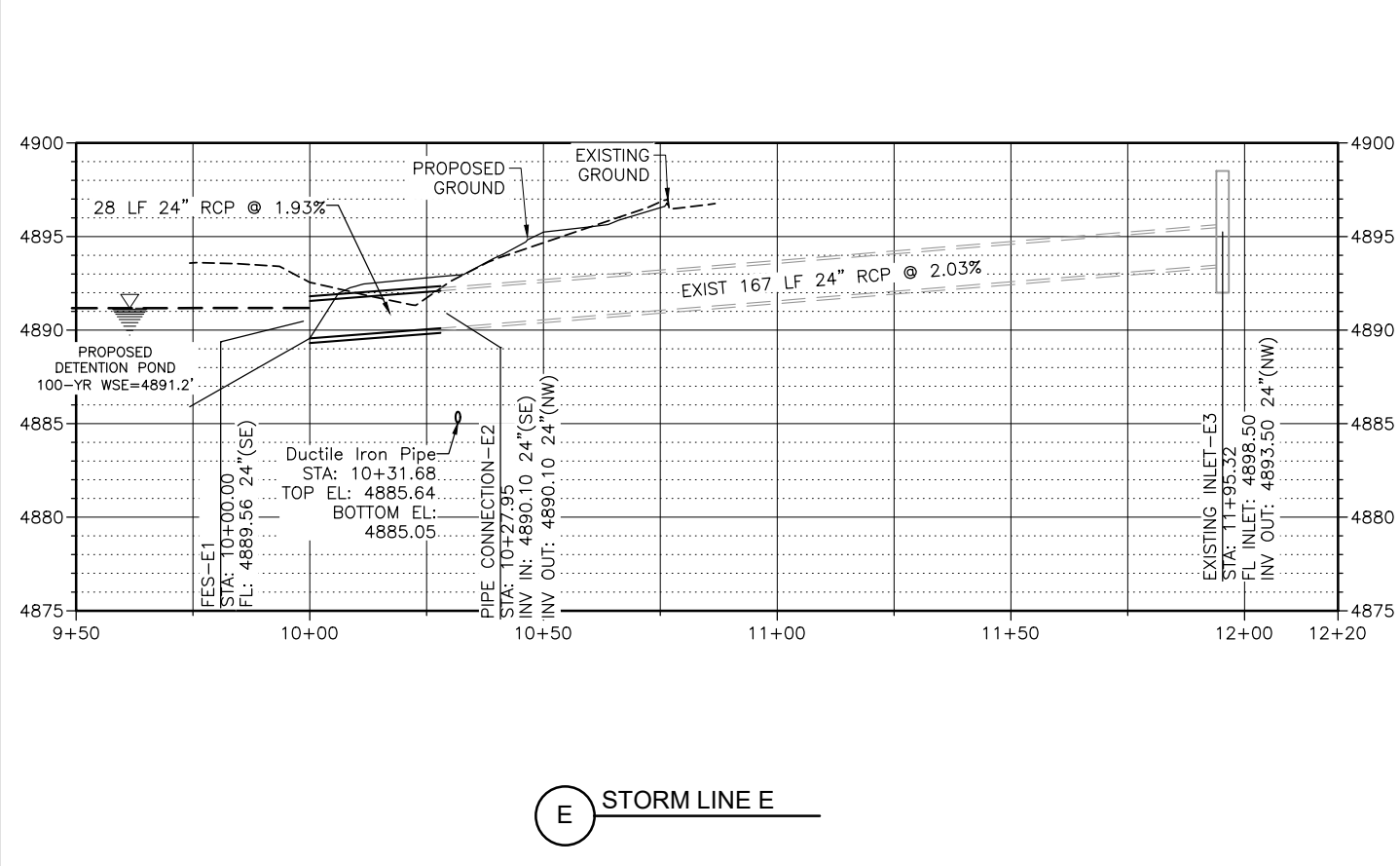
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- INLET DETAILS SEE DWG DT-1106
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- RIPRAP SIZING & DETAILS SEE DWG EC-710.
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INLET SCHEDULE:

A2 - 5' TYPE R	D2 - TYPE C - MESH
A3 - 5' TYPE R	G1 - TYPE C - MESH
C2 - 10' TYPE R	
C3 - 10' TYPE R	

DR SHEET LIST:

601 - 604	--- 65TH AVENUE & POND
605 - 606	--- ULTIMATE: E. OF 65TH AVE
607	--- ULTIMATE: W. OF 65TH AVE



Plot Date: 2/2/2020 4:46 PM, Plotted By: Amber Morse
 Date Created: 2/2/2020, Project: JUB-GREELEY-17-206, 65TH AVE, US4-CAD/SHEET/07-17-206-DR-60X.DWG

E STORM LINE E

F STORM LINE F

J-U-B ENGINEERS, INC.
 4745 Boardwalk Drive
 Building D Suite #200
 Fort Collins, CO 80525
 Phone: 970.377.3602
 Fax: 970.377.3935
 www.jub.com

CITY OF GREELEY
PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

NO.	REVISION	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
 CITY OF GREELEY

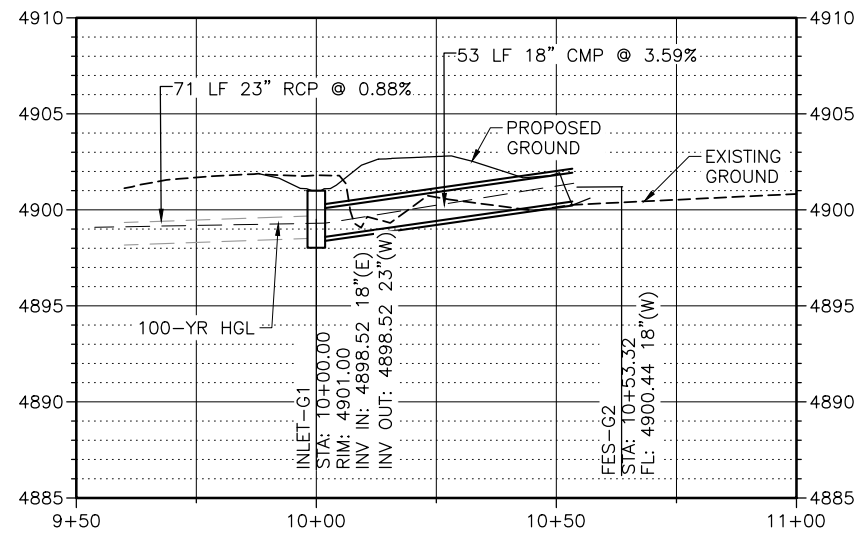
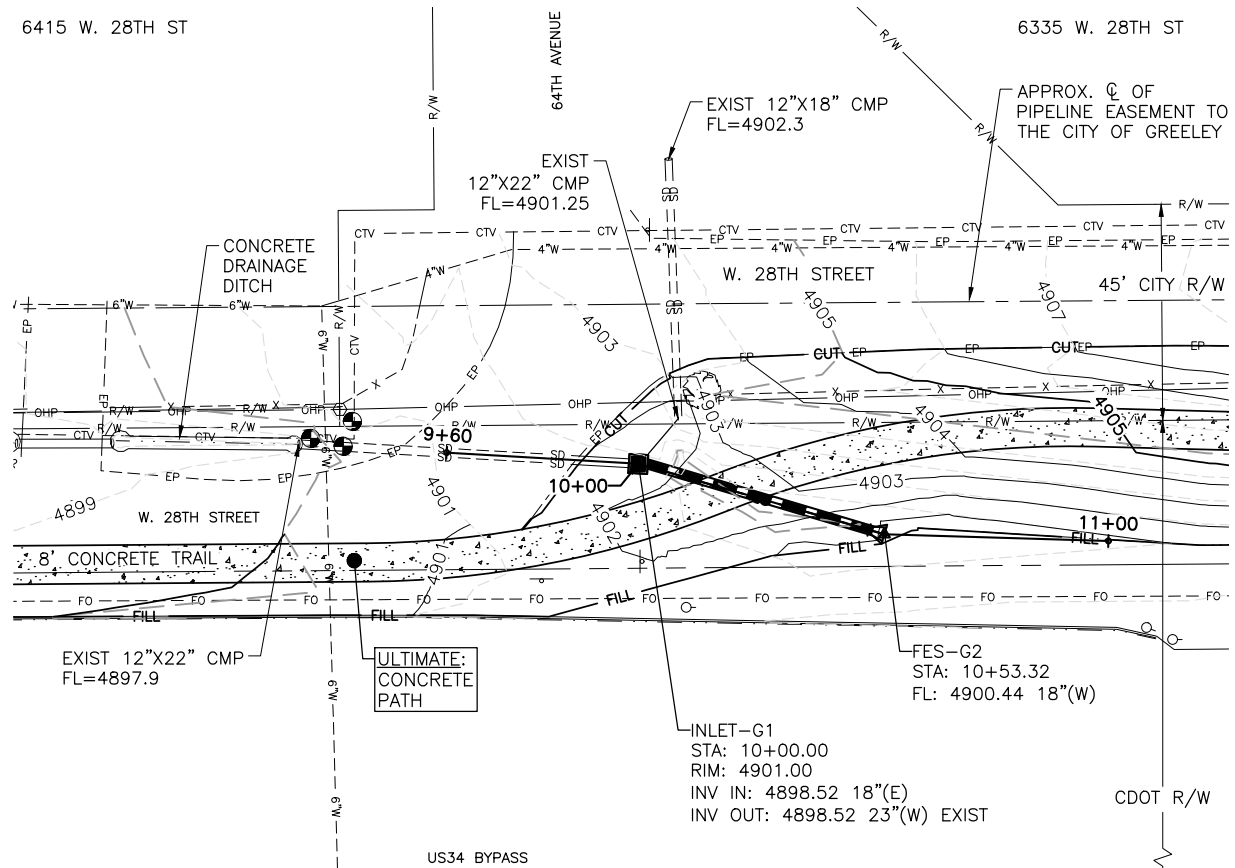
STORM DRAINAGE PLAN & PROFILE
 LINES E & F

FILE: 87-17-006-DR-60X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE
 INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020

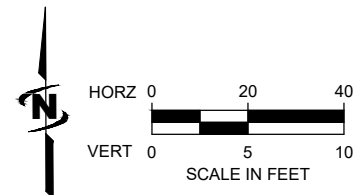
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DR-604

SHEET
74
 OF **115**

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 Date Created: 2/2/2020 File Path: C:\PROJECTS\JUB\GREELEY\09-17-2006-65TH AVE US&CAD\SHEET\09-17-2006-DR-407X.DWG



G ULTIMATE STORM LINE G



LEGEND:

- 4900 — PROPOSED MAJOR CONTOUR
- 4902 — PROPOSED MINOR CONTOUR
- - - 4900 - - - EXISTING MAJOR CONTOUR
- - - 4902 - - - EXISTING MINOR CONTOUR
- FILL
- CUT
- SWALE
- 2.0% PROPOSED SLOPES
- (2.0%) EXISTING SLOPES
- FG 89.56 FINISHED GRADE SPOT ELEVATION
- EG 89.56 EXISTING GRADE SPOT ELEVATION
- POT HOLE - SEE UT DRAWINGS

NOTES:

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INLET SCHEDULE:

- A2 - 5' TYPE R
- A3 - 5' TYPE R
- C2 - 10' TYPE R
- C3 - 10' TYPE R
- D2 - TYPE C - MESH
- G1 - TYPE C - MESH

DR SHEET LIST:

- 601 - 604 --- 65TH AVENUE & POND
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J-U-B ENGINEERS, INC.
 4745 Boardwalk Drive
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CITY OF GREELEY PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

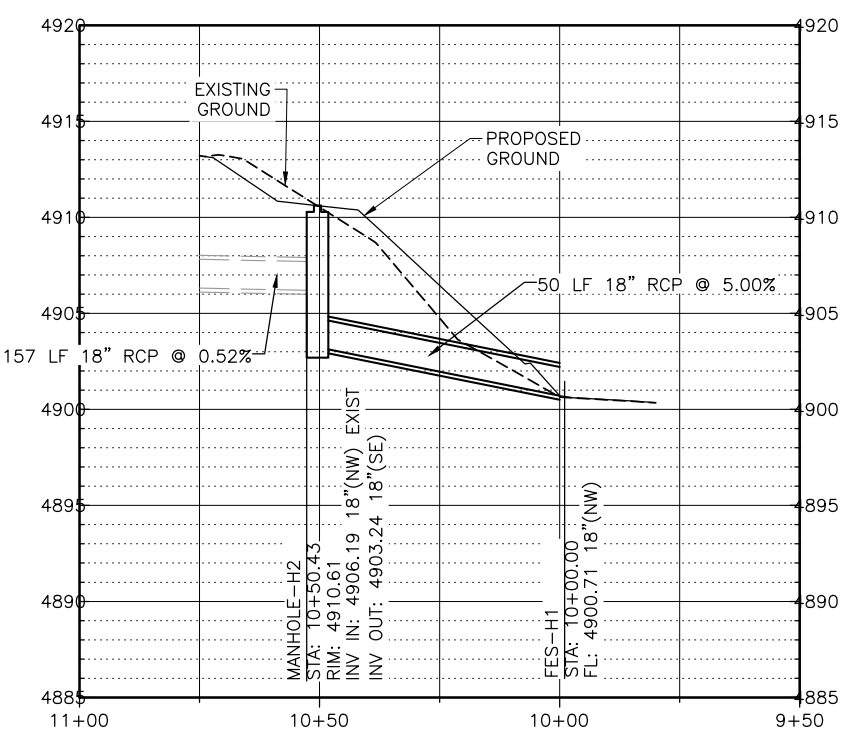
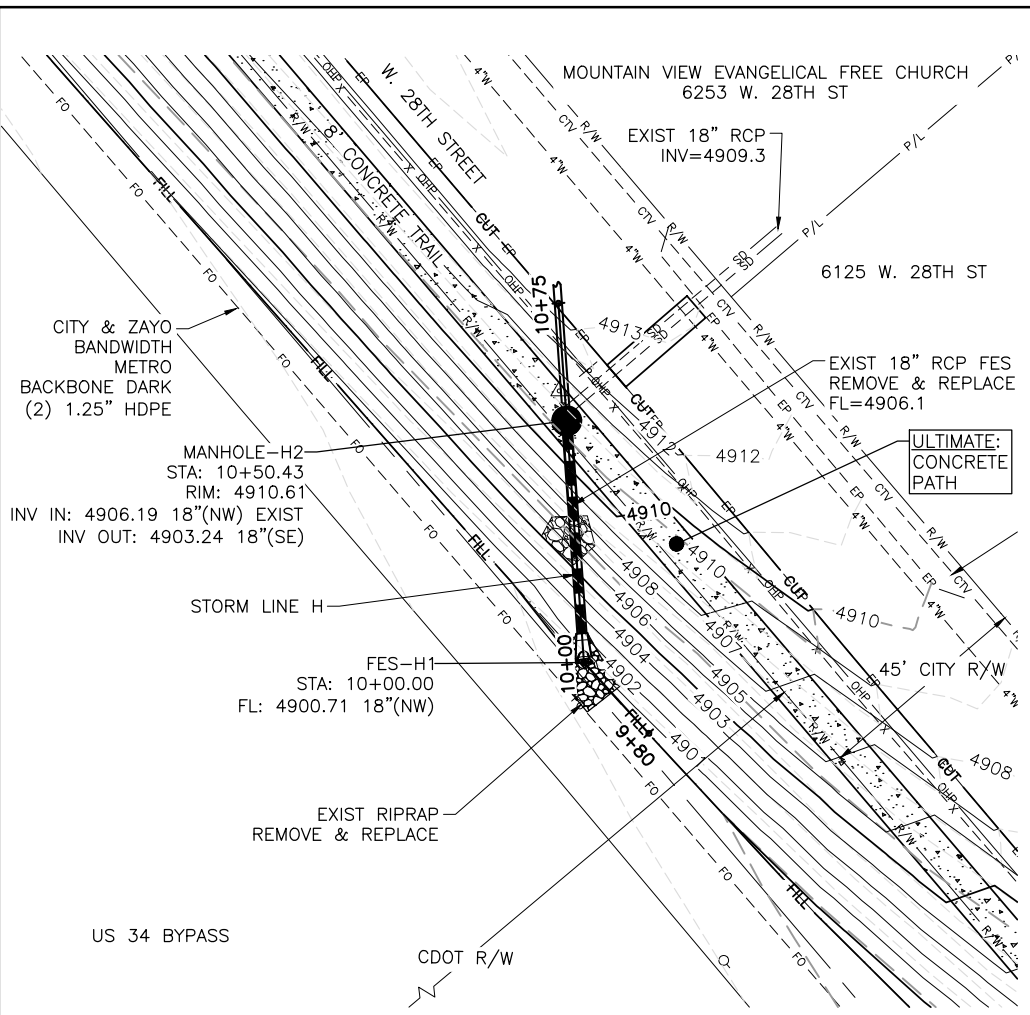
BID SET

NO.	REVISION	DESCRIPTION	BY	DATE

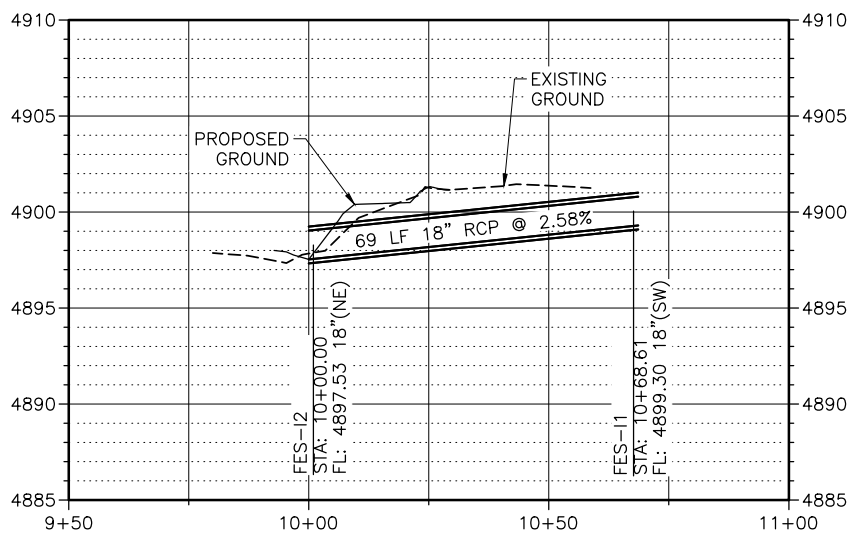
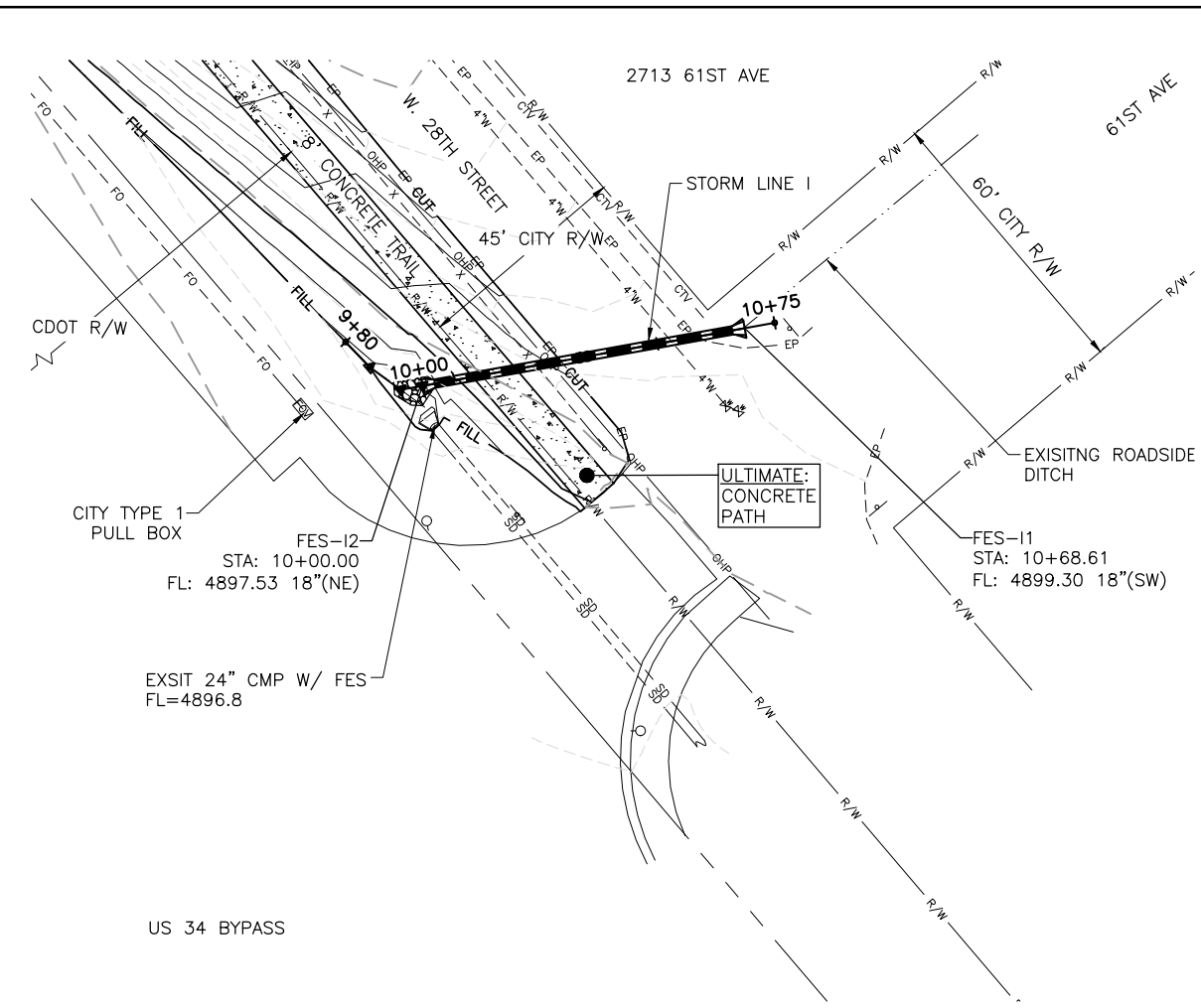
65th AVENUE ROAD WIDENING
 CITY OF GREELEY
 ULTIMATE
 STORM DRAINAGE PLAN & PROFILE
 LINE G

FILE : 87-17-006-DR-407X
 JUB PROJ. # : 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/2/2020
 DRAWING NUMBER:
DR-605
 SHEET
75
 OF 115

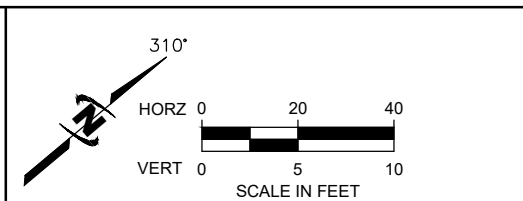
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H ULTIMATE STORM LINE H



I ULTIMATE STORM LINE I



- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
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 - CUT
 - SWALE
 - 2.0% PROPOSED SLOPES
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 - FG 89.56 FINISHED GRADE SPOT ELEVATION
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 - ⊙ POT HOLE - SEE UT DRAWINGS

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INLET SCHEDULE:

A2 - 5' TYPE R	D2 - TYPE C - MESH
A3 - 5' TYPE R	G1 - TYPE C - MESH
C2 - 10' TYPE R	
C3 - 10' TYPE R	

DR SHEET LIST:

601 - 604	--- 65TH AVENUE & POND
605 - 606	--- ULTIMATE: E. OF 65TH AVE
607	--- ULTIMATE: W. OF 65TH AVE



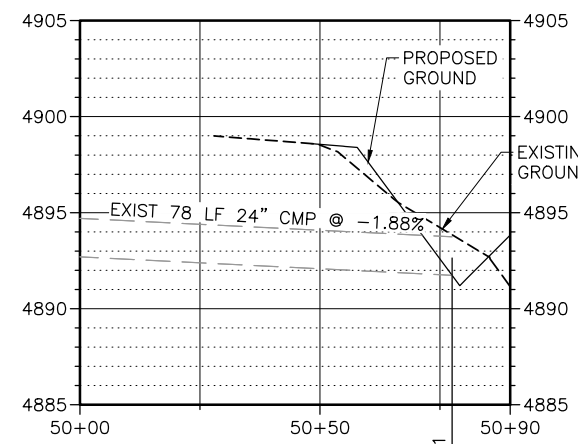
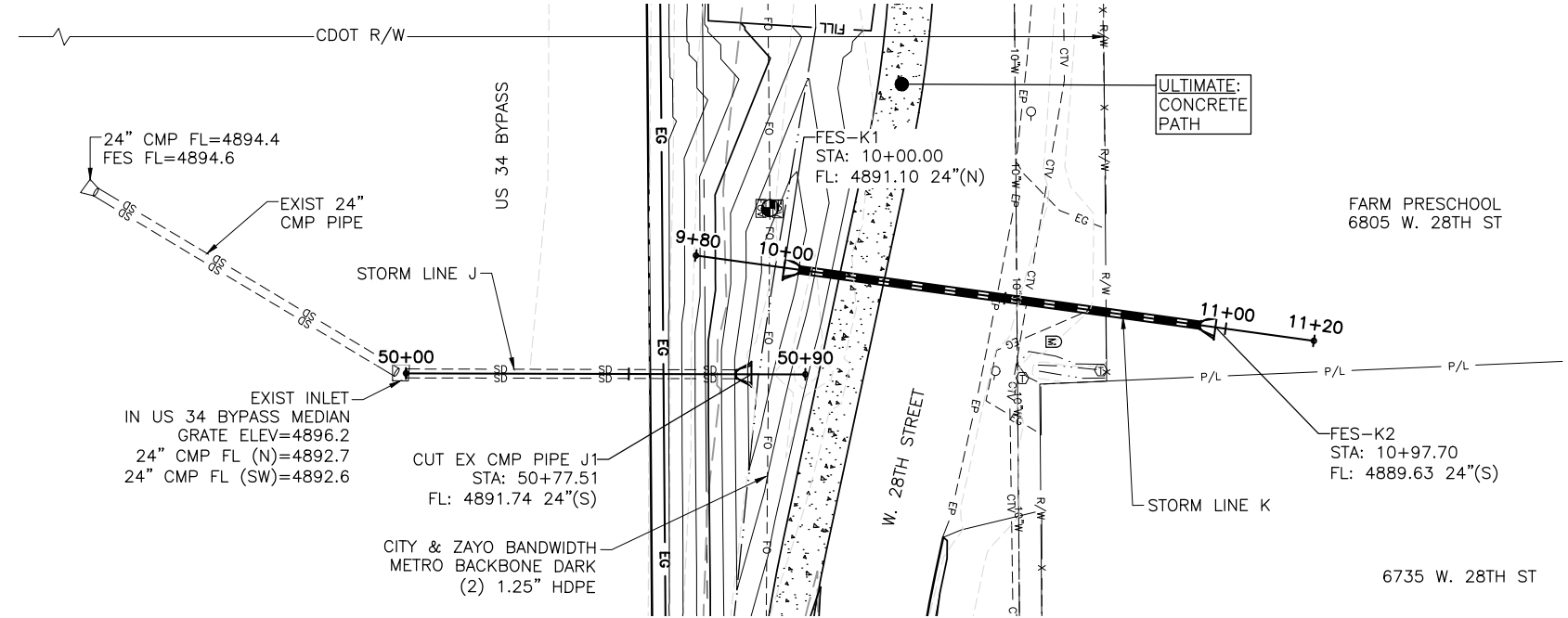
JUB
 J-U-B ENGINEERS, INC.
 4745 Boardwalk Drive
 Building D Suite #200
 Fort Collins, CO 80525
 Phone: 970.377.3602
 Fax: 970.377.3935
 www.jub.com

CITY OF GREELY PUBLIC WORKS
 Engineering Division
 1001 9th Avenue
 Greeley, CO 80631
 Phone: 970.377.3602

NO.	REVISION	DESCRIPTION	BY	DATE

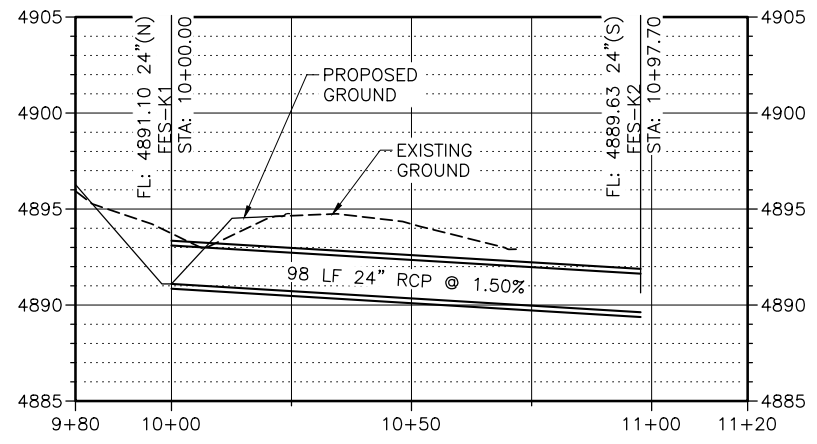
65th AVENUE ROAD WIDENING
 CITY OF GREELY
 ULTIMATE
 STORM DRAINAGE PLAN & PROFILE
 LINES H & I

FILE: 87-17-006 DR-408X
 JUB PROJ. #: 87-17-006
 DRAWN BY: BK
 DESIGN BY: BK
 CHECKED BY: ALM
 AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
 LAST UPDATED: 2/3/2020
 DRAWING NUMBER:
DR-606
 SHEET
76
 OF
115



J ULTIMATE STORM LINE J

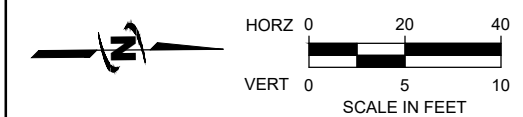
CUT EX CMP PIPE J1
STA: 50+77.51
FL: 4891.74 24"(S)



K ULTIMATE STORM LINE K

ULTIMATE STORM LINE K NOTES:

1. THE FINAL DESIGN AND CONSTRUCTION OF THIS STORM LINE MUST BE COORDINATED WITH THE PRIVATE LOT OWNER.
2. STORM LINE AS SHOWN MATCHES WHAT IS PROPOSED BY LANDONE ENGINEERING FOR THE FARM PRESCHOOL SITE IN 2019 DRAWINGS. THE SITE PLAN FOR THE FARM PRESCHOOL HAS NOT BEEN APPROVED BY THE CITY AT THE TIME OF THIS (65TH AVENUE ROAD WIDENING) CONSTRUCTION PLAN SET.



- LEGEND:**
- 4900 — PROPOSED MAJOR CONTOUR
 - 4902 — PROPOSED MINOR CONTOUR
 - - - 4900 - - - EXISTING MAJOR CONTOUR
 - - - 4902 - - - EXISTING MINOR CONTOUR
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 - CUT
 - SWALE
 - 2.0% PROPOSED SLOPES
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DR SHEET LIST:

601 - 604	---	65TH AVENUE & POND
605 - 606	---	ULTIMATE: E. OF 65TH AVE
607	---	ULTIMATE: W. OF 65TH AVE

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CITY OF GREELEY PUBLIC WORKS
Engineering Division
1001 9th Avenue
Greeley, CO 80631
Phone: 970.377.3602

BID SET

NO.	DESCRIPTION	BY	DATE

65th AVENUE ROAD WIDENING
CITY OF GREELEY
ULTIMATE
STORM DRAINAGE PLAN & PROFILE
LINES J & K

FILE :	87-17-006 DR-409
JUB PROJ. # :	87-17-006
DRAWN BY :	BK
DESIGN BY :	BK
CHECKED BY :	ALM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY	
LAST UPDATED:	2/2/2020
DRAWING NUMBER:	

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

COLORADO REGISTERED PROFESSIONAL ENGINEER
AMBER L. MORSE
47253

DR-607
SHEET 77 OF 115

Plot Date: 2/3/2020 4:47 PM, Plotted By: Amber Morse
Date Created: 2/2/2020, F:\PROJECTS\JUB\GREELEY\87-17-206-65THAVE_US&CAD\SHEET\87-17-206-DR-607.DWG

**APPENDIX G – SWMP DESCRIPTION IN SPECIAL
PROVISIONS FOR THIS SITE**

Storm Water Management Plan (SWMP)
for
65th Avenue Road Widening
at 65th Avenue and US 34 Bypass
Construction Plans
City of Greeley, Colorado

1. This plan identifies potential sources of pollutants of storm water, presents pollution control measures, and assists in ensuring the implementation and maintenance of the Control Measures; also referred to as, Best Management Practices (BMPs) indicated herein. The intent of this Storm Water Management Plan (SWMP) is to describe a Storm Water Pollution Prevention Plan (SWPPP) to reduce pollution associated with this project to the maximum extent practicable.
2. In the event of a release of a reportable quantity of a pollutant, the Contractor shall advise the Owner to notify the response center and City of Greeley. If necessary, this pollution prevention plan may be revised to reflect the change in conditions of the construction activity. A reportable quantity is established by 40 Code of Federal Regulations (CFR) 117.3 or 40 CFR 302.4.
3. The 2018 Colorado Discharge Permit System (CDPS) General Permit for Stormwater Discharges Associated with Construction Activities (COR-400000) is required before construction activities commence and the owner and operator are co-permittees (must sign permit) and are subject to the compliance with all terms and conditions.
4. All contractors and their personnel whose work can contribute to or cause pollution of storm water should be made familiar with this pollution prevention plan. Adequate training for implementation of the measures presented herein shall be provided to the contractors and their personnel.
5. Changes in construction or in conditions which are not covered by this plan should be brought to the attention of the Owner. This pollution prevention plan should be revised to reflect the change in construction or in conditions.
6. All prevention and clean up measures should be conducted in accordance with City of Greeley ordinances, as well as state and federal regulations. Waste materials should be disposed of in a legal manner. All dischargers of storm water must comply with the lawful requirements of City of Greeley, Weld County and other local agencies regarding the discharges of storm water to storm drains and drainage channels.
7. This plan does not cover the removal of hazardous or toxic waste. In the event of a discharge or release of a reportable quantity of toxic waste, work should be stopped until the spill can be assessed and a mitigation report prepared by a qualified environmental consultant, and if necessary, reviewed by Weld County, City of Greeley and any other agency having jurisdiction.
8. Permits: The City of Greeley will obtain a storm water discharge permit from State of Colorado, Department of public Health & Environment, Water Quality Control Division for temporary storm water runoff from the approximate 14.70 acres construction site.

9. Contact Information:

Owner: City of Greeley
Project Manager, Tom Helen
1001 9th Avenue, Greeley, CO 80631
970-350-9793

Contractor / Discharger: Company Name:
Contact Name:
Company Address:
Contact Phone:

SWMP Administrator: Name:
Contact Name:
Contact Address:
Contact Phone:

Civil Engineer: J-U-B Engineers, Inc.
Amber Morse, P.E.
4745 Boardwalk Drive, Building D, Suite 200, Fort Collins, CO 80525
970-377-3602

Regional Environmental Protection Agency
Region VIII EPA, Denver, Colorado
800-759-4372

Federal Environmental Protection Agency
U.S. EPA, Washington, D.C. 20460
202-475-9518

10. Site Description:

- A. The proposed improvements located north of US 34 Bypass will widen 65th Avenue near the intersection with US 34 Bypass to include two thru-lanes in each direction, bike lanes, two left-turn lanes, and protected right-turn lanes at both corners. Improvements extend 1,100-feet north along 65th Avenue from US34 as improvements transition to match existing. Proposed improvements along US34 include the addition of a westbound acceleration lane with shoulder connecting to the existing protected right-turn lane at 71st Avenue and pedestrian islands at both north corners of the intersection with 65th Avenue. Proposed improvements along frontage road W. 28th Street are re-alignment of the roadway to accommodate the addition of a multi-use trail between 71st Street and 61st Avenue. Improvements also include removing a portion of W. 28th Street between 65th Avenue and the first driveway to the east; eliminating through vehicle traffic east of 65th Avenue at this intersection.
- B. The proposed construction activity involves roadway reconstruction and widening along with some underground utility work. A detention pond with outlet structure is designed at the north-east corner of the intersection of 65th Avenue and W. 28th Street. The construction limits of the site encompass approximately 7.9-acres in Greeley, Colorado. The project will include excavation, embankment, hot mix asphalt pavement, new concrete curb, gutter, concrete shared use path, storm drainage improvements, waterline improvements and miscellaneous site improvements associated with the new improvements.

- C. The site is generally fairly flat with roadway grades averaging approximately 0.5% - 2.5%. The proposed finish grade of the sidewalk will generally match the roadway grades. Some embankment fill will occur at both sides of 65th Avenue and along the edge of proposed trail. Fill depths are approximately 1 to 3-feet higher than the existing roadway.
- D. Potential pollutants during construction are: generation of dust during mass grading, mud and debris being tracked into the streets and fuels and fluids needed to operate and maintain construction equipment.

Best Management Practices (BMP's) to Reduce Pollution

- A. Prohibition on most non-storm water discharges: Clean, non-chlorinated water from the flushing of fire hydrants, water mains, and storm drains may be discharged to the storm drain if it is not allowed to collect dirt, debris and trash while flowing to a storm drain inlet.
- B. Sources of storm water pollutants: storm water pollutants include soil sediment and nutrients, solvents, and typical vehicle gases, oils and fuels. Sources of storm water pollutants include but are not limited to soil erosion by water and/or wind; clearing of vegetation; grading; paints, solvents and adhesives; and landscaping work.
- C. Erosion and sediment controls:
 - 1. Areas will only be disturbed when needed.
 - 2. Long term stockpile areas (areas where stockpiles will lay dormant for four weeks or more) will be protected using perimeter containment berms or silt fencing.
 - 3. Re-vegetate areas where landscaping has died or not taken hold.
 - 4. Stabilize all construction site entrances to the site with a temporary or permanent material. This is intended to reduce significant amounts of mud-tracking onto the existing streets.
 - 5. Storm water inlets: Provide protection for all storm water inlets as identified on Sediment and Erosion Control Plans of the construction drawings to be clean and free of dirt and debris. Refer to detail sheets for additional inlet protection details and requirements.
 - 6. Provide a sign to identify the concrete washout area to truck drivers. The sign shall read "CONCRETE WASHOUT AREA."
- D. Other controls
 - 1. Waste disposal:
 - a. Keep waste disposal containers covered.
 - b. Provide for the disposal of waste containers every other week (or more frequent, if necessary).
 - c. Provide containers at convenient locations around the site.

2. Sweeping of site:
 - a. Provide sweeping by hand or mechanical means every other week to keep the paved areas of the site free of dust, dirt, and debris. Sweeping of streets during stormy periods may be required more frequently.
 - b. Dispose of accumulated dirt in waste containers or haul it off the site to a landfill.
3. Sanitary sewer:
 - a. Provide and maintain restroom facilities.
4. Spills:
 - a. Store adequate absorbent materials, rags, brooms, shovels, and waste containers on the site to clean-up spills of materials such as fuel, paint, solvents, or cleaners. Clean up minor spills immediately.
 - b. For reportable quantity of hazardous or toxic substance, secure the services of qualified personnel for clean-up and disposal.
5. Landscaping operations
 - a. Use only the minimum amount of landscaping fertilizes, nutrients, and other chemicals that are needed.
 - b. Do not over-water fertilized or treated landscape areas. Minimize runoff of irrigation water from landscaping.

E. Final stabilization and post-construction controls

1. After construction has been completed, the site shall be swept clean, storm water inlets (grates and basins) shall be cleaned, and all waste and leftover materials shall be removed from the site.
2. All landscaping and planting areas should be well maintained to prevent erosion. Avoid over watering of landscaping.
3. All paved and sidewalk areas should be swept either by hand or by mechanical means to keep the site clear of dirt, dust, and debris.
4. Waste materials should be removed from the site and properly disposed of.
5. Storm drain lines should be checked and cleaned annually to keep them clean and clear of debris.
6. All on-site storm water inlets should be clearly marked "storm water only".
7. Temporary BMPs should be removed once the site is stabilized.
8. Permanent BMPs include detention basins, surface drainage across grass areas and re-vegetation.

BMP Inspection (Provided by the City of Greeley)

1. Discharger Responsibility: All dischargers are required to: conduct inspections of the construction site prior to anticipated storm events and after actual storm events, to identify areas contributing to a storm water discharge, to evaluate whether measures to reduce pollutant loadings identified in this SWMP are adequate, to properly implement in accordance with the terms of the general permit, and to determine whether additional control practices are needed.
2. Frequency: Regular interval inspection to occur at a minimum of every 14 days and also before anticipated storm events and within 24 hours after storm events of ½ inch of moisture or more. The first inspection must be within 7 days of construction commencement. Inspections shall continue until the site is stabilized.
3. Documentation: Contractor must keep an inspection log on site at all times until construction is complete. If modifications to this plan are required, the modifications must be made within 7 calendar days of inspected deficiency. Inspection report must be signed and dated by the inspector.
4. Deficiencies: All deficiencies identified in the scheduled report must be corrected by the discharger within 7 calendar days of the notice of deficiency.
5. Retention of Records: The discharger is required to retain records of all monitoring information, copies of all reports required by this general permit, and records of all data used to complete the notice of intent for construction activity for a period of at least three years. This period may be extended by request of the State. With the exception of noncompliance reporting, dischargers are not required to submit the records except upon specific request by the State of Colorado Division of Water Quality.

Maintenance of Controls (Contractor)

1. Maintenance and Repair: All controls and measures indicated on this plan should be maintained in good and effective condition. If any controls or measures are damaged or removed, they should be promptly repaired or restored.
2. Plan Revisions: If construction activity or conditions change from those shown in this plan, then this plan shall be revised to reflect the current conditions. An updated copy of this site plan shall be kept on site at all times during construction. All revisions shall be noted with a signed acknowledgment of the change at the end of this document.
3. Accumulated Sediment: Sediment that has accumulated inside control structures, pipes, or conveyances must be removed when the capacity of the structure, pipe, or conveyance has been reduced by 50% of the available full capacity.

Completion of Construction Activities and Notice of Termination:

1. Transfer to City: At the completion of construction activities the Contractor shall transfer maintenance responsibilities of ongoing BMP's to the City. This transfer shall include transfer of all operation and maintenance manuals and maintenance instructions.
2. Removal of Temporary BMP's: After the area has been stabilized and a notice of termination has been received, all temporary erosion control measures shall be removed in a manner that minimizes disturbance to the site.