



Land Use

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BOARD OF COUNTY COMMISSIONERS

AGENDA ITEM

November 29, 2016 – 2:00 P.M.

Hearing Room, Third Floor, County Courthouse, Boulder

PUBLIC HEARING

STAFF PLANNER: Jennifer Severson, Senior Planner – Flood Recovery

Docket LU-16-0030: Boulder County - Fourmile Canyon Creek Restoration

Request: LISU application to undertake a stream restoration project on Fourmile Canyon Creek involving 12,530 cubic yards of earthwork.

Location: Parcels 146111000021, 146111000023, 146111000024, 146111002001, 146111002006, 146111002007, 146111002008, 146111002009, 146111002010, 146111002013, 146111003010, 146111005003, 146111006002, 146111006004, 146111008005, 146111008006, 146111008007, 146111008008, 146112000040, 146112000041, located at Fourmile Canyon Creek along Lee Hill Drive, Wagonwheel Gap Road and Pinto Drive, in Sections 11 and 12, T1N, R71W.

Zoning: Forestry (F) and Rural Residential (RR) Zoning Districts

Applicant: George Gerstle, Boulder County Department of Transportation

Agent: Clarissa Hageman, Boulder County Department of Transportation

SUMMARY AND RECOMMENDATION:

The proposal seeks to improve stream health and resilience along a 1.4 mile reach of Fourmile Canyon Creek by re-establishing natural channel design and restoring habitat. Staff finds that this stream restoration project, proposed to repair damage from the 2013 Extreme Rain and Flood Event (the flood), can, with the recommended conditions of approval, meet the applicable criteria and recommends **CONDITIONAL APPROVAL**.

DISCUSSION:

The subject properties are private residences located along Fourmile Canyon Creek (the creek) on Wagonwheel Gap Road, Pinto Drive, and Lee Hill Drive. The upstream end of the project abuts county open space that was accessed before the flood via the Anne U. White trailhead. The trailhead remains closed due to flood damage, but is planned for future restoration and repair by the county Parks and Open Space Department (POS).

The 2013 flood caused extensive damage to infrastructure and the creek channel, embankments, and adjacent habitat throughout the project corridor. The proposed restoration will reestablish physical,

chemical and biological functions of the river system and protect the embankments along Wagonwheel Gap Road and Lee Hill Drive against erosion during future high flow events.

Boulder County is proposing to reestablish natural channel design; restore habitat and ecological connectivity; and reduce flood risk to public infrastructure and private property along the creek through the following improvements:

- Channel realignment and embankment stabilization using boulders, root wads, and tow wood with soil wrapped lifts;
- Revegetation of the channel edge, riparian zones, and upland areas to improve habitat and control erosion;
- Construction of pool and riffle sequences to increase aquatic habitat diversity; and,
- Installation of rock vanes, boulder clusters, root wads, and tow wood to control flow velocity and increase habitat complexity.

Work will take place within the floodplain for Fourmile Canyon Creek. The project will involve approximately 12,530 cubic yards of earthwork, including 9,700 cubic yards of cut of which 1,200 cubic yards will be repurposed as fill. An additional 1,630 cubic yards of large boulders and granular material will be imported. The excess 8,468 cubic yards of cut material will be utilized on-site for the road project where feasible, or exported offsite to a location to be determined by the contractor.

To reduce construction costs and minimize impacts to area residents the creek restoration will be coordinated with the adjacent Wagonwheel Gap Road reconstruction project. Construction is expected to begin in spring 2017 and last approximately 7-8 months for both the road and creek projects.

Preliminary staging and creek access locations have been identified along the project corridor; however, final locations will be determined by the contractor in coordination with the road project and updated information will be provided with plans submitted for stream restoration permitting. The applicant has identified recommended temporary erosion control measures; however, details will be finalized by the contractor and included in final plans. Haul information will also be determined by the contractor, and routes and trip information provided with final plans submitted for permitting.

The revegetation plan includes using non-invasive, native seed mix in the riparian areas and some woody plants at discrete locations. Best practices will be used to avoid invasive species introduction and reduce noxious weed growth in the revegetated areas.

The following permits are being obtained by the applicant or have been approved:

- US Fish and Wildlife Service concurrence for threatened and endangered species
- State Historic Preservation Office Section 106 clearance
- US Army Corps of Engineers 404 Permit
- FEMA approval of Conditional Letter of Map Revision (CLOMR)

REFERRAL RESPONSES:

The application was referred to the standard agencies and adjacent property owners. Copies of all responses received by the Land Use Department are attached. A summary of each response follows:

Boulder County Building Safety & Inspection Services Team – This division of the Land Use Department reviewed the proposal and noted requirements for a grading permit. Additionally, plan review, inspections approval, and engineer-certified observation reports will be required prior to final approval of the work covered by the permit.

Boulder County Transportation Department – Development Review Team – This division of the Transportation Department reviewed the proposal and noted the applicant must show access locations on final plans and provide permissions from the respective property owners. Close coordination between the contractors for the stream restoration and adjacent road project is required. Additionally, the applicant shall coordinate with the Transportation Department’s Public Information Officer.

Staff also noted requirements for the following: a traffic control plan; a transportation management plan; vehicle tracking; haul hours; final grades; staging locations; worker vehicle parking; and erosion control. Additionally, the applicant must obtain all other necessary permits, including without limitation: United States Army Corps of Engineers Permits, a stormwater permit from the State of Colorado (for over 1 acre of disturbance), and Oversize/Overweight permits from the Transportation Department if applicable.

Boulder County Transportation Department – Floodplain Review Team – This division of the Transportation Department reviewed the proposal and noted that the project is within a floodplain overlay district and that a floodplain development permit is required. The plans submitted for permitting must be certified by a qualified engineer and the permit application will require an approved Conditional Letter of Map Revision (CLOMR) from FEMA. Additionally, a Letter of Map Revision (LOMR) will be required after project completion. Demonstration of coverage under an appropriate US Army Corps of Engineers permit is also required prior to floodplain development permit issuance.

Boulder County Parks and Open Space (POS) – This agency reviewed the proposal and noted the subject parcels hold the following designations from the Boulder County Comprehensive Plan: Preble’s Meadow Jumping Mouse (PMJM) Habitat – Foothills Perennial Stream; Riparian Area; and, Archaeologically Sensitive Area.

Staff supports the proposal to restore this heavily flood-impacted stream reach and noted that several of the above-listed resources will be improved in the long-term. Staff requested clarification about sourcing for certain plants, cuttings, and woody materials to be used for restoration. Staff also provided recommendations for the following: protection of existing riparian vegetation and proposed revegetation; reuse of onsite woody materials; location of staging and refueling areas; and, coordination with POS staff for floodplain grading at the upstream end of project.

Staff noted requirements for using soil riprap for new installation to facilitate natural germination and vegetation establishment; fines material should also be added to existing, previously-placed riprap. Requirements for the following were also noted: use of biodegradable hydraulic fluid in heavy machinery; location and method of equipment cleaning; pollution prevention; use of native species for revegetation; and, monitoring of noxious weeds. A completed Revegetation Plan must be submitted for approval that addresses all comments/ questions outlined in the referral letter dated November 6, 2016 (attached). Staging areas and stream access corridors must be approved by the county prior to permit issuance.

Boulder County Land Use – Historic Review - This agency reviewed the proposal and noted the identification of the Fourmile Canyon Creek corridor as an Archaeologically Sensitive Area. Proof of State Historic Preservation Office (SHPO) consultation and cultural resource inventories or background documentation (including site forms) must be provided by the applicant prior to permit issuance.

Boulder County Public Health – Environmental Division – This agency reviewed the proposal and noted the contractor must determine the location of all existing approved OWTS components in the project area prior to beginning construction. Additionally, heavy equipment should be restricted from the surface of the absorption fields during construction to avoid soil compaction, and caution should be exercised to prevent damage to OWTS components.

Boulder County Surveyor - This agency reviewed the proposal and had no conflicts.

Colorado Division of Water Resources – This agency reviewed the proposal and noted that the proposed construction activity may adversely affect diversion structures and water quantity and quality in the stream system. Conditions for wetland mitigation and replacement were provided, based on the proposed use of wetland plants for site revegetation. Additionally, the applicant is encouraged to consult with the local District Water Commissioner prior to construction.

Adjacent Property Owners – 188 referrals sent; 1 comment received.

- Simon Carlton requested that a detailed overlay of the proposed creek realignment, showing official plat boundaries of adjacent and impacted land, be included with the documentation included with the staff recommendation provided to county commissioners and made available to the public in advance of the public hearing.

CRITERIA REVIEW:

Article 4-601 of the Boulder County Land Use Code sets the standards for Uses Permitted by Limited Impact Special Review. Staff has reviewed this proposal for earthwork in excess of 500 cubic yards per these criteria and finds the following:

- (1) ***Complies with the minimum zoning requirements of the zoning district in which the use is to be established, and will also comply with all other applicable requirements;***

The project is located within Forestry (F) and Rural Residential (RR) zoning districts, and construction work is proposed within the floodplain for Fourmile Canyon Creek.

The project is within an Area of State Interest per Article 8-308 of the Land Use Code that includes an area containing archaeological resources, natural resources, and a flood hazard area. Such work would require a 1041 review and approval however, Article 8-405.E requires the 1041 review “unless the development is otherwise regulated with full and binding effect under other Articles of this code.” The Land Use Department has in a number of instances substituted the Limited Impact process for 1041 review for earthwork projects in flood hazard areas as the scope of the projects are relatively small and typically the impacts of these projects are localized to the site under consideration. The subject Limited Impact Special Use review is therefore allowed as the substitute process given the proposed earthwork will exceed 500 cubic yards.

Applicable requirements, which have been incorporated as recommended conditions of approval, include obtaining a county stream restoration permit (which is a combination of grading and floodplain development permits) and meeting appropriate US Army Corps of Engineers permitting requirements. An approved Conditional Letter of Map Revision (CLOMR) from FEMA is also required.

With adherence to the proposed conditions of approval, staff finds this criterion can be met.

- (2) ***The use will be compatible with the surrounding area. In determining compatibility, the Board should consider the location of structures and other improvements on the site; the size, height and massing of the structures; the number and arrangement of structures; the design of structures and other site features; the proposed removal or addition of vegetation; the extent of site disturbance, including, but not limited to, any grading and changes to natural topography; and the nature and intensity of the activities that will take place on the site. In determining the surrounding area, the Board should consider the unique location and environment of the proposed use; assess the relevant area that the use***

is expected to impact; and take note of important features in the area including, but not limited to, scenic vistas, historic townsites and rural communities, mountainous terrain, agricultural lands and activities, sensitive environmental areas, and the characteristics of nearby development and neighborhoods;

The project area is located in the foothills west of the City of Boulder and is predominantly rural private residences, but includes some county open space acreage.

The proposed restoration will re-establish stream function and greatly improve aesthetics in the project corridor. No building structures are proposed as part of the restoration, and no change in the use of impacted parcels is anticipated.

Staff anticipates no adverse impacts on the character of the surrounding area and finds that this criterion is met.

(3) *Will be in accordance with the Boulder County Comprehensive Plan;*

The subject property has several Comprehensive Plan designations as listed above in the referral comments from POS which highlight the concept that creek corridors are important ecological areas which should be protected and preserved. Natural resources may be temporarily impacted by project activity; however, the area will be much improved in the long-term by the proposed restoration.

The project will uphold Comprehensive Plan goals by providing benefits to local flora and fauna through habitat restoration which promote the preservation of natural ecosystems. Per the Comprehensive Plan ER Goal B.1, the county "...shall conserve and preserve environmental resources including...ecosystems through protection and restoration in recognition of the irreplaceable character of such resources and their importance to the quality of life in Boulder County." The restoration of the creek channel will stabilize flow and restore aquatic habitat connectivity and condition, while the riparian habitat restoration will contribute to the overall ecological health of the creek corridor.

The project area has been identified as PMJM Habitat – Foothills Perennial Stream. Concurrence of no adverse impact from the project on threatened and endangered species has been provided by the USFWS. The Fourmile Canyon Creek corridor has been identified as an Archaeologically Sensitive Travel Route and is subject to historic review. The applicant has obtained SHPO clearance for the project, and will be required to provide proof of consultation and any cultural resource inventories or background documentation.

With adherence to the above-mentioned condition of approval, staff finds that this criterion can be met.

(4) *The use will not result in an over-intensive use of land or excessive depletion of natural resources. In evaluating the intensity of the use, the Board should consider the extent of the proposed development in relation to parcel size and the natural landscape/topography; the area of impermeable surface; the amount of blasting, grading, or other alteration of the natural topography; the elimination or disruption of agricultural lands; the effect on significant natural areas and environmental resources; the disturbance of plant and animal habitat, and wildlife migration corridors; the relationship of the proposed development to natural hazards; and available mitigation measures such as the preservation of open lands, the addition or restoration of natural features and screening, the reduction or rearrangement of structures and land disturbance, and the use of sustainable construction techniques, resource use, and transportation management;*

Staff does not anticipate the use will result in over-intensive use of land or cause an excessive depletion of natural resources on the site. The proposed restoration will improve physical, chemical, and biological functions along the creek and will ultimately result in a river system that is more resilient to damage during future flood events.

The amount of site disturbance proposed is not excessive and is necessary to restore the function and health of the creek. The work will be confined to a relatively small area along the creek within the subject parcels. Mobilization and staging will be done in conjunction with the adjacent road reconstruction project, which should minimize impact within the project corridor.

Erosion Control is required for all disturbed areas, including staging and refueling sites, and the location and types of erosion control must be shown on final plans submitted for permitting. Construction staging should be located outside of the 100-year floodplain, where possible. Staging and refueling should be as far away from the creek as possible. Biodegradable hydraulic fluids must be used in all heavy machinery and a “spill kit” must remain on site during construction activity. To prevent the spread of noxious weeds and nuisance species, all equipment must be steam-cleaned before entering the project site. Staging areas and creek access corridors must be approved by the county prior to permit issuance. Disturbed areas will be revegetated after construction activities are completed. If straw is used on site it must be certified weed-free. A complete Revegetation Plan must be submitted to Land Use staff for review prior to permit approval.

Additionally, the applicant is subject to all applicable environmental and public health requirements regarding water quality, stormwater, and site dewatering, which may include the following: CWA Sec. 401 Water Quality Certification from CDPHE; Stormwater Individual or General Permit for Construction Activities if area of disturbance exceeds one acre in size; coverage under CDPS permit for Construction Dewatering.

With adherence to the recommended conditions of approval, staff finds that this criterion can be met.

(5) *Will not have a material adverse effect on community capital improvement programs;*

No information has been presented that indicates the proposal will have an adverse effect on community capital improvement programs, and no referral agency indicated any such concern; therefore, staff finds this criterion is met.

(6) *Will not require a level of community facilities and services greater than that which is available;*

No information has been presented that indicates the proposal will have an adverse effect on community facilities and services, and no referral agency indicated any such concern; therefore, staff finds that this criterion is met.

(7) *Will support a multimodal transportation system and not result in significant negative impacts to the transportation system or traffic hazards;*

Project activity will take place along the creek where it is adjacent to Wagonwheel Gap Road (including at the Bow Mountain Road intersection) and Lee Hill Drive; these are all county roads that primarily serve local area residents. The impact of hauling activity on traffic will be mitigated by the coordination of the stream and road restoration projects. Although the road project is not included in this review, a Traffic Control Plan and a Transportation Management Plan for the stream restoration project must be submitted prior to permit

approval. The applicant must also coordinate with the Transportation Department's Public Information Officer throughout the duration of the project. All additional requirements noted in the Transportation referral letter dated October 31, 2016 (attached) must be addressed before permit issuance.

With adherence to the recommended conditions of approval, staff finds that this criterion can be met.

(8) *Will not cause significant air, odor, water, or noise pollution;*

Staff does not anticipate the proposed stream restoration will cause significant long-term air, odor, water, or noise pollution. Criterion 4, above, discusses requirements for erosion control measures and environmental clearance requirements to prevent water pollution from site disturbance and runoff.

With adherence to the recommended conditions of approval noted in Criterion 4 above, staff finds that this criterion can be met.

(9) *Will be adequately buffered or screened to mitigate any undue visual impacts of the use;*

The proposed stream restoration project will be primarily limited to the creek channel, riparian areas, and adjacent staging locations within the creek corridor. Although the work will be visible to area residents during construction activity, the temporary visual impacts are necessary to achieve the long-term benefits anticipated from the project. Consequently, staff finds the proposal meets this criterion.

(10) *Will not otherwise be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County;*

The proposed channel and bank stabilization should mitigate future flood risk to public infrastructure and private property along the creek; this represents a safety improvement over existing conditions that will benefit the health, safety, and welfare of present and future inhabitants of Boulder County. Consequently, staff finds the proposal meets this criterion.

(11) *Will establish an appropriate balance between current and future economic, environmental, and societal needs by minimizing the consumption and inefficient use of energy, materials, minerals, water, land, and other finite resources;*

Staff finds that the consumption of energy and materials required for the proposed project is minimal and is balanced by project goals of infrastructure protection and improving ecological health and aesthetics in the creek corridor. Consequently, staff finds the proposal meets this criterion.

(12) *The use will not result in unreasonable risk of harm to people or property – both onsite and in the surrounding area – from natural hazards. Development or activity associated with the use must avoid natural hazards, including those on the subject property and those originating off-site with a reasonable likelihood of affecting the subject property. Natural hazards include, without limitation, expansive soils or claystone, subsiding soils, soil creep areas, or questionable soils where the safe-sustaining power of the soils is in doubt; landslides, mudslides, mudfalls, debris fans, unstable slopes, and rockfalls; flash flooding corridors, alluvial fans, floodways, floodplains, and flood-prone areas; and avalanche corridors; all as identified in the Comprehensive Plan Geologic Hazard and Constraint Areas Map or through the Special Review or Limited Impact Special Review process using the best available information. Best available information includes, without limitation,*

updated topographic or geologic data, Colorado Geologic Survey landslide or earth/debris flow data, interim floodplain mapping data, and creek planning studies;

Staff does not anticipate the proposed activities will result in unreasonable risk of harm to people or property from natural hazards. The proposed channel and bank stabilization, combined with habitat restoration, will help reestablish the natural function of the river system and should improve the overall long-term resilience of the Fourmile Canyon Creek watershed. Consequently, staff finds the proposal meets this criterion.

RECOMMENDATION:

For the reasons described above, Land Use staff recommends that the Board of County Commissioners **CONDITIONALLY APPROVE Docket LU-16-0030: Boulder County – Fourmile Canyon Creek Restoration** with the following conditions:

- 1) ***Prior to the commencement of site disturbance***, the Applicant shall obtain a County stream restoration permit (a combination of grading and floodplain development permits) from Building Safety and Inspection Services in the Land Use Department. Detailed plan review will be performed at time of permit application and engineering observations are required ***prior to final approval of the work covered in the permit***.
 - a. The applicant must provide an approved Conditional Letter of Map Revision (CLOMR) from FEMA with permit application. A Letter of Map Revision (LOMR) will also be required ***after project completion***. See Floodplain Review Team referral letter dated October 24, 2016 (attached) for additional details.
 - b. The location and types of all erosion control measures shall be shown on plans submitted for permitting.
 - c. Creek access locations must be shown on plans submitted for permitting and permission letters/ easements from respective impacted property owners must be provided.
 - d. Parking for worker vehicles must be shown on plans submitted for permitting. Workers' vehicles can be parked in designated approved areas that are outside of the road traveled way.
 - e. Plans provided for permit application must be certified by a qualified professional engineer registered in the state of Colorado.
- 2) ***At time of permit application***, the applicant must submit a Traffic Control Plan (TCP) to the Transportation Department for review and approval that addresses the following:
 - a. Flaggers and/or other traffic control measures must be used at the intersections of the access points on Wagonwheel Gap Road during hauling operations.
 - b. Locations and types of warning signs along the roads shall be shown.
- 3) ***Prior to construction***, the applicant must coordinate with the Transportation Department to develop a Transportation Management Plan that outlines how public information about the project and construction progress will be communicated to the public. The applicant must coordinate with the Transportation Department's Public Information Officer.
- 4) The applicant must address all other requirements and comments as outlined in the Transportation Development Review referral letter dated October 31, 2016 (attached), which include, but are not limited to the following:

- a. The stream restoration project will occur concurrently with the Boulder County permanent road reconstruction project. The projects shall be coordinated between the two project contractors.
 - b. Vehicle tracking and a sweeping plan must be included in the erosion and sediment control plan.
 - c. Hours of hauling on County roads shall be limited to 8:30 am-4:00 pm.
 - d. The applicant must photo-document the conditions of all County roads used for hauling operations and must restore all affected roadways to pre-project conditions or better.
 - e. Construction staging should be located in areas outside of the 100-year floodplain, and as far away from the edge of Fourmile Canyon Creek as possible. Stockpiled fill piles over 30 days shall be properly covered and/or stabilized with temporary vegetation.
 - f. Final grade cuts and fills shall not be steeper than a 1-½ to 1 slope. Grades steeper than a 1-½ to 1 slope will need to be supported by a retaining wall.
- 5) The applicant must address all other requirements and comments as outlined in the Parks and Open Space referral letter dated November 6, 2016 (attached), which include, but are not limited to the following:
 - a. A complete list of proposed species to be used for revegetation, including scientific names, must be approved by Land Use staff **prior to project commencement**.
 - b. All equipment must be steam-cleaned before entering the construction site.
 - c. A “spill kit” for emergency pollutant isolation, and written clean-up procedures, must be onsite at all times during construction activity.
 - d. Biodegradable hydraulic fluids must be used in all heavy machinery.
 - 6) **Prior to issuance of a stream restoration permit**, the applicant should consult with the local Water Commissioner about the proposed construction activity and possible adverse impacts on water resources or vested water rights in Boulder Creek.
 - 7) **Prior to issuance of a permit**, the applicant must provide cultural resource inventories or background documentation.
 - 8) **Prior to commencement of site disturbance**, appropriate erosion control measures shall be installed downslope and parallel to contours for all disturbed areas, including staging areas.
 - 9) The applicant must obtain all necessary permits **before commencing operations**, including without limitation: United States Army Corps of Engineers permits, a stormwater permit from the State of Colorado (for over 1 acre of disturbance), and Oversize/Overweight permits from the county Transportation Department if applicable.
 - 10) Heavy equipment should be restricted from the surface of the absorption fields of nearby residences during construction to avoid soil compaction, which could cause premature absorption field malfunction. Detailed information about the location of OWTS components can be found at www.bouldercounty.org/env/water/pages/septicmartcheckrecords.aspx.
 - 11) The Applicant shall be subject to the terms, conditions, and commitments of record and in the file for **Docket LU-16-0030: Boulder County – Fourmile Canyon Creek Restoration**.



Boulder County Land Use Department

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 Tuesday 10 a.m. to 4:30 p.m.

Shaded Areas for Staff Only
Intake Stamp

Application Form

Project Number		Project Name		
<input checked="" type="checkbox"/> Limited Impact Special Use <input type="checkbox"/> Limited Impact Special Use Waiver <input type="checkbox"/> Modification of Special Use <input type="checkbox"/> Site Plan Review <input type="checkbox"/> Site Plan Review Waiver <input type="checkbox"/> Subdivision Exemption <input type="checkbox"/> Exemption Plat <input type="checkbox"/> 1041 State Interest Review <input type="checkbox"/> Other:	Application Deadline: First Wednesday of the Month <input type="checkbox"/> Variance <input type="checkbox"/> Appeal		Application Deadline: Second Wednesday of the Month <input type="checkbox"/> Sketch Plan <input type="checkbox"/> Preliminary Plan <input type="checkbox"/> Final Plat <input type="checkbox"/> Resubdivision (Replat) <input type="checkbox"/> Special Use/SSDP	
				<input type="checkbox"/> Rezoning <input type="checkbox"/> Road/Easement Vacation <input type="checkbox"/> Location and Extent <input type="checkbox"/> Road Name Change
Location(s)/Street Address(es) Full list of parcels attached				
Boulder, CO 80302				
Subdivision Name				
Lot(s)	Block(s)	Section(s) 11	Township(s) 1 North	Range(s) 71 West
Area in Acres	Existing Zoning Rural Residential & Forestry	Existing Use of Property		Number of Proposed Lots
Proposed Water Supply		Proposed Sewage Disposal Method		

Applicants:

Applicant/Property Owner George Gerstle - Director, Boulder County Transportation Department			Email Address ggerstle@bouldercounty.org	
Mailing Address P.O. Box 471				
City Boulder	State CO	Zip Code 80306	Phone (303) 441-3955	Fax
Applicant/Property Owner/Agent/Consultant			Email Address	
Mailing Address				
City	State	Zip Code	Phone	Fax
Agent/Consultant Clarissa Hageman - Stream Restoration Project Engineer, Boulder County Transportation Department			Email Address chageman@bouldercounty.org	
Mailing Address P.O. Box 471				
City Boulder	State CO	Zip Code 80306	Phone (303) 441-1610	Fax

Certification (Please refer to the Regulations and Application Submittal Package for complete application requirements.)

I certify that I am signing this Application Form as an owner of record of the property included in the Application. I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge. I understand that all materials required by Boulder County must be submitted prior to having this matter processed. I understand that public hearings or meetings may be required. I understand that I must sign an Agreement of Payment for Application processing fees, and that additional fees or materials may be required as a result of considerations which may arise in the processing of this docket. I understand that the road, school, and park dedications may be required as a condition of approval.

I understand that I am consenting to allow the County Staff involved in this application or their designees to enter onto and inspect the subject property at any reasonable time, without obtaining any prior consent.

All landowners are required to sign application. If additional space is needed, attach additional sheet signed and dated.

Signature of Property Owner 	Printed Name George Gerstle, Director - Boulder County Transportation Department	Date 10/14/16
Signature of Property Owner	Printed Name	Date

The Land Use Director may waive the landowner signature requirement for good cause, under the applicable provisions of the Land Use Code.

**Fourmile Canyon Creek
Stream Restoration
Participating Properties**

Number	PARCEL_NO	Property Address
1	146112000040	0 Lee Hill Dr.
2	146112000041	927 Lee Hill Dr.
3	146111000021	1073 Lee Hill Dr.
4	146111000023	67 Wagonwheel Gap Rd.
5	146111000024	388 Wagonwheel Gap Rd.
6	146111002001	400 Wagonwheel Gap Rd.
7	146111002013	491 Wagonwheel Gap Rd.
8	146111002006	565 Wagonwheel Gap Rd.
9	146111002007	597 Wagonwheel Gap Rd.
10	146111002008	0 Wagonwheel Gap Rd.
11	146111002009	0 Wagonwheel Gap Rd.
12	146111002010	753 Wagonwheel Gap Rd.
13	146111003010	778 Wagonwheel Gap Rd.
14	146111005003	909 Wagonwheel Gap Rd.
15	146111006004	938 Wagonwheel Gap Rd.
16	146111008005	1037 Wagonwheel Gap Rd.
17	146111006002	1604 Wagonwheel Gap Rd.
18	146111008006	55 Pinto Dr.
19	146111008007	123 Pinto Dr.
20	146111008008	157 Pinto Dr.

Limited Impact Special Use Review Fact Sheet

Project Identification

Project Name: Fourmile Canyon Creek Stream Restoration
Property Address/Location: Sec 11&12, T1N, R71W - see parcel numbers above
Current Owner: see attached list
Size of Property in Acres: 127.35 (total for all impacted parcels)

The applicant(s) is/are required to complete each section of this Limited Impact Special Use Review Fact Sheet even if the information is duplicated elsewhere in the application. Completed Fact Sheets reduce the application review time which helps expediate the Director's Determination. Please make duplicates of this Limited Impact Special Use Review Fact Sheet if the project involves more than two structures.

Determining Floor Area

If an existing wall(s) and/or roof(s) are removed and a new wall(s)/roof(s) are constructed, the associated floor area due to the new wall(s)/roof(s) are considered new construction and must be included in the calculation of floor area for the Limited Impact Special Use Review and shown on this Fact Sheet.

Structure #1 Information

N/A

Type of Structure: (e.g. residence, studio, barn, etc.)			
Total Existing Floor Area: (Finished + Unfinished square feet including garage if attached.)		sq. ft.	Deconstruction: sq. ft.
Are new floor areas being proposed where demolition will occur? <input type="checkbox"/> Yes (include the new floor area square footage in the table below) <input type="checkbox"/> No			
Proposed Floor Area (New Construction Only)			
	Finished	Unfinished	Total
Basement:	sq. ft.	sq. ft.	sq. ft.
First Floor:	sq. ft.	sq. ft.	sq. ft.
Second Floor:	sq. ft.	sq. ft.	sq. ft.
Garage: <input type="checkbox"/> Detached <input type="checkbox"/> Attached	sq. ft.	sq. ft.	sq. ft.
Covered Deck:	sq. ft.	sq. ft.	sq. ft.
Total:	sq. ft.	sq. ft.	sq. ft.
			Total Bedrooms

Structure #2 Information

Type of Structure: (e.g. residence, studio, barn, etc.)			
Total Existing Floor Area: (Finished + Unfinished square feet including garage if attached.)		sq. ft.	Deconstruction: sq. ft.
Are new floor areas being proposed where demolition will occur? <input type="checkbox"/> Yes (include the new floor area square footage in the table below) <input type="checkbox"/> No			
Proposed Floor Area (New Construction Only)			
	Finished	Unfinished	Total
Basement:	sq. ft.	sq. ft.	sq. ft.
First Floor:	sq. ft.	sq. ft.	sq. ft.
Second Floor:	sq. ft.	sq. ft.	sq. ft.
Garage: <input type="checkbox"/> Detached <input type="checkbox"/> Attached	sq. ft.	sq. ft.	sq. ft.
Covered Deck:	sq. ft.	sq. ft.	sq. ft.
Total:	sq. ft.	sq. ft.	sq. ft.
			Total Bedrooms

Grading Calculation

Cut and fill calculations are necessary to evaluate the disturbance of a project and to verify whether or not a Limited Impact Special Use Review (LISR) is required. A Limited Impact Special Use Review is required when grading for a project involves more than 500 cubic yards (minus normal cut/fill and backfill contained within the foundation footprint).

If grading totals are close to the 500 yard trigger, additional information may be required, such as a grading plan stamped by a Colorado Registered Professional Engineer.

Earth Work and Grading

This worksheet is to help you accurately determine the amount of grading for the property in accordance with the Boulder County Land Use Code. Please fill in all applicable boxes.

Note: Applicant(s) must fill in the shaded boxes even though foundation work does not contribute toward the 500 cubic yard trigger requiring Limited Impact Special Use Review. Also, all areas of earthwork must be represented on the site plan.

Earth Work and Grading Worksheet:

	Cut	Fill	Subtotal
Driveway and Parking Areas	0	0	0
Berm(s)	0	0	0
Other Grading <small>debris removal & stream channel grading</small>	9,658 cyds	1,190 cyds	10,848 cyds
Subtotal	9,658 cyds	1,190 cyds	10,848 cyds <small>Box 1</small>
* If the total in Box 1 is greater than 500 cubic yards, then a Limited Impact Special Review is required.			
	Cut	Fill	Total
Foundation	0	0	0
Material cut from foundation excavation that will be removed from the property			0

Excess Material will be Transported to the Following Location:

Excess Materials Transport Location:
Excess materials will be used for on site or off site Boulder County stream or road projects, where appropriate. Any materials that cannot be used for these projects will be transported by the contractor to an appropriate disposal facility.

Is Your Property Gated and Locked?

Note: If county personnel cannot access the property, it could cause delays in reviewing your application.

Certification

I certify that the information submitted is complete and correct. I agree to clearly identify the property (if not already addressed) and stake the location of the improvements on the site within four days of submitting this application. I understand that the intent of the Site Plan Review process is to address the impacts of location and type of structures, and that modifications may be required. Site work will not be done prior to issuance of a Grading or Building Permit.

Signature <i>Clarissa J. Hageman</i>	Date <i>10/14/2016</i>
--------------------------------------	------------------------



Boulder County Land Use Department

2045 13th Street, Boulder, CO 80302 303-441-3930 www.bouldercounty.org/lu

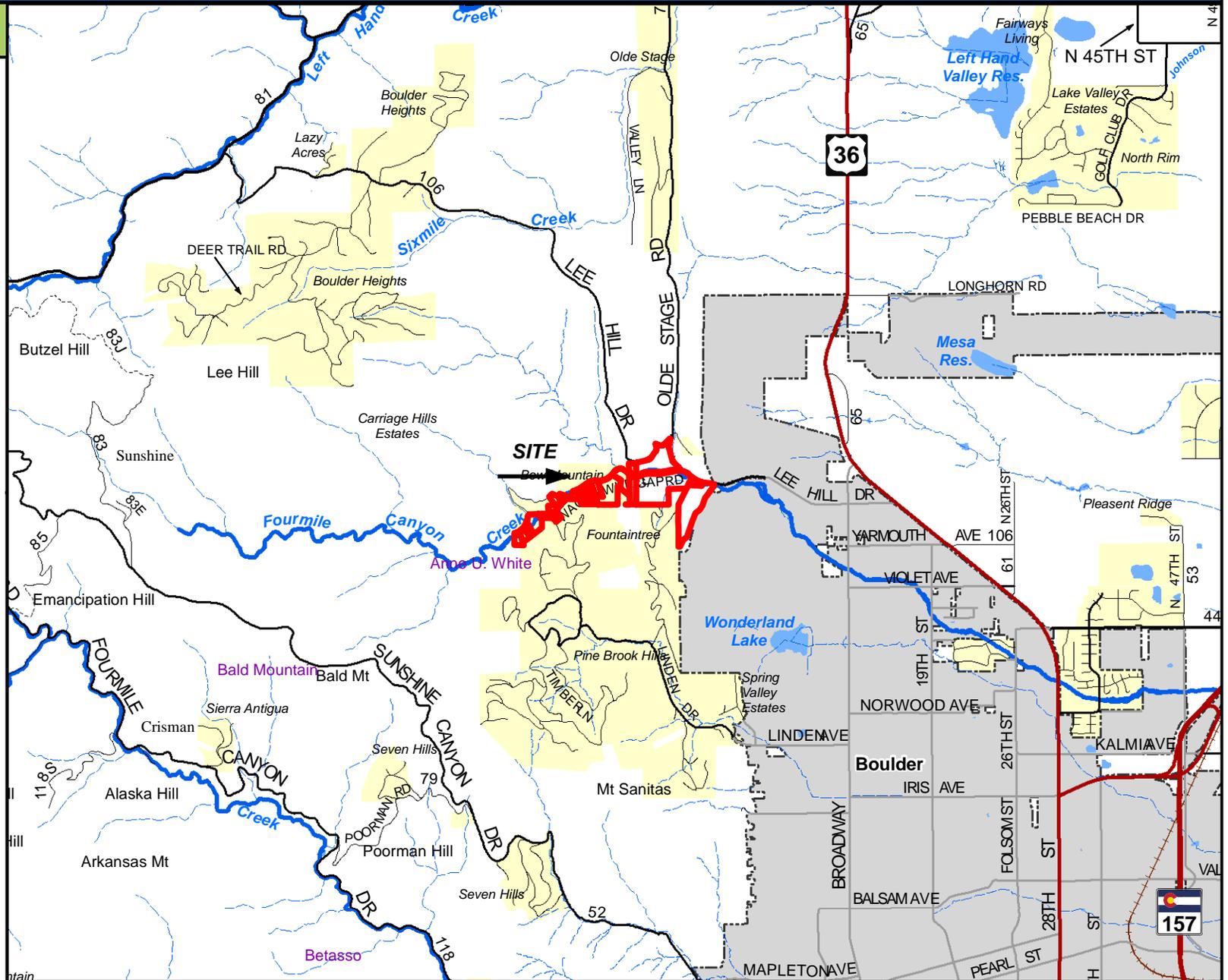
Land Use PreApplication Map: Vicinity

Boulder County- Fourmile Canyon Creek Restoration

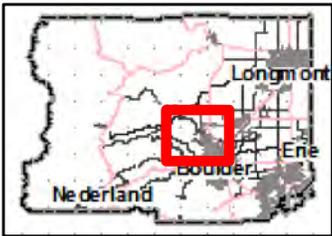
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Legend

- Subject Property
- Intermittent Stream
- Perennial Stream
- Municipalities
- Subdivisions



Area of Detail Date: 10/11/2016



The user agrees to all Terms of Use set forth by Boulder County. For Terms of Use, please visit: www.bouldercounty.org/mapdisclaimer

Fourmile Canyon Creek Stream Restoration Project Narrative

The Boulder County Transportation Department proposes to sponsor stream habitat restoration within segments of Fourmile Canyon Creek that were scoured, degraded, and aggraded by flooding in September 2013. The narrative describes the project location, existing conditions, project description, activities, objectives, and restoration strategies.

I. Project Description

The proposed project will include approximately 10,900 cubic yards of earth moved to restore approximately 7,240 linear feet of creek corridor along 1.4 miles of stream. Approximately speaking, 9,700 cubic yards of earthwork will be cut and 1,200 cubic yards will be fill. This will leave approximately 8,500 cubic yards to be moved off-site or used on site during road or stream reconstruction.

A total of 20 properties are included in the project area. Of these, one is owned and managed by the City of Boulder and the remaining 19 are private properties. Two of these properties include conservation easements, one with the City of Boulder and another with Boulder County. Properties in the project area are shown in the attached table and the staging and cut and fill map.

A. Project Objectives and Design Strategies

A Watershed Master Plan was not developed for Fourmile Canyon Creek. The project goal is to establish the physical, chemical, and biological self-regulating functions of the river system that emulate the natural stable form within the constraints imposed by landscape conditions. Project objectives include:

- To restore the natural channel to the extent practical
- To restore aquatic and terrestrial habitat and ecological connectivity
- To reduce flood risk to infrastructure and private property
- To integrate stream restoration strategies with changes to Wagonwheel Gap Road & Pinto Drive

Rehabilitation strategies include the establishment of a bankfull channel, asset protection, and the restoration of floodplain connectivity where viable. The project will increase channel and floodplain complexity through modification of the plan and profile of the creek, including the placement of root wads, boulder clusters, soil lifts, and numerous other geomorphic and habitat features in the channel and on the floodplain. The proposed project will use earthwork, stream realignment, in-stream structures, and native plantings to provide erosion control and reconnect the stream to the floodplain. Project design details are included in the enclosed project plans. The project will:

- Realign portions of the stream channel and bank stabilization using boulder bank protection, root wads, and tow wood with soil wrapped lifts to control erosion;
- Revegetate the channel edge, lower and upper riparian zones, and upland areas to improve habitat and control erosion;
- Place engineered rock and rock-and-log step pools and constructed riffles in select locations to increase aquatic habitat diversity; and
- Place rock cross-vanes, boulder and log j-hook vanes, converging boulder clusters, root wads, and tow wood in select locations to control velocity and add habitat complexity.

B. Construction Activities & Plan Set

Boulder County contracted a stream restoration design engineer to develop enhanced 30 percent design plans. In conjunction with these plans, the design engineer will assist Boulder County in construction oversight to field-fit the 30% design, allowing the designer to customize the design to field conditions during construction. The project is intended to be constructed with proposed road reconstruction to reduce construction costs and residential impacts. The estimated construction time frame is beginning of spring or summer of 2017 and must be completed 220 days after construction begins.

The attached Stream Restoration Staging Areas Plan indicates the locations of cut and fill along the project area, calls out property owners, parcel numbers, and property addresses within the project area, potential stream access points during construction, and possible staging areas located in the floodplain. Actual staging areas will be identified prior to construction. The project will be accessed from Wagonwheel Gap Road and Pinto Drive. The anticipated haul routes include the transport of materials from Fourmile Canyon Creek to the greater Boulder County area via Pinto Drive and Wagonwheel Gap Road between the upper extent of the project limits and Lee Hill Drive west of the City of Boulder. We anticipate approximately 280 trips along the proposed route will be required assuming 40 trips with flatbed trucks and 240 trips with side dump trucks. This assumes that the trucks will be carrying less than full capacity to safely navigate canyon roads. No areas of concern have been identified on the proposed haul route. Road closures may occur as a result of road reconstruction, but none are anticipated for the proposed stream restoration. This information will be updated by the contractor and submitted to the County upon award of the construction contract.

An erosion control memo is attached to provide the contractor with guidelines to be used in obtaining a stormwater construction management permit. The revegetation plan consists of planting non-invasive, local riparian vegetation along the channel edge, the lower riparian area, and the upper riparian area. Some floodplain revegetation beyond this depth may be implemented in select areas where stream realignment requires replacing coverage. Revegetation includes a riparian seed mix and discrete installation of woody plants. While a focused invasive species removal is not proposed, best management practices will be used to avoid invasive species introduction and to reduce noxious weed growth. A detailed landscaping and revegetation plan is included with the attached plan set.

C. Special Land Use Review Criteria

While the proposed project area includes wetlands, the project would not result in any permanent losses to these or other water features. All impacts are temporary and associated with repositioning sediment to create the appropriate channel plan and profile. Although some boulders, rootwads, and other large woody debris will be used to create the desired geomorphic and habitat features (and may be imported to the site), they will not cause the permanent loss of channel or wetlands.

Additionally, the project constitutes nearly 1.5 miles of stream reconstruction that will be performed in conjunction with road rehabilitation that will require the construction of culverts and bridges. As a result, the project will change the base flood elevation within the watershed.

D. Permits and Communications

The following permits have either received concurrence or are currently being pursued:

- **National Environmental Protection Act (NEPA)** - In June 2016, the US Fish and Wildlife Service concurred that the project will have no adverse impacts on threatened and endangered species.
- **Section 106** - In June 2016, the State Historical Preservation Office (SHPO) concurred that the project will have no adverse effects on cultural resources.
- **Army Corps 404 Nationwide 37 Permit** - In August 2016, a 404 nationwide 37 permit application was submitted to the U.S. Army Corps of Engineers and is under review.
- **FEMA Conditional Letter of Map Revision (CLOMR)** - The CLOMR will be submitted to FEMA in October 2016.
- **Boulder County Floodplain Development Permit and Grading Permit** – FDP and Grading Permit applications will be submitted upon approval of the Boulder County Review process.
- **Conservation Easements** - Communications with the City and County are ongoing.

II. Site Description

A. Project Location

The proposed project limits begin approximately 1 mile west of the intersection of Lee Hill Drive and U.S. Highway 36, at the downstream end of 927 Lee Hill Drive and extend for approximately 1.4 miles to the upstream end of 157 Pinto Drive. The elevation in this reach ranges from 5,700 to 8,500 feet with a channel slope between 2 and 5 percent.

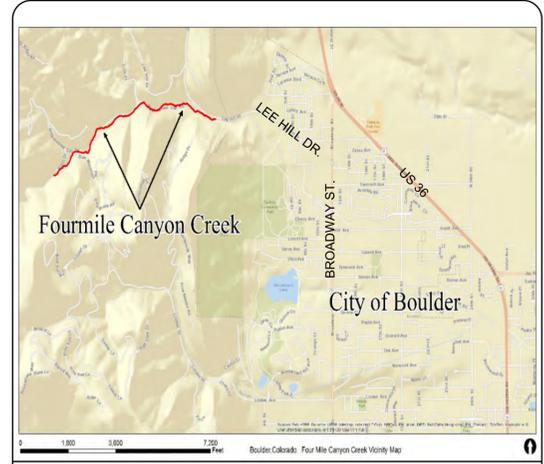
B. Existing Conditions

The watershed encompasses over 7 square miles at an elevation of 6,000 to 8,500 feet above mean sea level. Typical vegetation includes ponderosa pine, shrubs, and grassland. The project area includes three small wetland areas covering less than 0.1 acres. Watershed geology consists of mostly granite with some siltstone and sandstone. Most soils are well-drained with a high rate of infiltration. The channel slope ranges from 2 to 5 percent with estimated bankfull flows between 120 and 130 cfs. The channel has poor to good stability and is gravel-dominated with some cobble, sand, silt, and clay. The stream conditions range from aggrading to degrading, slightly to deeply entrenched, moderately to highly sinuous, and contain riffle/pool and cascade/pool sequences.

Several natural disasters in recent years have impacted watershed health. In September of 2010, the Fourmile Canyon fire damaged the upper watershed and impacted its hydrology. Prior to the fire, residents observed stream flows that dropped to a trickle during the dry season. Since then, the stream has been observed to flow year round. Floods in 2013 and 2015 further impacted the stream by straightening the creek alignment, over widening the channel cross section, and modifying the channel profile through the cutting and depositing of sediment. Aquatic and terrestrial habitat was severely impacted or destroyed and most riparian vegetation was removed. The results of these disasters are unstable channel conditions and a general inability of the existing channel to move water and sediment efficiently through the system without resulting in channel degradation, aggradation, and bank erosion. Much of the earth stabilizing riparian and upland vegetation was stripped during the floods, further reducing the stream stability. Above average precipitation received during the summer of 2015 has resulted in faster than expected regrowth of natural and invasive vegetation. However, a general lack of riparian vegetation still exists.

PROJECT: 138200 **FOURMILE CANYON CREEK**

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
CO	138200	1	38



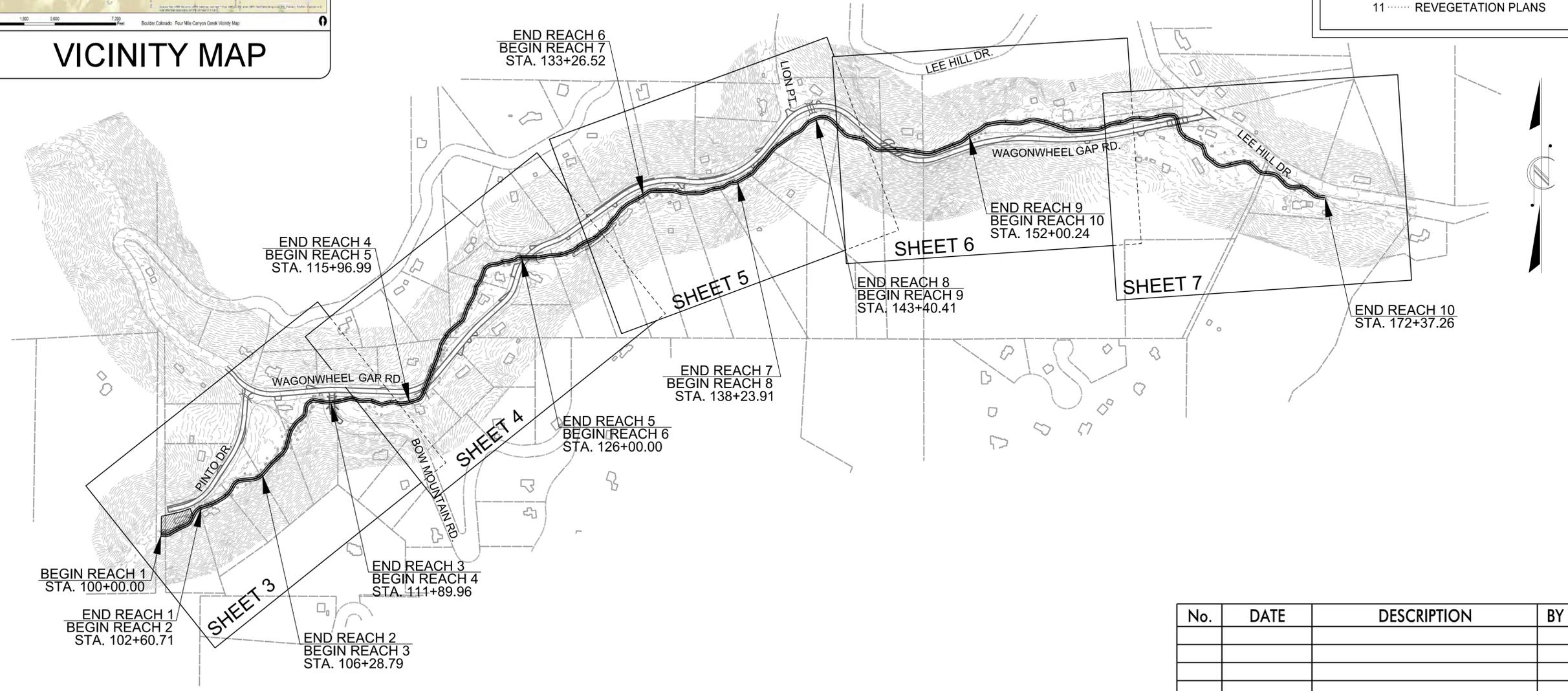
VICINITY MAP

FOURMILE CANYON CREEK

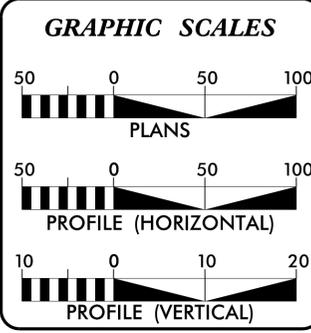
**LOCATION: WAGONWHEEL GAP ROAD AND LEE HILL DRIVE
TO ANNE U WHITE TRAIL HEAD**

TYPE OF WORK: 30% STREAM RESTORATION PLANS

1	TITLE SHEET
1-A	STREAM CONVENTIONAL SYMBOLS GENERAL NOTES
2-2D	DETAILS
3-7	PLAN SHEETS
8-10	PROFILE SHEETS
X-1 - X-22	CROSS SECTIONS
11	REVEGETATION PLANS



No.	DATE	DESCRIPTION	BY	APPROVED



	UPSTREAM OF LION POINT	DOWNSIDE OF LION POINT
DESIGN REACH LENGTH	= 4,340	2,897 ft
BANKFULL XSEC AREA	= 21.4	24.3 sq ft
BANKFULL WIDTH	= 18.5	19.5 ft
AVERAGE BANKFULL DEPTH	= 1.2	1.2 ft
WD RATIO	= 16	15.7
DRAINAGE AREA	= 4.97	7.19 sq mi

PREPARED FOR
BOULDER COUNTY
DEPARTMENT OF TRANSPORTATION

CONTACT: CLARISSA HAGEMAN, PE

Michael Baker International
Michael Baker Engineering Inc.
165 South Union Boulevard, Suite 200
Lakewood, COLORADO 80228
Phone: 720.514.1100
Fax: 720.514.1120

TBD
LETTING DATE:

LUCAS BABBITT, PE, CFM
PROJECT ENGINEER

PROJECT ENGINEER

SIGNATURE: _____ P.E.

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL INSTREAM STRUCTURES USING AN EXCAVATOR OR EQUIVALENT WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS, LOGS, AND ROOTWADS.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONTRACTOR SHALL CALL UTILITY NOTIFICATION CENTER OF COLORADO 2 - BUSINESS DAYS IN ADVANCE BEFORE DIGGING, GRADING, OR EXCAVATION FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.
4. PROPOSED CHANNEL ALIGNMENT IS INTENDED TO CAUSE MINIMAL DISTURBANCE TO THE EXISTING TREES AND VEGETATION. THE ENGINEER RESERVES THE RIGHT TO MAKE FIELD-FIT CHANGES TO THESE PLANS AND DETAILS TO FURTHER REDUCE DISTURBANCE.
5. NO FIELD FIT CHANGES SHALL BE MADE WITHOUT ENGINEER BEING PRESENT ON-SITE AND WITHOUT APPROVAL.
6. THIS IS A PRELIMINARY PLAN SET THAT WAS COMPLETED TO EVALUATE MAJOR DESIGN FEATURES PRIOR TO ADVANCING TO THE DESIGN-BUILD PHASE. CONSTRUCTION SHALL NOT BEGIN, OR CONTINUE, WITHOUT ENGINEER BEING PRESENT. AS SUCH, THE ENGINEER RESERVES THE RIGHT TO MAKE DESIGN MODIFICATIONS TO IMPROVE STREAM FUNCTION AND/OR CONSTRUCTABILITY. MODIFICATIONS COULD INCLUDE, BUT ARE NOT LIMITED TO, GRADING MODIFICATIONS, CHANGE IN MATERIAL TYPE, CHANGE IN MATERIAL SIZE, CHANGE IN MATERIAL PLACEMENT, ETC.
7. CONSTRUCTION SHALL BEGIN AT THE UPSTREAM END OF THE PROJECT AT STA 100+00 AND CONTINUE TO THE DOWNSTREAM END AT STA 172+37.26 IN ORDER TO AVOID DAMAGING PREVIOUSLY COMPLETED WORK.
8. THE CONTRACTOR SHALL CONFIRM THE RECEIPT OF ALL NECESSARY PERMITS AND APPROVALS BEFORE THE START OF CONSTRUCTION.
9. THE CONTRACTOR SHALL CONDUCT THEIR OPERATIONS IN SUCH A WAY THAT THE AREA OF DISTURBANCE IS MINIMIZED. ALL EXISTING TREES, SHRUBS AND VEGETATION SHALL BE PROTECTED UNLESS OTHERWISE NOTED ON THE DRAWINGS. NO TREES SHALL BE REMOVED WITHOUT APPROVAL FROM LANDOWNER, ENGINEER, AND BOULDER COUNTY.
10. FOR ALL SITE GRADING, SMOOTH, PARABOLIC TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE.
11. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
12. CONSTRUCTION OF THE PROPOSED WORK WILL TAKE PLACE WITHIN THE CHANNEL AND WATER CONTROL MEASURES WILL BE REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF DRAINAGE WATER FROM AREAS ADJACENT TO FOURMILE CANYON CREEK AND ITS TRIBUTARIES INCLUDING STORMWATER OUTFALLS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ESTABLISHING MEANS AND METHODS OF GROUND AND SURFACE WATER CONTROL APPROPRIATE FOR CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT DRAWINGS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS AND ALL PERMITS.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING AND MAINTAINING IN CONTINUOUS OPERATION, ALL EXISTING STRUCTURES, NOT ALL POTENTIALLY IMPACTED STRUCTURES MAY BE SHOWN ON THE DRAWINGS AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ALL STRUCTURES INCLUDING BUT NOT LIMITED TO STREETS, CURB AND GUTTER, BRIDGE PIERS AND ABUTMENTS, CREEK BANK PROTECTION OF VARIOUS TYPES, CREEK DROP STRUCTURES, SIGNS, PEDESTRIAN WALKS, RETAINING WALLS AND FENCING. IN THE EVENT THAT A STRUCTURE OR UTILITY IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL IMMEDIATELY NOTIFY BOULDER COUNTY IN WRITING AND MAKE REPAIRS IN ACCORDANCE WITH BOULDER COUNTY REQUIREMENTS.
14. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS OF BOULDER COUNTY UNLESS SPECIFICALLY DETAILED OTHERWISE ON THESE PLANS AND ASSOCIATED SPECIFICATIONS.
15. THE CONTRACTOR SHALL MAINTAIN AT THE SITE AT ALL TIMES ONE SIGNED COPY OF THE PROJECT DRAWINGS AND SPECIFICATIONS, ONE COPY OF BOULDER COUNTY STANDARDS, AND ONE COPY OF ALL REQUIRED PERMITS.
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING AND SUBMITTING AS-BUILT DRAWINGS TO BOULDER COUNTY.
17. THE CONTRACTOR SHALL PREPARE AND MAINTAIN THE STORMWATER MANAGEMENT PLAN AND OBTAIN THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT THROUGH THE COLORADO DEPARTMENT OF PUBLIC HEALTH (CDPHE).
18. THE CONTRACTOR SHALL PROVIDE DAILY ON-SITE SURVEY CONTROL TO THE LEVEL OF DETAIL REQUIRED TO EVALUATE CONSTRUCTION VERSUS THESE DESIGN PLANS.

GROUND COORDINATE TABLE:

PT#	NORTHING	EASTING	ELEVATION	DESCRIPTION
401	266,824.52	56,029.71	5780.4	#5 REBAR w/1-1/4" ORANGE PLASTIC CAP
402	265,571.50	56,625.58	N/A	#5 REBAR w/1-1/4" ORANGE PLASTIC CAP
403	266,345.15	51,185.07	N/A	#5 REBAR w/1-1/4" ORANGE PLASTIC CAP

NOTES:

1. THE BASIS OF COORDINATES FOR THIS MAP IS THE NORTH AMERICAN DATUM OF 1983-2011 (NAD 83 (2011)) U.S. SURVEY FEET, BASED LOCALLY UPON THE DAVID EVANS AND ASSOCIATES, INC. CONTROL POINT DEA CP 402 FOR GROUND COORDINATE SCALE FACTOR DETERMINATION.
 2. THE BASIS OF ELEVATIONS FOR THIS MAP IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), BASED LOCALLY UPON THE CP 401.
 3. TO MODIFY GROUND CONTROL TO COLORADO STATE PLANE NORTH ZONE; ADD 1,000,000 FEET TO NORTH COORDINATE, ADD 3,000,000 FEET TO EAST COORDINATE AND MULTIPLY BY 1/CFs (COMBINED SCALE FACTOR = 1/1.000319292 = 0.999680809).
 4. FIELDWORK FOR CONTROL WAS COMPLETED NOVEMBER 2013.
 5. SET 18" LONG #5 REBAR w/1-1/4"
19. THE PROJECT ENGINEER SHALL BE ON-SITE DURING CONSTRUCTION TO HELP INTERPRET DESIGN PLANS.
 20. THE PROPOSED PLANS ARE BASED ON NOVEMBER 2013 LIDAR INFORMATION AND NOT DETAILED SURVEY DATA. AS A RESULT, EXISTING TOPOGRAPHY INFORMATION SHOWN ON THIS PLAN SET IS APPROXIMATE ONLY AND ACTUAL CONDITIONS MAY VARY.
 21. FLOOD DEBRIS REMOVAL IS PART OF THIS PROJECT AND CONSISTS OF WOODY MATERIAL AND ALLUVIUM. THE LOCATION AND QUANTITY OF FLOOD DEBRIS REMOVAL HAS NOT BEEN DETERMINED. FLOOD DEBRIS REMOVAL WILL BE DETERMINED BY THE ENGINEER DURING CONSTRUCTION.
 22. SOME SECTIONS OF CREEK HAVE BEGUN, AND WILL CONTINUE TO HEAL AND WILL NOT REQUIRE RESOTRATION. THESE LOCATIONS HAVE BEEN IDENTIFIED ON THE PLANS. THESE LOCATIONS WILL BE IDENTIFIED BY ENGINEER DURING CONSTRUCTION.

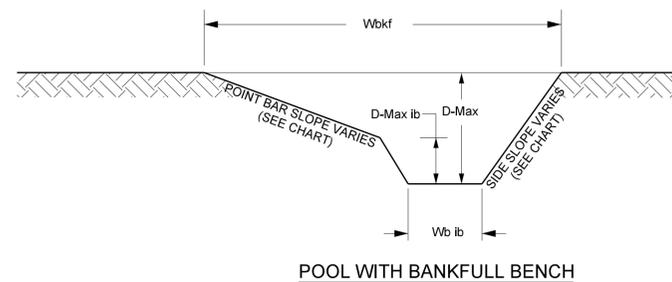
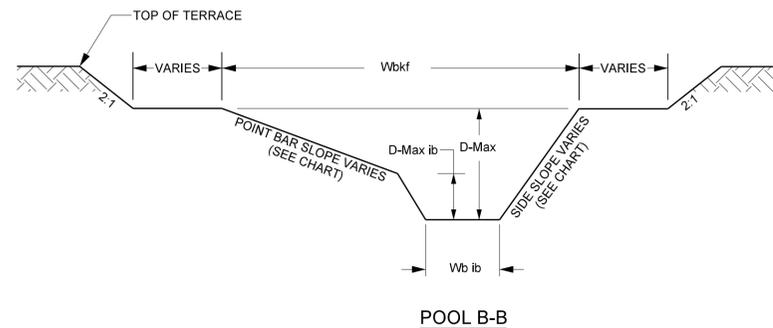
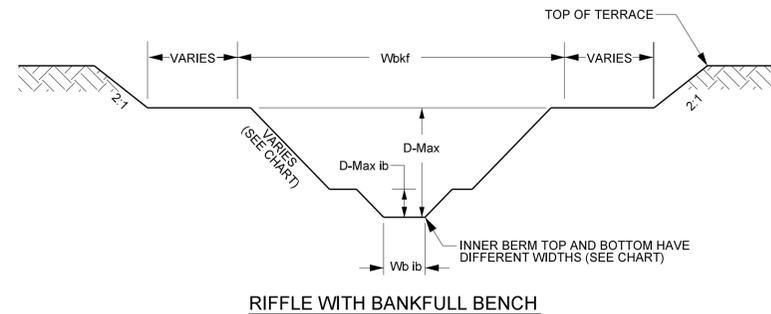
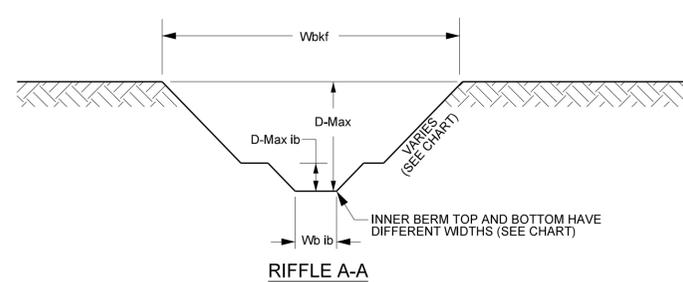
STREAM CONVENTIONAL SYMBOLS

 OUTLET PROTECTION  ROCK CROSS VANE  CONSTRUCTED RIFFLE  ROOT WAD  STREAM REALIGNMENT REQUIRED AS A RESULT OF ROADWAY IMPROVEMENTS  EXISTING STREAM ALIGNMENT  BANKFULL CHANNEL EXTENTS  EXISTING PROPERTY BOUNDARY  EXISTING STRUCTURE / HOMES  EXISTING ROAD CROSSING  PROPOSED ROAD CROSSING  POOL  EXISTING RIGHT OF WAY	 LOG STEP POOL  BOULDER STEP POOL  EXISTING MAJOR CONTOUR  EXISTING MINOR CONTOUR  EXISTING DECIDUOUS TREE  EXISTING CONIFEROUS TREE  LOG J-HOOK VANE  BOULDER J-HOOK VANE  CONVERGING BOULDER CLUSTER  BOULDER BANK PROTECTION  TOE WOOD BANK PROTECTION
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**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	1A
PROJECT ENGINEER	
	

TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS
NTS

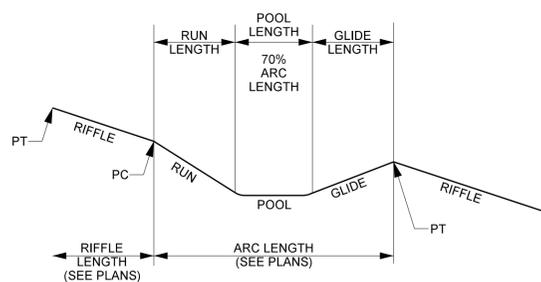


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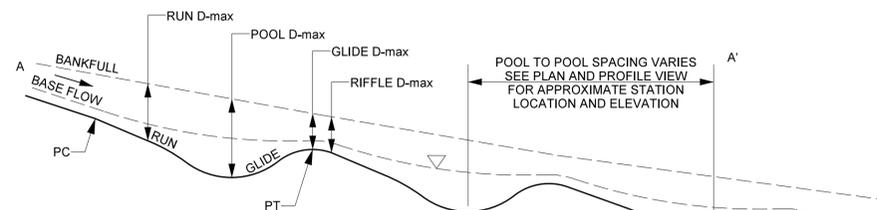
1. DURING CONSTRUCTION CORNERS OF DESIGN CHANNEL WILL BE ROUNDED AND A THALWEG WILL BE SHAPED PER DIRECTION OF ENGINEER.
2. POOL SHOWN ABOVE IS RIGHT BANK POOL ONLY.

XS 1 UPSTREAM OF LION POINT STA 100+00 to 111+90 and 115+97 to 143+40	RIFFLE				POOL			
	XS 2 UPSTREAM OF LION POINT STA 111+90 to 115+97	XS 3 DOWNSTREAM OF LION POINT 143+90 to 152+00	XS 4 DOWNSTREAM OF LION POINT 152+00 to 172+37	POOL - MIN AREA	POOL - MAX AREA	POOL WITH BOULDERS		
18.5	16.5	19.5	17.5	18.0	19.0	18.0	WIDTH BANKFULL (Wbkf) (FT)	
1.2	1.2	1.2	1.3	1.4	1.5	1.5	AVERAGE DEPTH (D) (FT)	
1.8	1.8	1.9	1.9	2.5	2.7	2.6	MAXIMUM DEPTH (D-Max) (FT)	
16.0	14.1	15.7	13.8	13.0	12.3	12.0	WIDTH TO DEPTH RATIO (Wbkf/D)	
2.5	2.5	2.5	2.5	0.5	0.5	2.0	SIDE SLOPE (V:H)	
0.8	0.8	0.8	0.8	3.0	3.1	1.8	INNER BERM SIDE SLOPE (V:H)	
21.4	19.4	24.3	22.2	25.0	29.4	27.0	BANKFULL XSEC AREA (FT ²)	
2.4	1.4	2.3	1.3	-	-	-	INNER BERM BENCH WIDTH (Wbnch) (FT)	
8.5	8.5	9.5	9.5	9.0	10.0	9.5	INNER BERM WIDTH TOP (W ib) (FT)	
6.5	6.5	7.5	7.5	4.5	5.0	4.5	INNER BERM WIDTH BOTTOM (Wb ib) (FT)	
0.6	0.6	0.7	0.7	1.0	1.1	1.0	INNER BERM AVERAGE DEPTH (D ib) (FT)	
0.8	0.8	0.8	0.8	1.3	1.4	1.3	INNER BERM MAX DEPTH (D-max ib) (FT)	
13.9	13.9	14.3	14.3	9.2	9.5	9.9	INNER BERM W/D RATIO (W ib/D ib)	
5.2	5.2	6.3	6.3	8.8	10.5	9.1	INNER BERM AREA (A ib) (FT ²)	

TYPICAL PROFILE SECTION
NTS

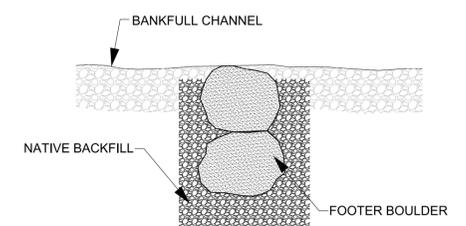
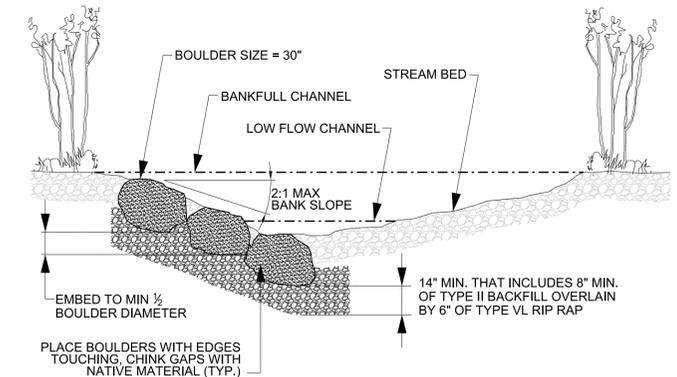
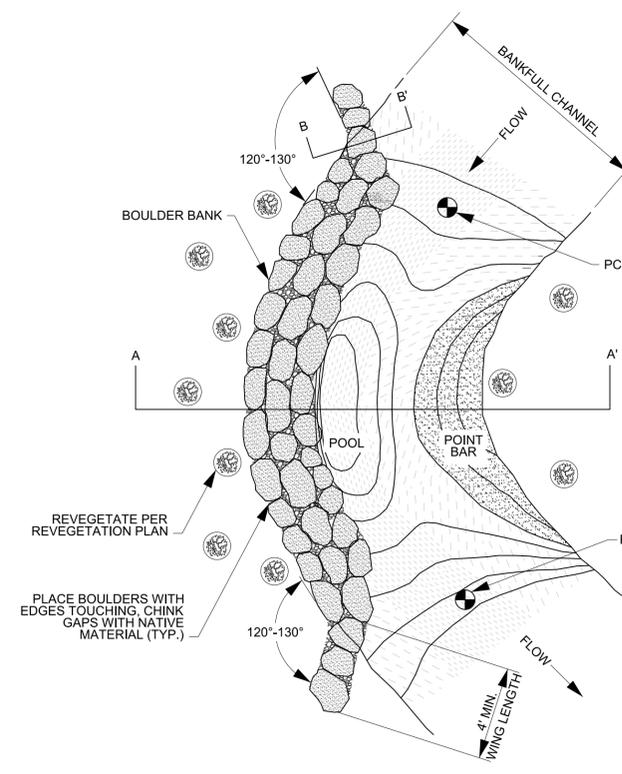


STREAM FACET	RANGE OF FACET SLOPE RATIOS	
	*AVG. WATER SURFACE SLOPE VARIES BY REACH (SEE PLANS)	
	RATIO OF AVG. SLOPE TO FACET SLOPE	
	MIN	MAX
RIFFLE	SEE PLANS & PROFILE	
RUN	1.30	4.00
POOL	0.001	0.003
GLIDE	0.200	0.600



STREAM FACET	RANGE OF MAX DEPTHS			
	UPSTREAM OF LION POINT		DOWNSTREAM OF LION POINT	
	MIN	MAX	MIN	MAX
RIFFLE	1.8	1.8	1.9	1.9
RUN	1.8	2.3	1.9	2.6
POOL	2.4	2.7	2.7	2.9
GLIDE	1.4	1.7	1.5	1.8

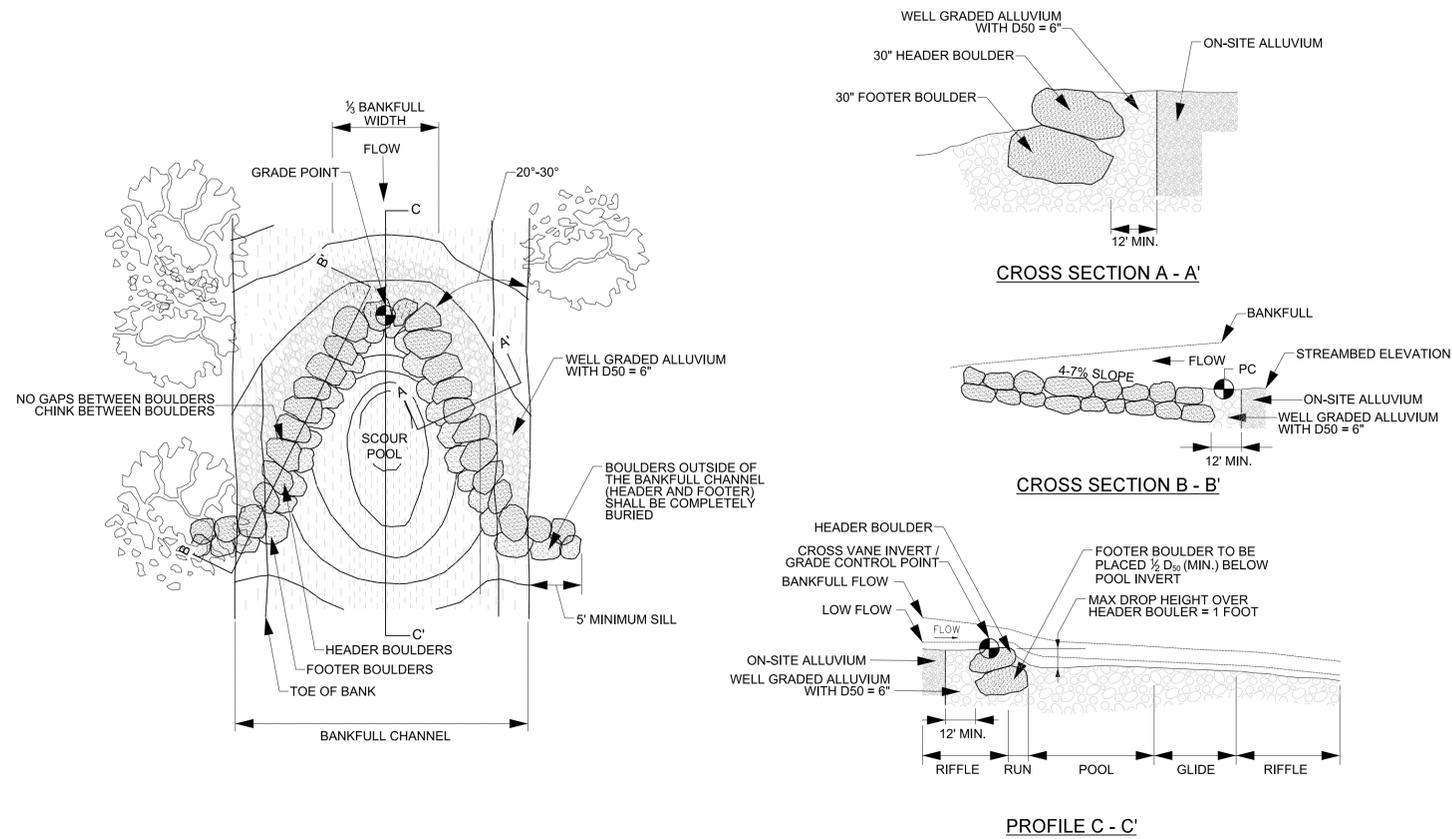
BOULDER BANK PROTECTION
NTS



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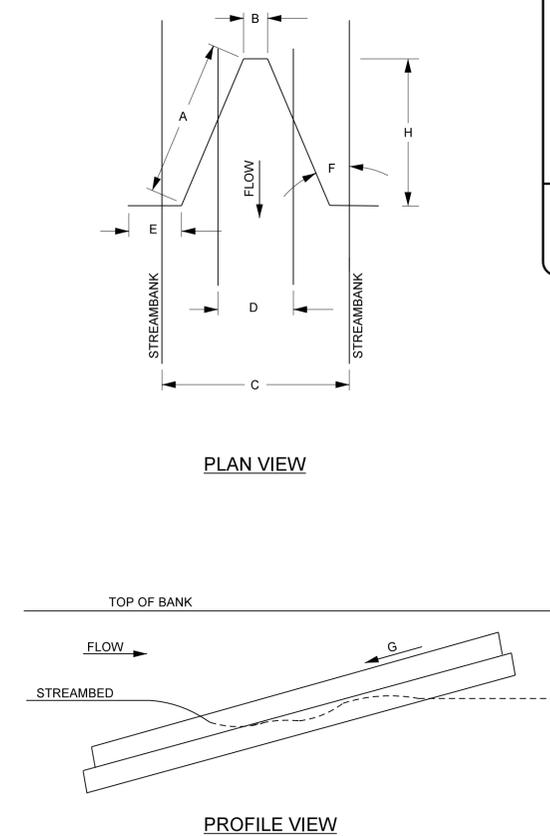
ROCK CROSS VANE

NTS



CROSS VANE TYPICAL

NTS

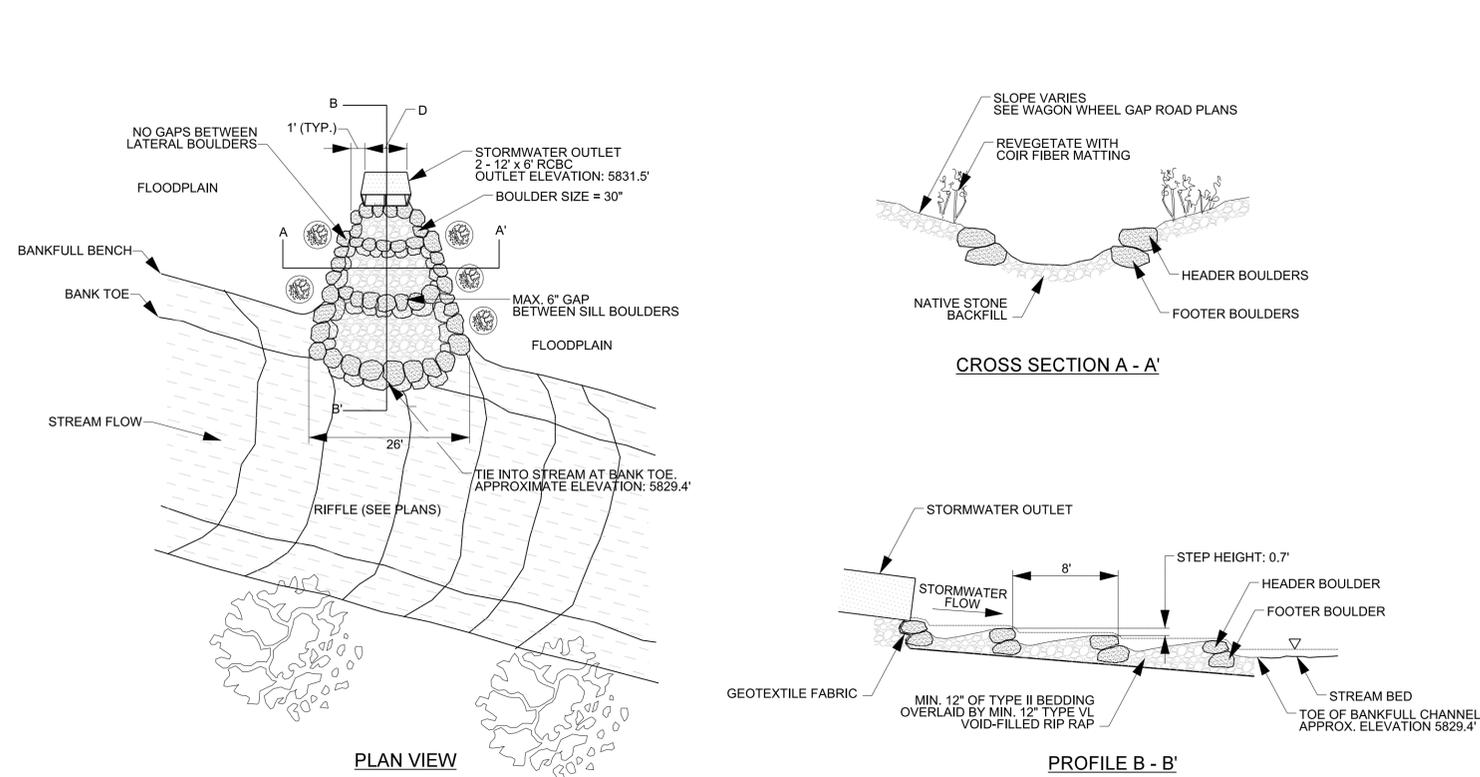


BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	2A
Michael Baker International	
<small>Michael Baker Engineering Inc. 165 South Union Boulevard, Suite 200 Lakewood, COLORADO 80226 Phone: 720.514.1100 Fax: 720.514.1120</small>	

	UPSTREAM OF LION POINT		DOWNSTREAM OF LION POINT	
	XS1	XS2	XS3	XS4
A VANE ARM LENGTH	16.5 ft	14.8 ft	17.4 ft	15.6 ft
B INVERT LENGTH	6.1 ft	5.4 ft	6.4 ft	5.8 ft
C BANKFULL WIDTH	18.5 ft	16.5 ft	19.5 ft	17.5 ft
D BOTTOM WIDTH	8.5 ft	8.5 ft	9.5 ft	9.5 ft
E SILL LENGTH	5.0 ft	5.0 ft	5.0 ft	5.0 ft
F VANE ARM ANGLE	22.0°	22.0°	22.0°	22.0°
G VANE ARM SLOPE	10.9%	12.2%	10.9%	12.1%
H STRUCTURE LENGTH	15.3 ft	13.7 ft	16.2 ft	14.5 ft

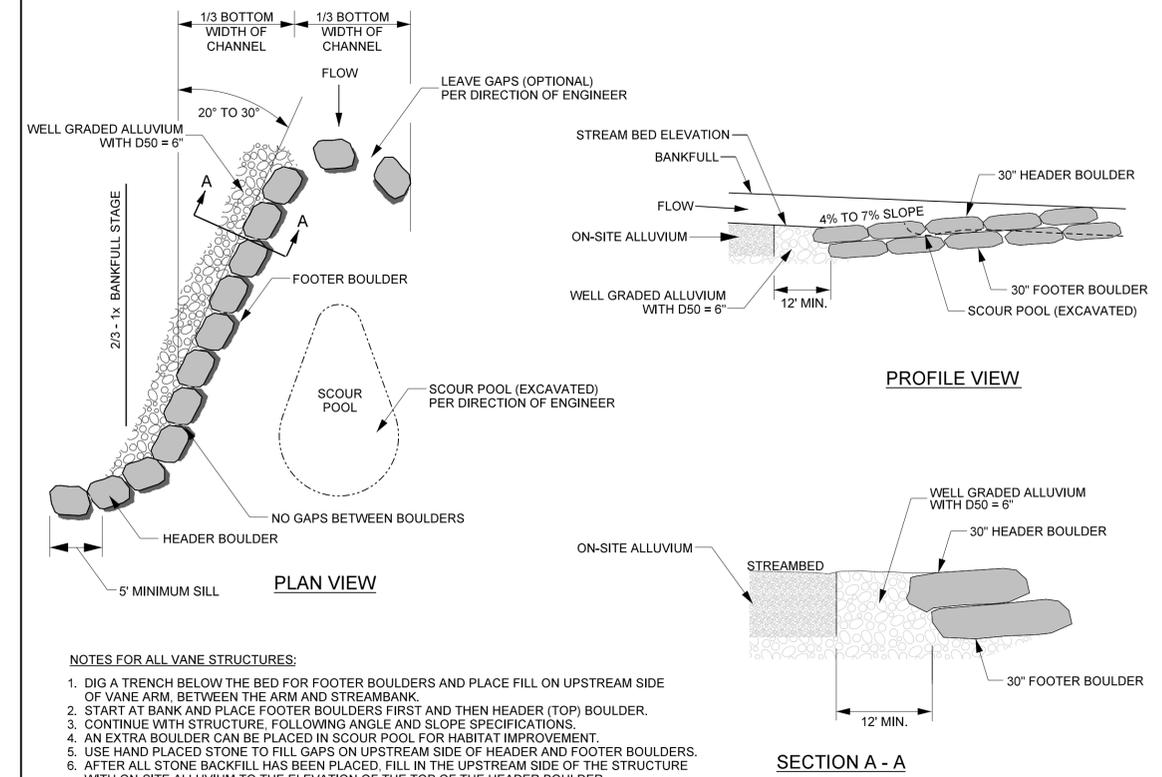
OUTLET PROTECTION

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BOULDER J-HOOK VANE

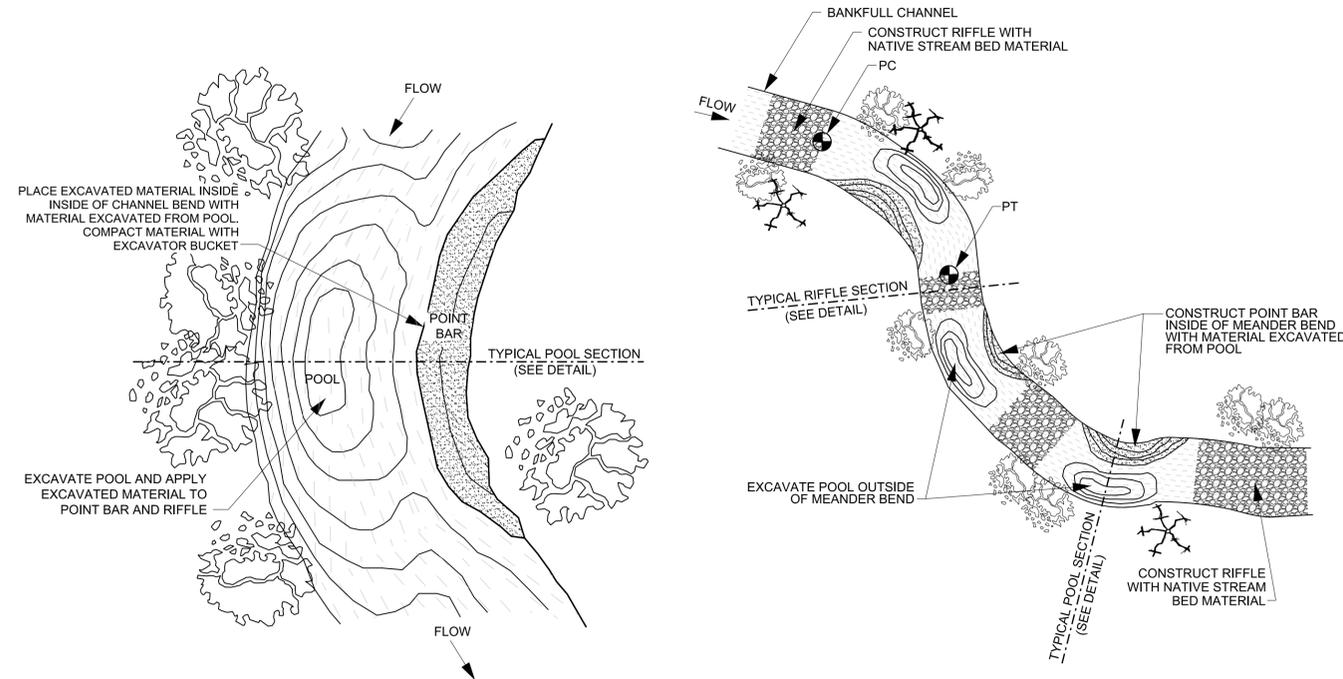
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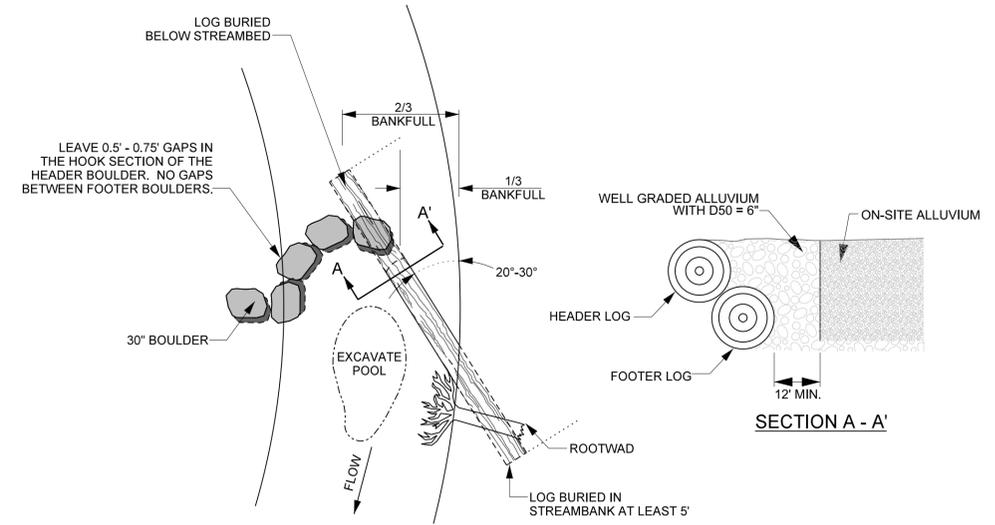
CONSTRUCTED POOL AND POINT BAR

NTS

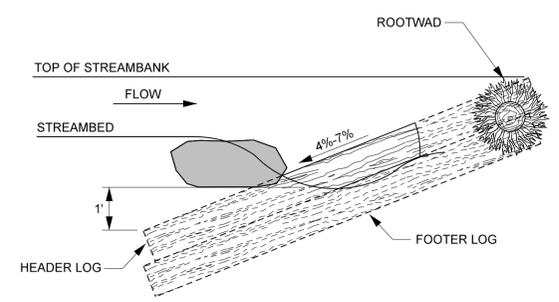


GRADE CONTROL LOG J-HOOK VANE

NTS



PLAN VIEW



PROFILE VIEW

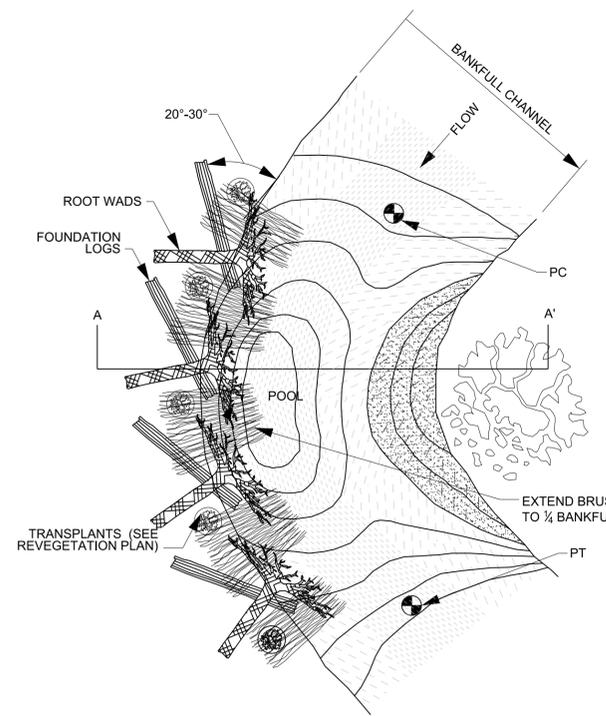
- NOTES:**
- LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
 - SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
 - ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK. SEE ROOTWAD DETAIL.
 - BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
 - HEADER BOULDERS TO BE PLACED 0.5 TO 0.75 FEET APART.
 - TRANSPLANTS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.

ROOT WADS

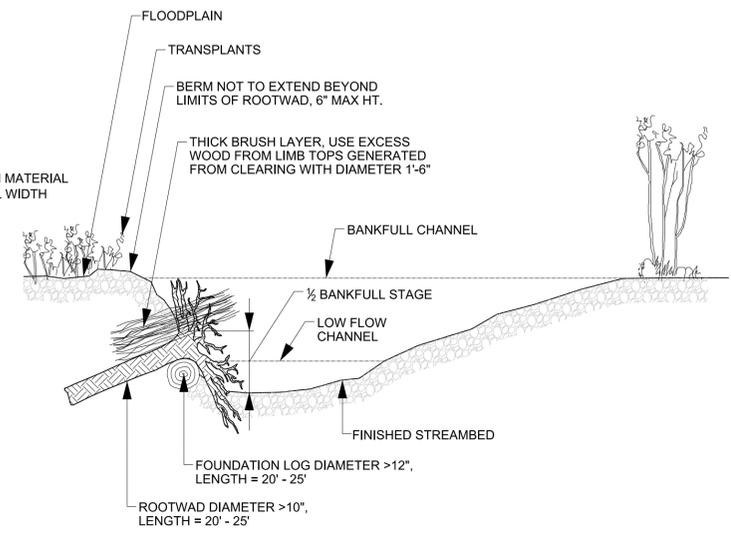
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NOTES:

- IF THE ROOT WAD CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. IN THIS CASE, A FOOTER LOG SHOULD BE INSTALLED UNDERNEATH THE ROOT WAD IN A TRENCH EXCAVATED PARALLEL TO THE BANK AND BELOW THE STREAMBED. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.
- BANK PROTECTION SHALL BE EXTENDED A MINIMUM OF 10 FEET UPSTREAM OF PC 10 FEET DOWNSTREAM OF PT UNLESS OTHERWISE NOTED.



PLAN VIEW



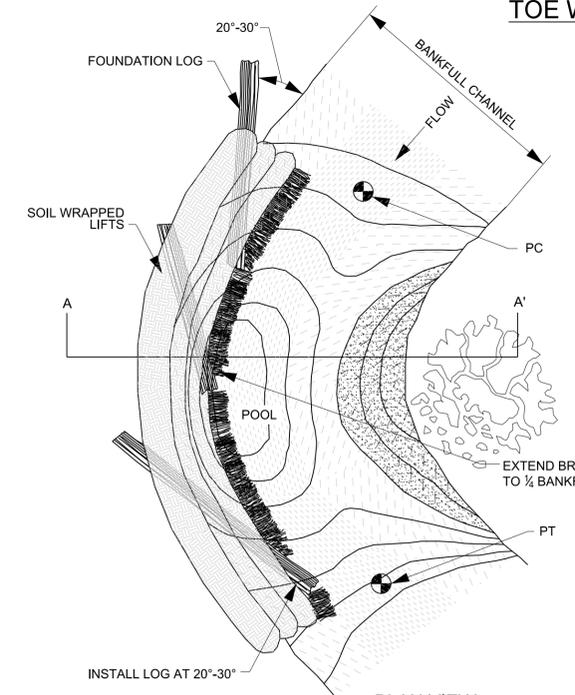
CROSS SECTION A - A'

TOE WOOD WITH SOIL WRAPPED LIFT

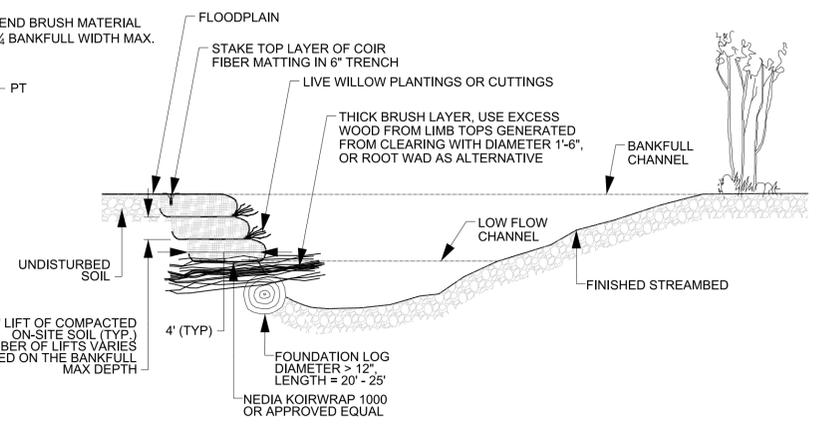
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NOTES:

- BANK PROTECTION SHALL BE EXTENDED A MINIMUM OF 10 FEET UPSTREAM OF PC 10 FEET DOWNSTREAM OF PT UNLESS OTHERWISE NOTED.



PLAN VIEW

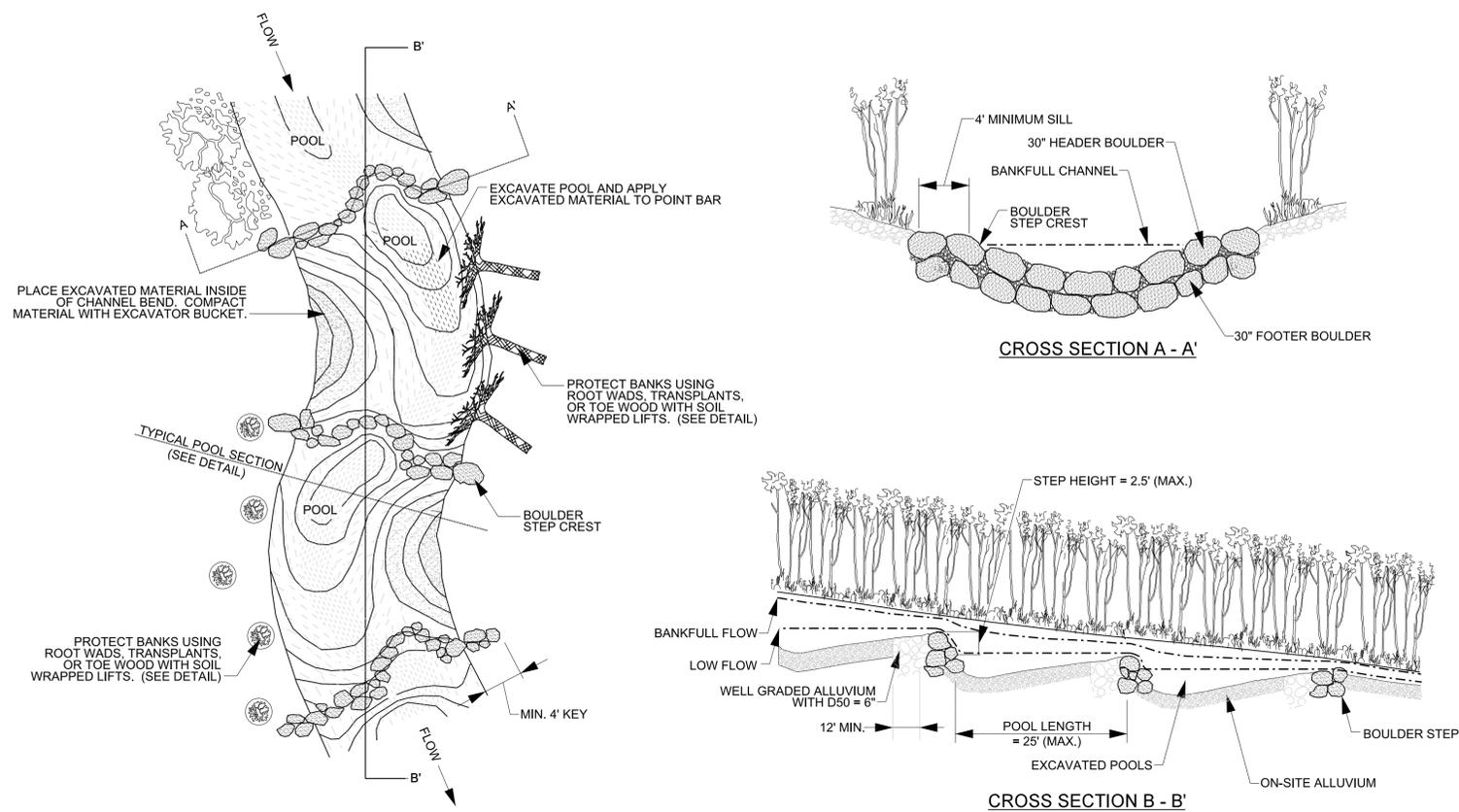


CROSS SECTION A - A'

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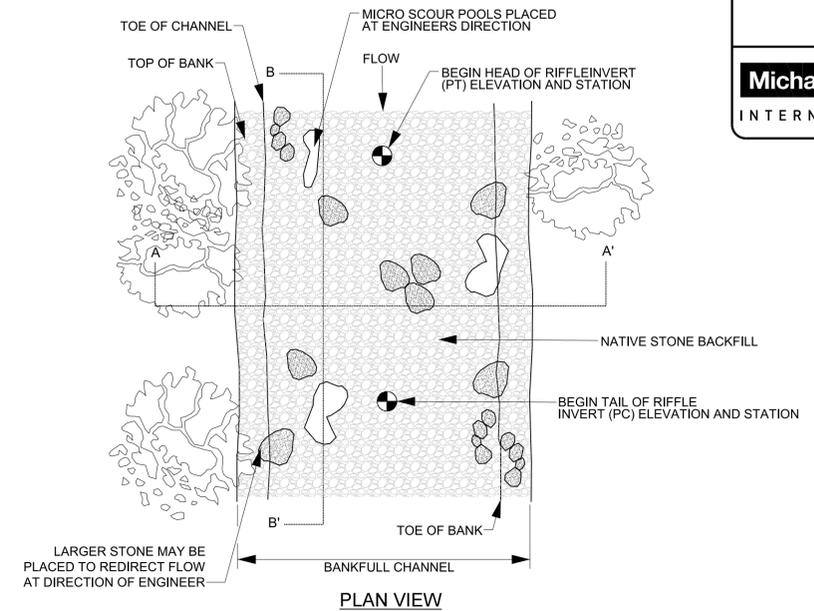
ROCK STEP POOL

NTS



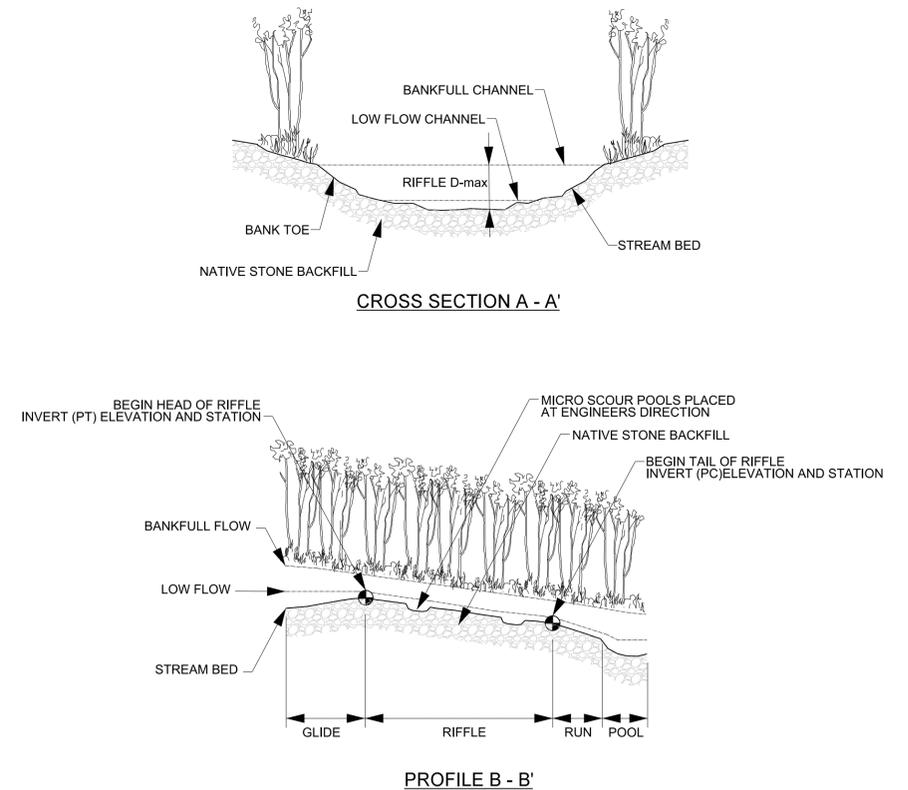
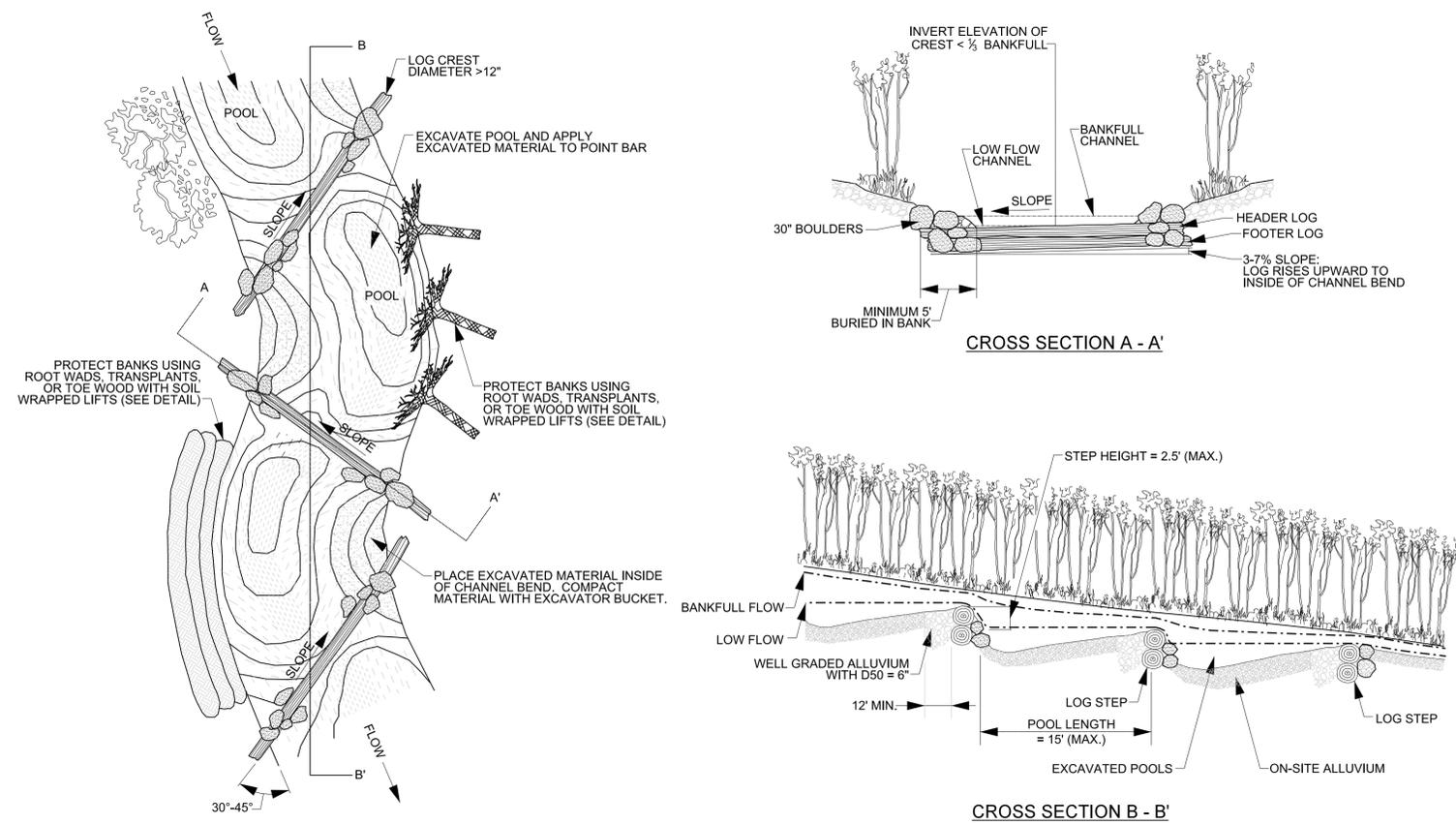
CONSTRUCTED RIFFLE

NTS



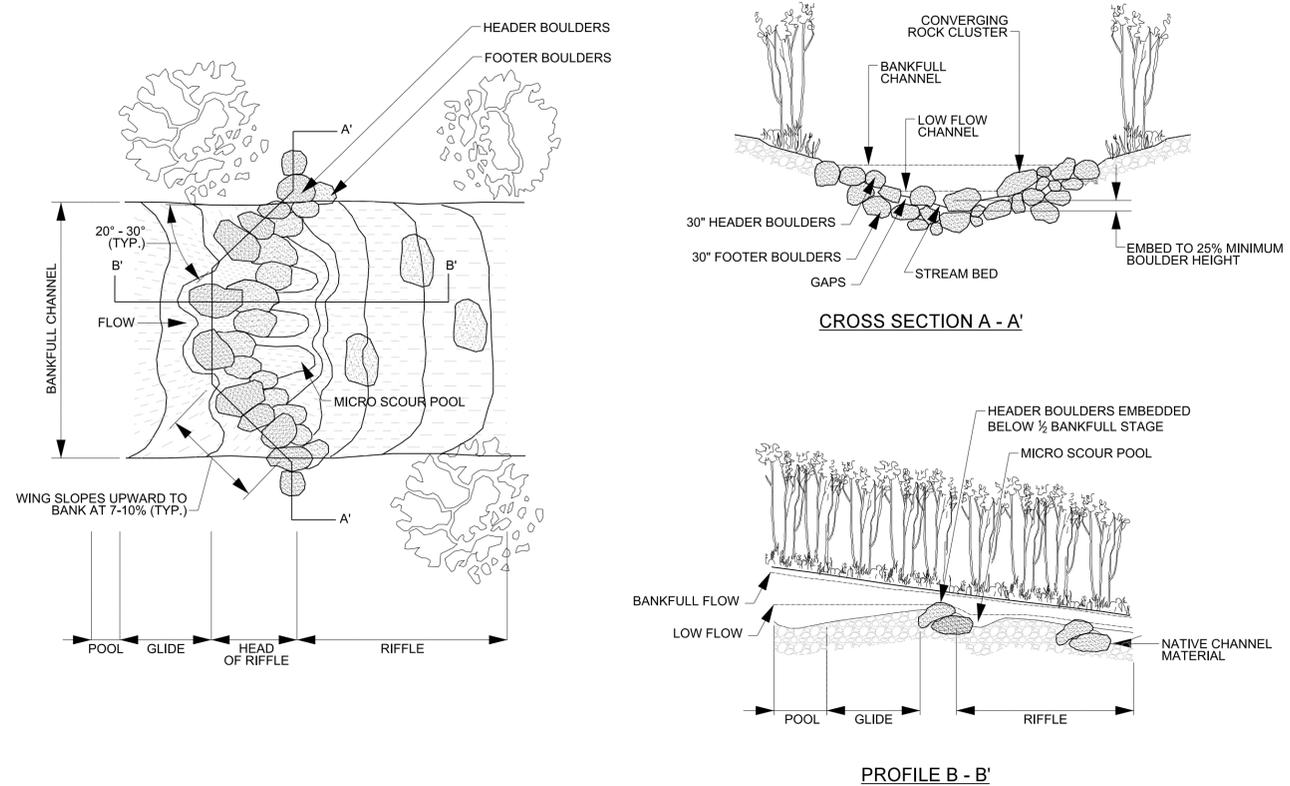
ROCK AND LOG STEP POOL

NTS

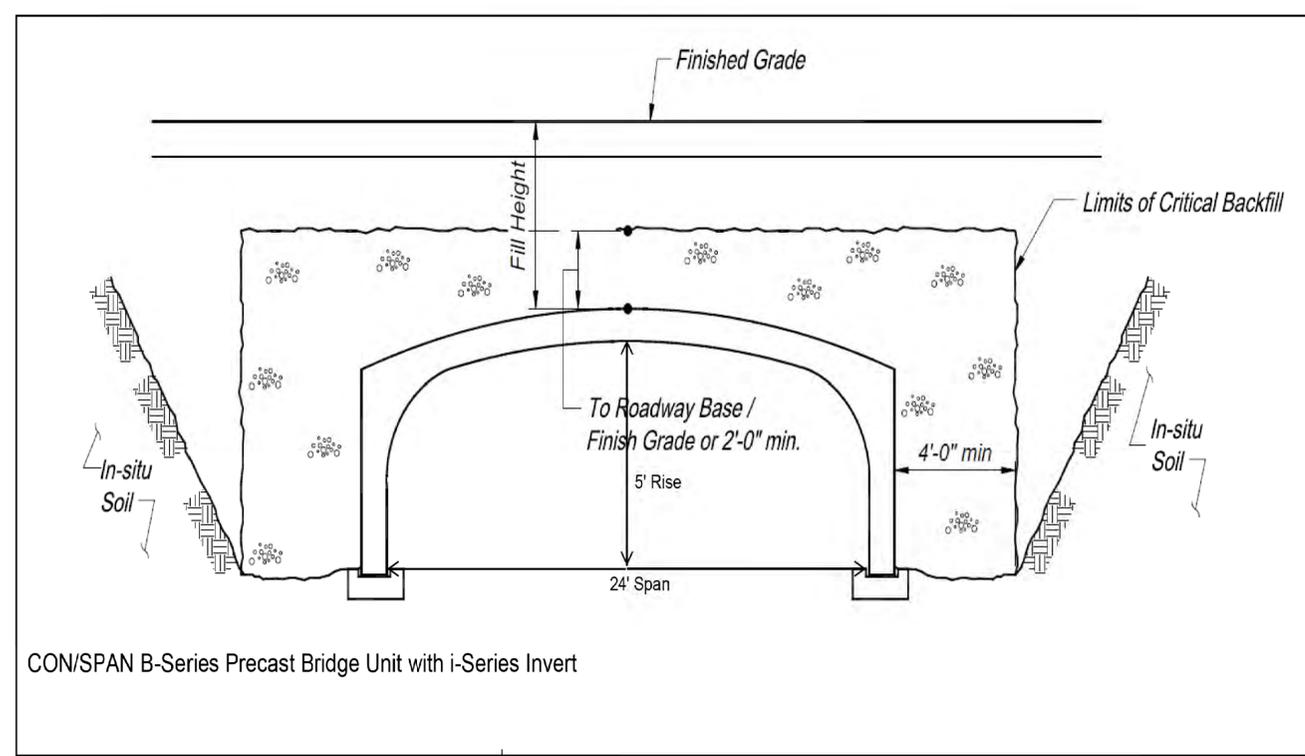


- NOTES:**
1. UNDERCUT CHANNEL BED ELEVATION AS NEEDED TO ALLOW FOR LAYERS OF STONE TO ACHIEVE FINAL GRADE.
 2. INSTALL STONE BACKFILL, COMPACTED TO GRADE.
 3. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, SMOOTH, AND CONCAVE, WITH THE ELEVATION OF THE BED 0.2 FT DEEPER IN THE CENTER THAN AT THE EDGES.
 4. NOT ALL RIFFLE LOCATIONS SHOWN ON PLANS NEED TO BE COMPLETELY RECONSTRUCTED, SOME JUST NEED TO BE RESHAPED.

CONVERGING BOULDER CLUSTER NTS

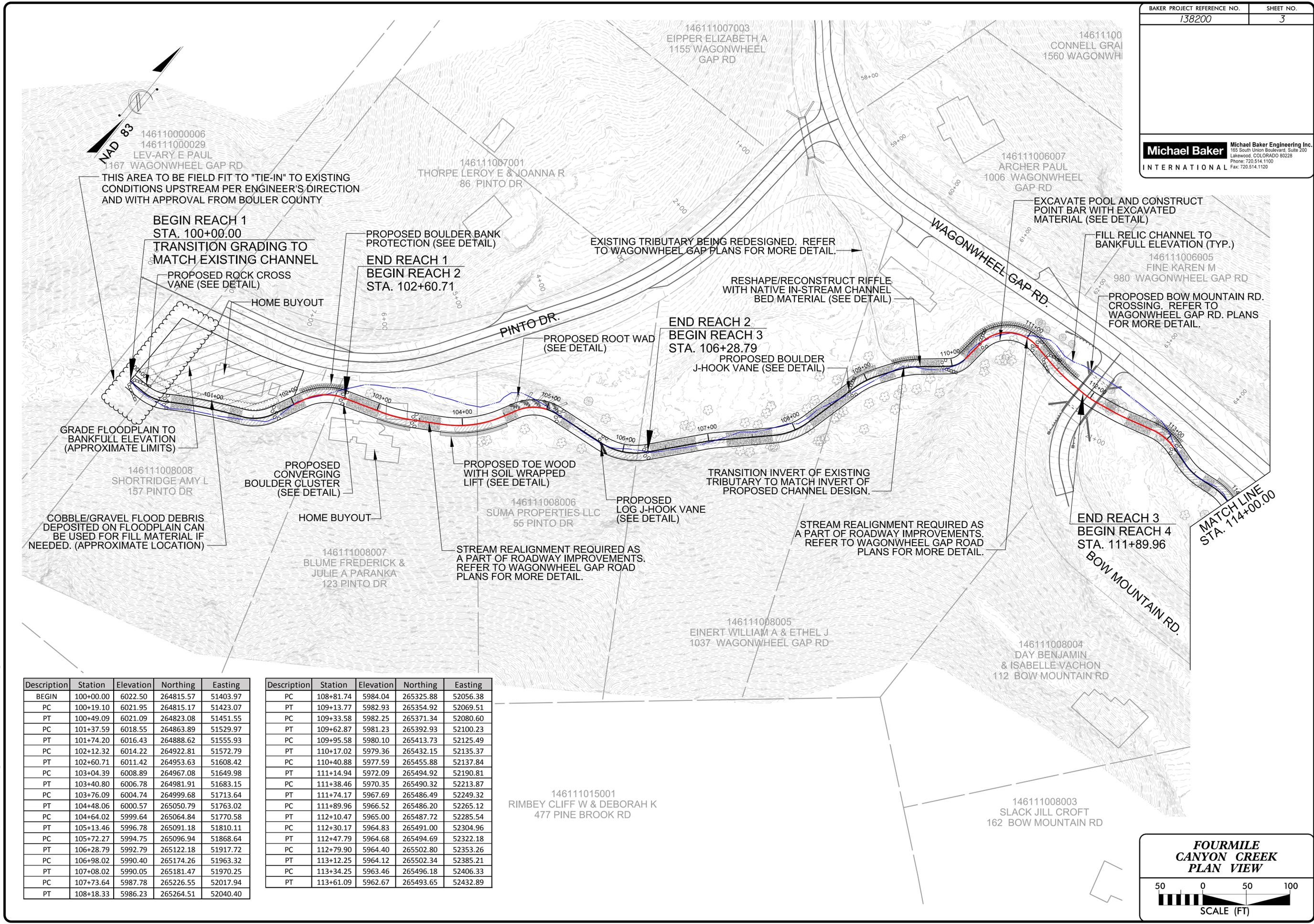


CONSPAN PRECAST BRIDGE NTS



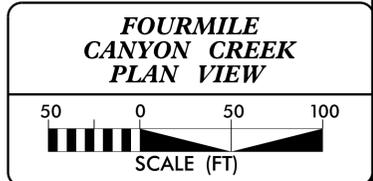
CONSPAN B-Series Precast Bridge Unit with i-Series Invert

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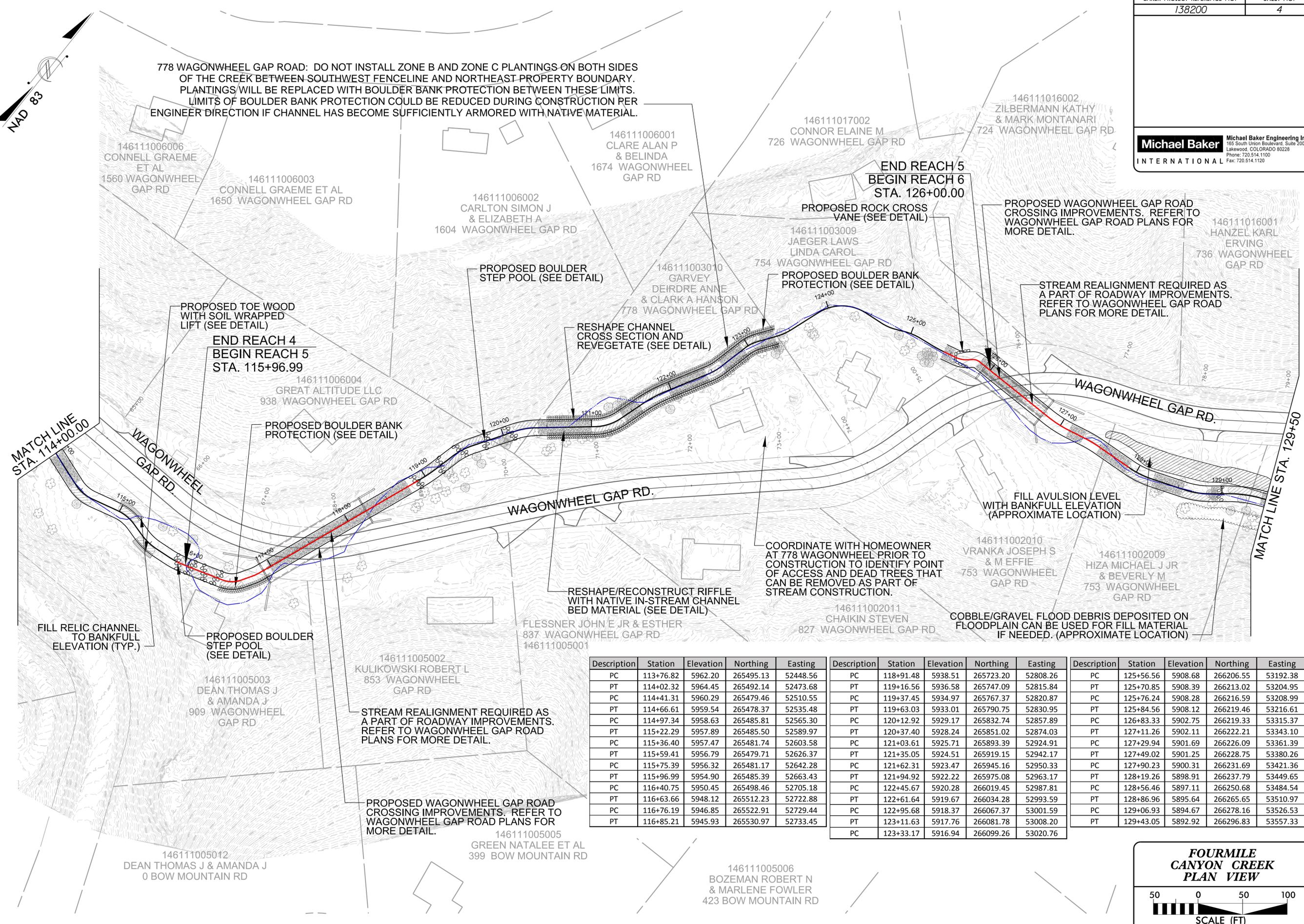
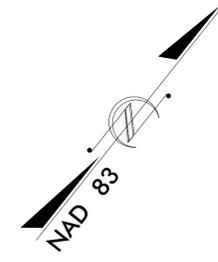


Description	Station	Elevation	Northing	Easting
BEGIN	100+00.00	6022.50	264815.57	51403.97
PC	100+19.10	6021.95	264815.17	51423.07
PT	100+49.09	6021.09	264823.08	51451.55
PC	101+37.59	6018.55	264863.89	51529.93
PT	101+74.20	6016.43	264888.62	51555.97
PC	102+12.32	6014.22	264922.81	51572.79
PT	102+60.71	6011.42	264953.63	51608.42
PC	103+04.39	6008.89	264967.08	51649.98
PT	103+40.80	6006.78	264981.91	51683.15
PC	103+76.09	6004.74	264999.68	51713.64
PT	104+48.06	6000.57	265050.79	51763.02
PC	104+64.02	5999.64	265064.84	51770.58
PT	105+13.46	5996.78	265091.18	51810.11
PC	105+72.27	5994.75	265096.94	51868.64
PT	106+28.79	5992.79	265122.18	51917.72
PC	106+98.02	5990.40	265174.26	51963.32
PT	107+08.02	5990.05	265181.47	51970.25
PC	107+73.64	5987.78	265226.55	52017.94
PT	108+18.33	5986.23	265264.51	52040.40

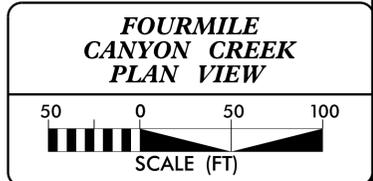
Description	Station	Elevation	Northing	Easting
PC	108+81.74	5984.04	265325.88	52056.38
PT	109+13.77	5982.93	265354.92	52069.51
PC	109+33.58	5982.25	265371.34	52080.60
PT	109+62.87	5981.23	265392.93	52100.23
PC	109+95.58	5980.10	265413.73	52125.49
PT	110+17.02	5979.36	265432.15	52135.37
PC	110+40.88	5977.59	265455.88	52137.84
PT	111+14.94	5972.09	265494.92	52190.81
PC	111+38.46	5970.35	265490.32	52213.87
PT	111+74.17	5967.69	265486.49	52249.32
PC	111+89.96	5966.52	265486.20	52265.12
PT	112+10.47	5965.00	265487.72	52285.54
PC	112+30.17	5964.83	265491.00	52304.96
PT	112+47.79	5964.68	265494.69	52322.18
PC	112+79.90	5964.40	265502.80	52353.26
PT	113+12.25	5964.12	265502.34	52385.21
PC	113+34.25	5963.46	265496.18	52406.33
PT	113+61.09	5962.67	265493.65	52432.89



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Description	Station	Elevation	Northing	Easting	Description	Station	Elevation	Northing	Easting	Description	Station	Elevation	Northing	Easting
PC	113+76.82	5962.20	265495.13	52448.56	PC	118+91.48	5938.51	265723.20	52808.26	PC	125+56.56	5908.68	266206.55	53192.38
PT	114+02.32	5964.45	265492.14	52473.68	PT	119+16.56	5936.58	265747.09	52815.84	PT	125+70.85	5908.39	266213.02	53204.95
PC	114+41.31	5960.29	265479.46	52510.55	PC	119+37.45	5934.97	265767.37	52820.87	PC	125+76.24	5908.28	266216.59	53208.99
PT	114+66.61	5959.54	265478.37	52535.48	PT	119+63.03	5933.01	265790.75	52830.95	PT	125+84.56	5908.12	266219.46	53216.61
PC	114+97.34	5958.63	265485.81	52565.30	PC	120+12.92	5929.17	265832.74	52857.89	PC	126+83.33	5902.75	266219.33	53315.37
PT	115+22.29	5957.89	265485.50	52589.97	PT	120+37.40	5928.24	265851.02	52874.03	PT	127+11.26	5902.11	266222.21	53343.10
PC	115+36.40	5957.47	265481.74	52603.58	PC	121+03.61	5925.71	265893.39	52924.91	PC	127+29.94	5901.69	266226.09	53361.39
PT	115+59.41	5956.79	265479.71	52626.37	PT	121+35.05	5924.51	265919.15	52942.17	PT	127+49.02	5901.25	266228.75	53380.26
PC	115+75.39	5956.32	265481.17	52642.28	PC	121+62.31	5923.47	265945.16	52950.33	PC	127+90.23	5900.31	266231.69	53421.36
PT	115+96.99	5954.90	265485.39	52663.43	PT	121+94.92	5922.22	265975.08	52963.17	PT	128+19.26	5898.91	266237.79	53449.65
PC	116+40.75	5950.45	265498.46	52705.18	PC	122+45.67	5920.28	266019.45	52987.81	PC	128+56.46	5897.11	266250.68	53484.54
PT	116+63.66	5948.12	265512.23	52722.88	PT	122+61.64	5919.67	266034.28	52993.59	PT	128+86.96	5895.64	266265.65	53510.97
PC	116+76.19	5946.85	265522.91	52729.44	PC	122+95.68	5918.37	266067.37	53001.59	PC	129+06.93	5894.67	266278.16	53526.53
PT	116+85.21	5945.93	265530.97	52733.45	PT	123+11.63	5917.76	266081.78	53008.20	PT	129+43.05	5892.92	266296.83	53557.33
					PC	123+33.17	5916.94	266099.26	53020.76					



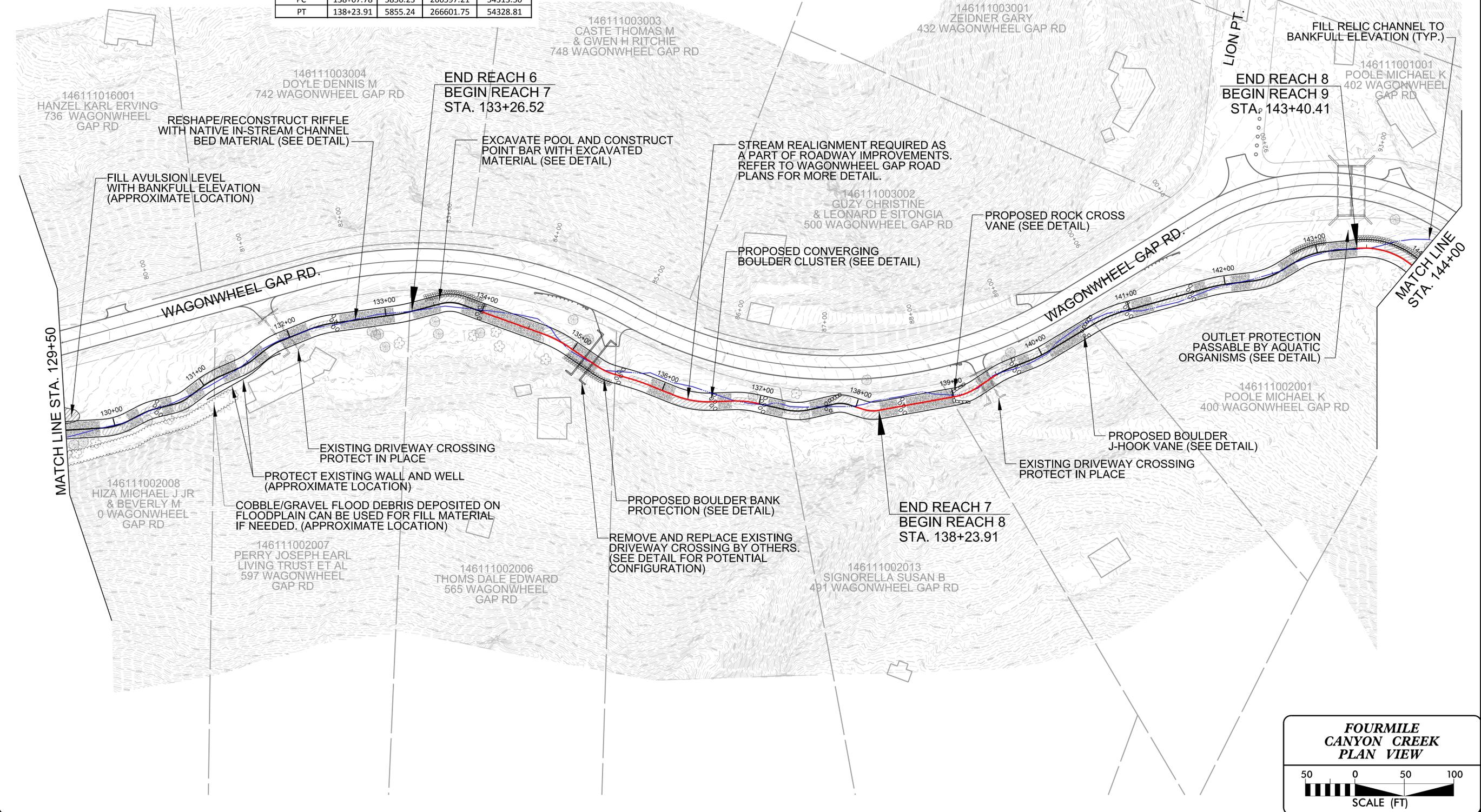
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Description	Station	Elevation	Northing	Easting
PC	129+87.18	5890.79	266314.51	53597.76
PT	130+14.45	5889.57	266330.24	53619.80
PC	130+29.34	5888.96	266341.19	53629.88
PT	130+45.53	5888.30	266351.71	53642.14
PC	130+63.68	5887.56	266361.83	53657.21
PT	130+80.31	5886.88	266373.62	53668.77
PC	130+97.07	5886.19	266387.72	53677.84
PT	131+19.46	5885.28	266404.97	53692.02
PC	131+39.62	5884.45	266418.95	53706.55
PT	131+56.71	5883.75	266432.24	53717.23
PC	131+71.09	5883.17	266444.50	53724.74
PT	131+90.07	5882.39	266459.06	53736.81
PC	132+21.15	5881.12	266479.92	53759.85
PT	132+45.58	5880.12	266493.92	53779.80
PC	133+08.84	5877.79	266523.57	53835.67
PT	133+26.52	5877.14	266532.77	53850.77

Description	Station	Elevation	Northing	Easting
PC	133+56.71	5876.03	266549.96	53875.57
PT	133+78.90	5875.22	266556.55	53896.42
PC	134+64.88	5872.05	266557.10	53982.40
PT	134+96.65	5870.88	266553.34	54013.86
PC	135+30.94	5869.62	266545.05	54047.13
PT	135+47.90	5869.00	266543.65	54063.96
PC	135+64.17	5868.39	266544.91	54080.18
PT	135+85.43	5867.58	266545.44	54101.42
PC	136+12.73	5866.55	266544.66	54128.72
PT	136+52.00	5865.07	266551.61	54167.08
PC	136+73.36	5864.26	266559.67	54186.86
PT	136+97.30	5863.07	266565.77	54209.94
PC	137+27.13	5861.25	266569.61	54239.52
PT	137+52.23	5859.62	266578.21	54262.88
PC	137+76.40	5858.14	266591.40	54283.13
PT	137+93.24	5857.12	266596.52	54298.98
PC	138+07.78	5856.23	266597.21	54313.50
PT	138+23.91	5855.24	266601.75	54328.81

Description	Station	Elevation	Northing	Easting
PC	139+01.65	5850.49	266641.00	54395.91
PT	139+25.83	5849.02	266657.06	54413.77
PC	139+44.88	5847.85	266672.40	54425.07
PT	139+65.95	5846.94	266687.93	54439.26
PC	139+87.78	5846.00	266702.40	54455.59
PT	140+06.65	5845.18	266716.03	54468.61
PC	140+59.10	5842.91	266756.83	54501.56
PT	140+94.84	5841.36	266781.30	54527.47
PC	141+80.82	5837.64	266831.43	54597.32
PT	142+04.63	5836.61	266843.78	54617.66
PC	142+26.40	5835.67	266853.62	54637.08
PT	142+58.46	5834.28	266873.70	54661.76
PC	142+76.38	5833.50	266887.69	54672.94
PT	143+10.00	5832.05	266908.46	54699.02
PC	143+40.41	5830.73	266921.65	54726.43
PT	144+34.84	5826.59	266905.73	54813.30

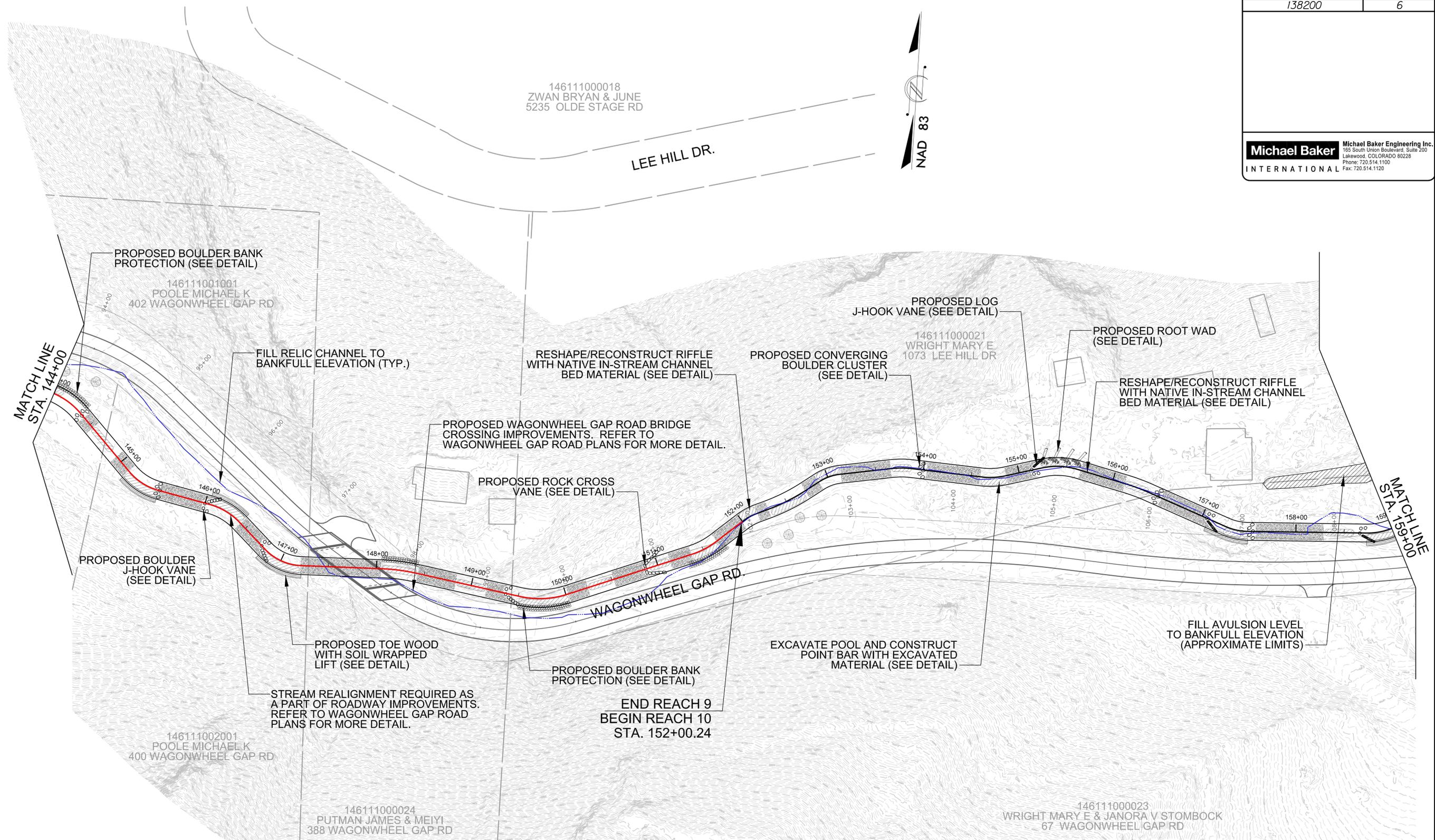
BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	5
Michael Baker INTERNATIONAL	
<small>Michael Baker Engineering Inc. 165 South Union Boulevard, Suite 200 Lakewood, COLORADO 80126 Phone: 720.514.1100 Fax: 720.514.1120</small>	



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FOURMILE CANYON CREEK PLAN VIEW

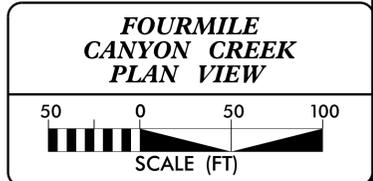
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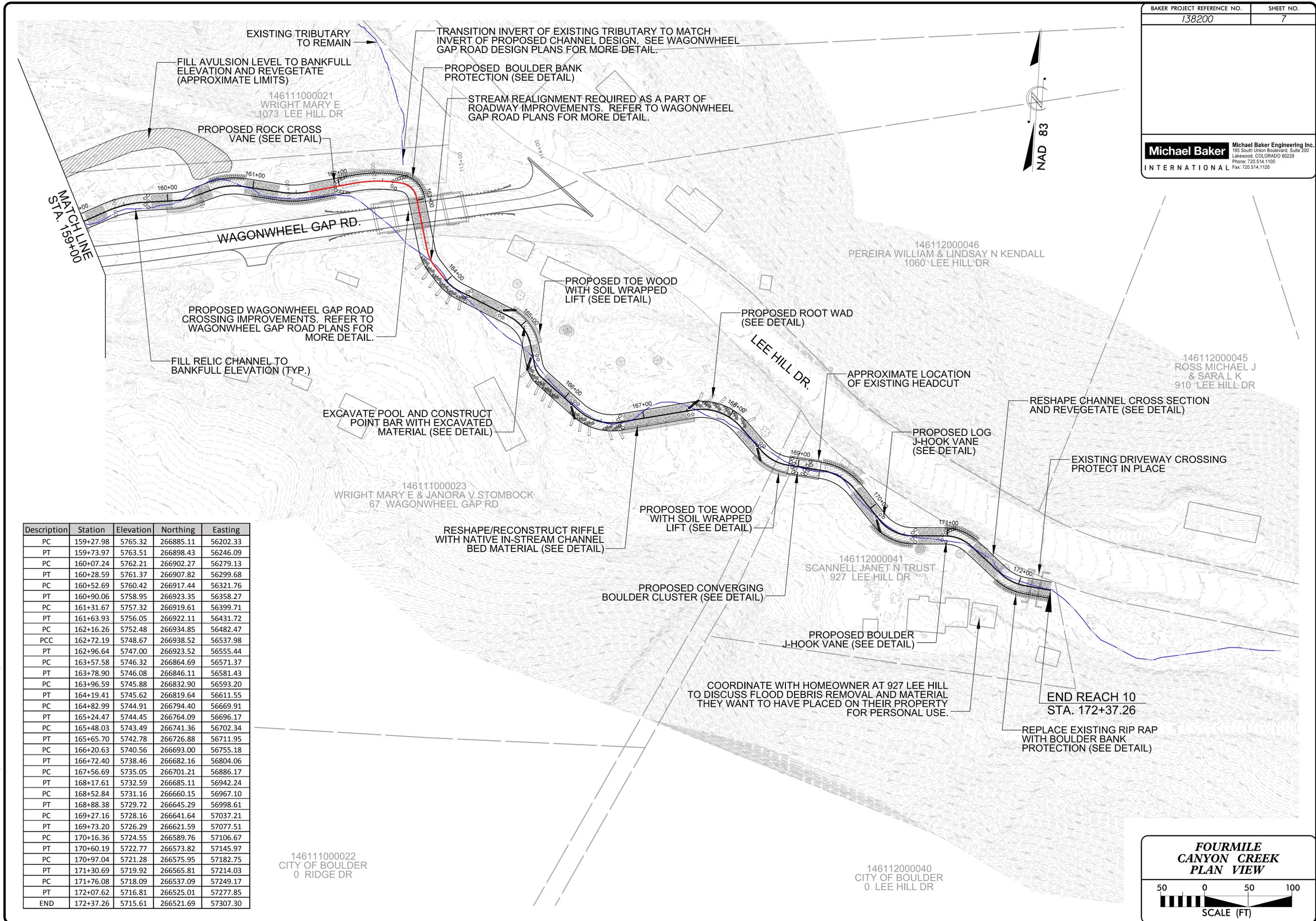
Description	Station	Elevaton	Northing	Easting
PC	145+13.36	5823.14	266848.83	54867.40
PT	145+49.68	5821.54	266831.43	54898.65
PC	146+04.78	5819.13	266820.20	54952.59
PT	146+41.82	5817.50	266803.38	54985.08
PC	146+79.44	5815.91	266777.74	55012.61
PT	147+22.03	5814.11	266763.00	55051.43
PC	148+05.47	5810.59	266765.02	55134.86
PT	148+41.87	5809.05	266762.60	55171.13
PC	149+51.54	5804.42	266745.38	55279.43
PT	150+01.70	5802.30	266750.71	55328.72

Description	Station	Elevaton	Northing	Easting
PC	151+37.21	5796.58	266800.10	55454.91
PT	151+65.62	5795.38	266814.72	55479.11
PC	152+00.24	5793.92	266837.37	55505.29
PT	152+17.23	5793.25	266846.43	55519.58
PC	152+29.10	5792.78	266851.23	55530.44
PT	152+72.61	5791.07	266873.02	55568.01
PC	152+90.13	5790.39	266883.40	55582.13
PT	153+13.08	5789.48	266892.33	55603.04
PC	153+66.99	5787.37	266901.62	55656.15
PT	153+87.45	5786.56	266902.82	55676.52

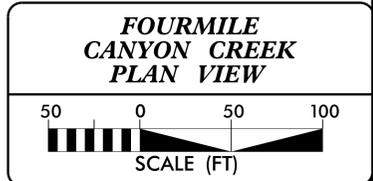
Description	Station	Elevaton	Northing	Easting
PC	154+60.69	5783.68	266898.76	55749.66
PT	154+85.41	5782.71	266901.44	55774.11
PC	155+24.05	5781.19	266911.90	55811.31
PT	155+61.70	5779.72	266912.76	55848.56
PC	156+13.33	5777.69	266901.09	55898.85
PT	156+38.59	5776.69	266893.85	55923.03
PC	157+26.31	5773.25	266863.42	56005.31
PT	157+49.99	5772.32	266859.84	56028.55
PC	158+73.37	5767.47	266865.84	56151.79
PT	159+01.84	5766.35	266873.15	56179.08



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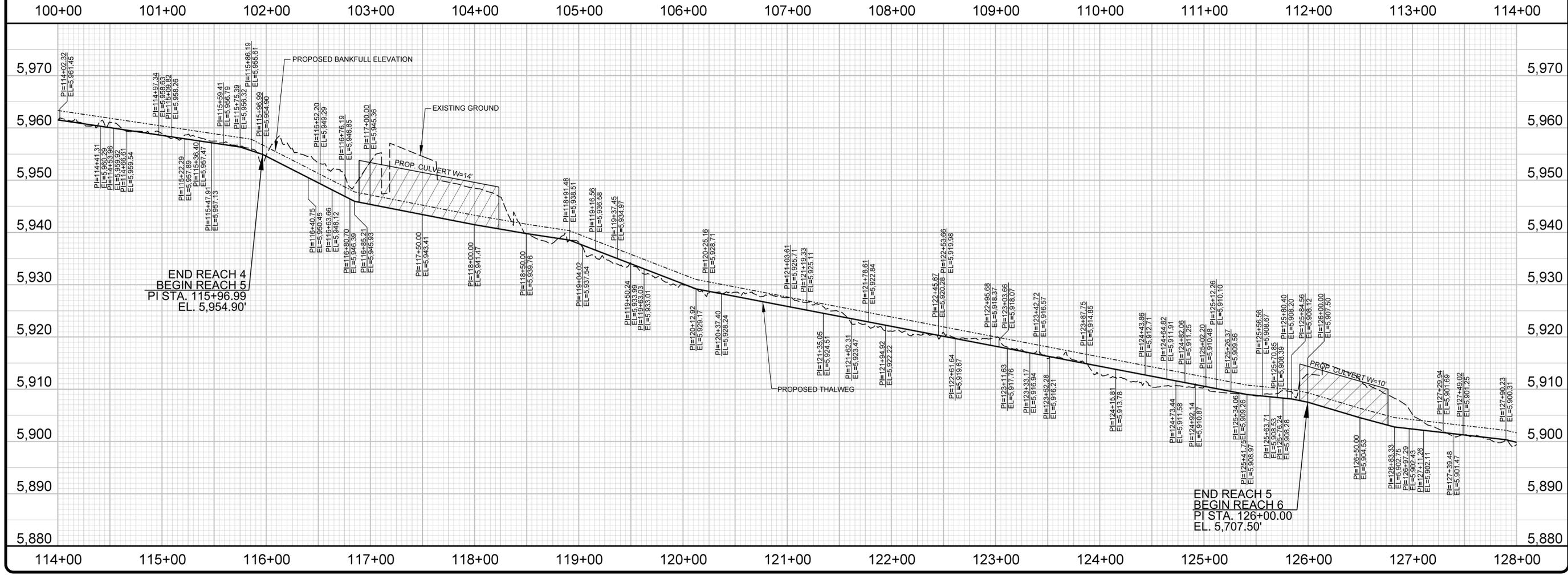
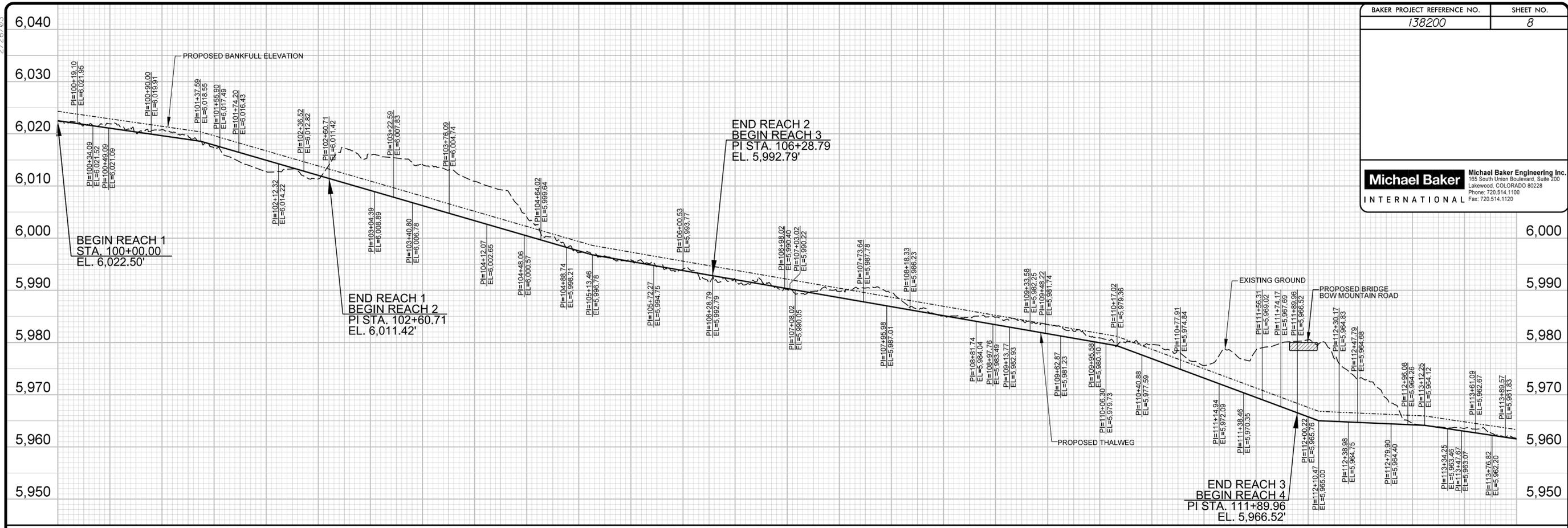


Description	Station	Elevation	Northing	Easting
PC	159+27.98	5765.32	266885.11	56202.33
PT	159+73.97	5763.51	266898.43	56246.09
PC	160+07.24	5762.21	266902.27	56279.13
PT	160+28.59	5761.37	266907.82	56299.68
PC	160+52.69	5760.42	266917.44	56321.76
PT	160+90.06	5758.95	266923.35	56358.27
PC	161+31.67	5757.32	266919.61	56399.71
PT	161+63.93	5756.05	266922.11	56431.72
PC	162+16.26	5752.48	266934.85	56482.47
PCC	162+72.19	5748.67	266938.52	56537.98
PT	162+96.64	5747.00	266923.52	56555.44
PC	163+57.58	5746.32	266864.69	56571.37
PT	163+78.90	5746.08	266846.11	56581.43
PC	163+96.59	5745.88	266832.90	56593.20
PT	164+19.41	5745.62	266819.64	56611.55
PC	164+82.99	5744.91	266794.40	56669.91
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PC	165+48.03	5743.49	266741.36	56702.34
PT	165+65.70	5742.78	266726.88	56711.95
PC	166+20.63	5740.56	266693.00	56755.18
PT	166+72.40	5738.46	266682.16	56804.06
PC	167+56.69	5735.05	266701.21	56886.17
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PT	168+88.38	5729.72	266645.29	56998.61
PC	169+27.16	5728.16	266641.64	57037.21
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PC	170+16.36	5724.55	266589.76	57106.67
PT	170+60.19	5722.77	266573.82	57145.97
PC	170+97.04	5721.28	266575.95	57182.75
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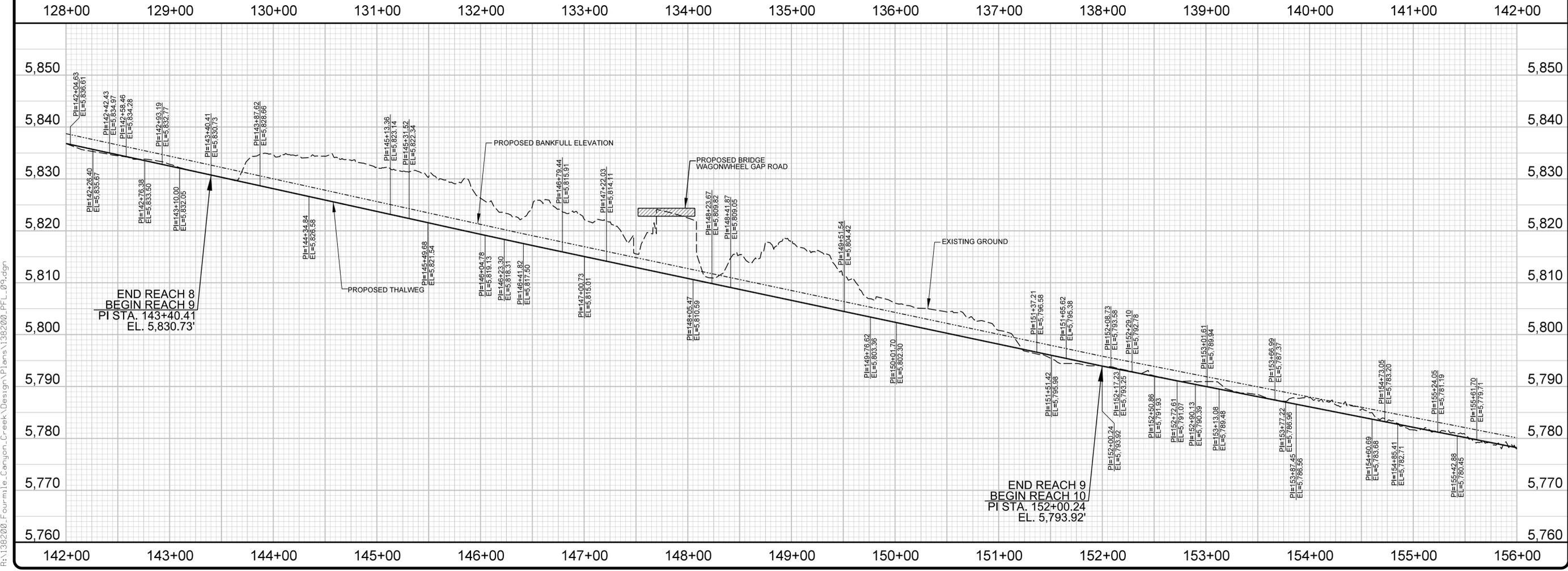
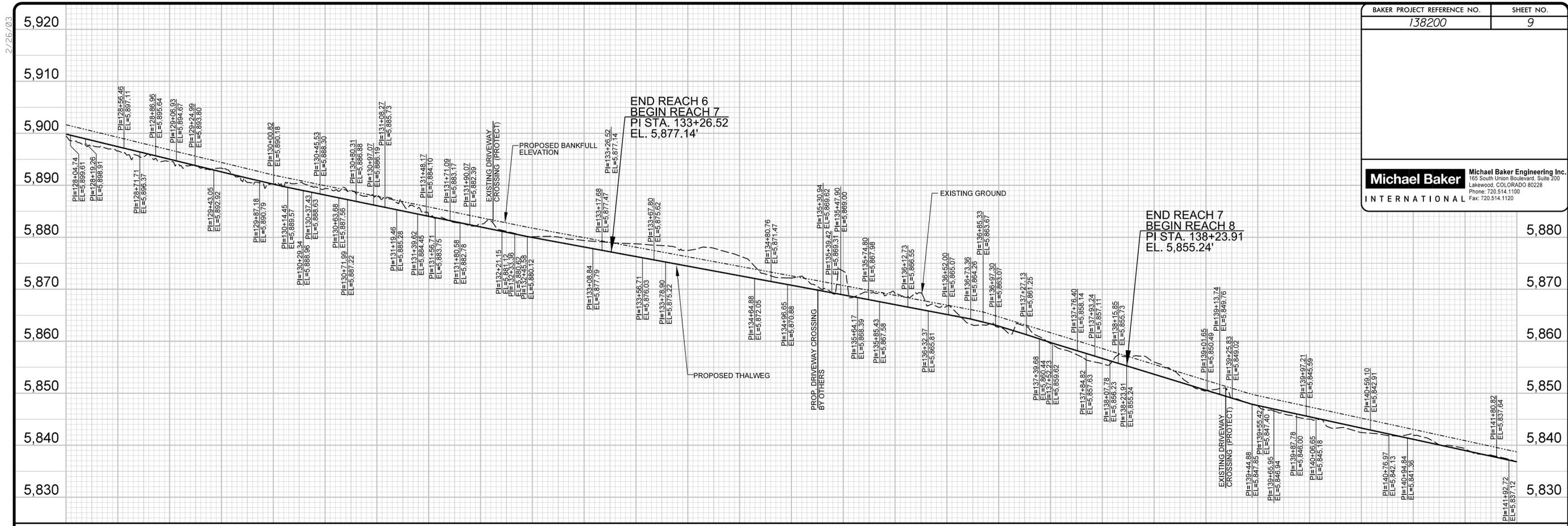


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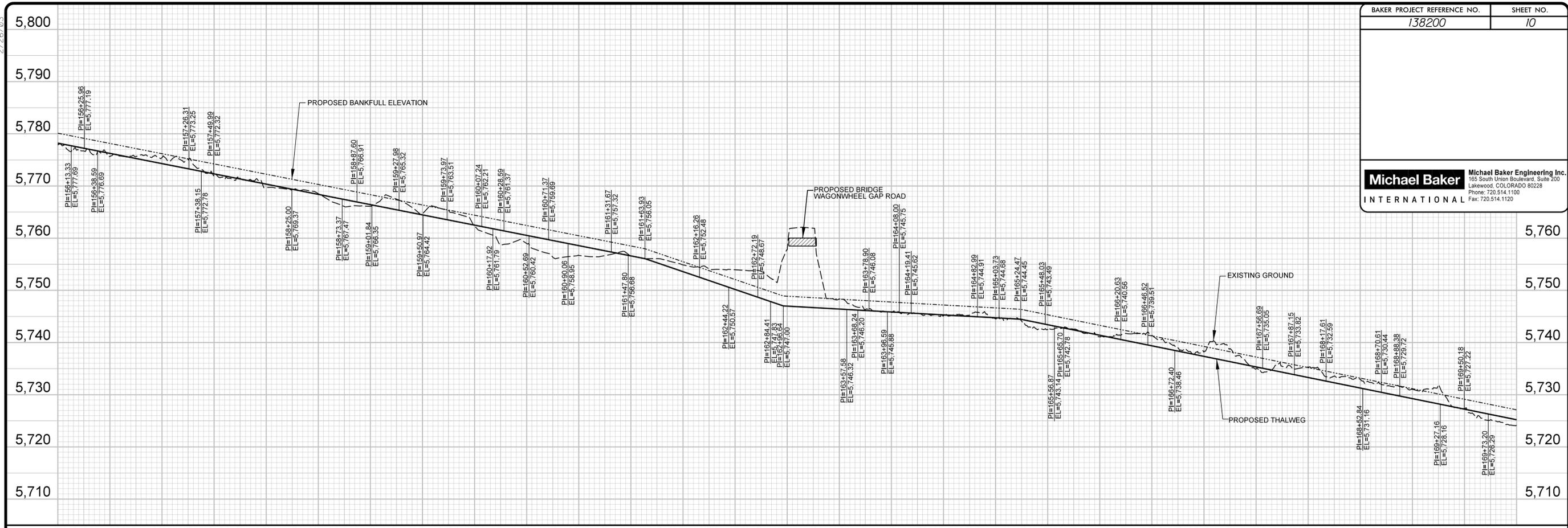


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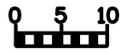
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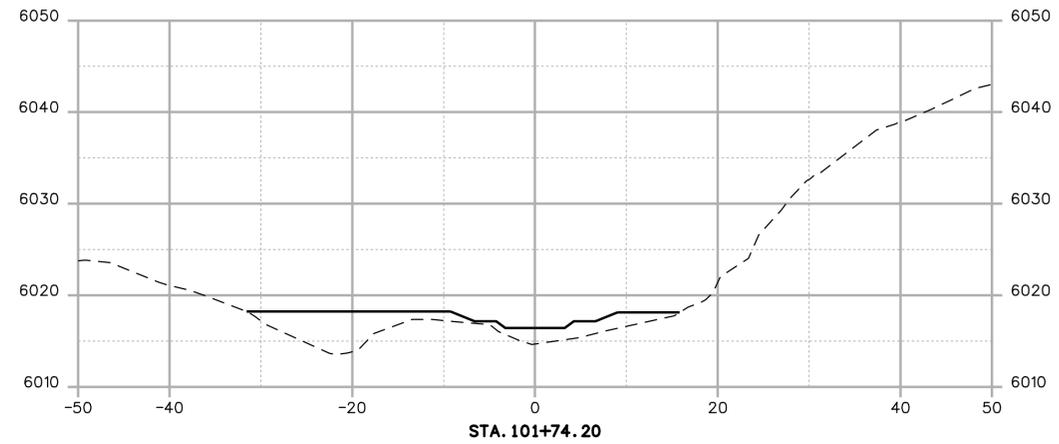
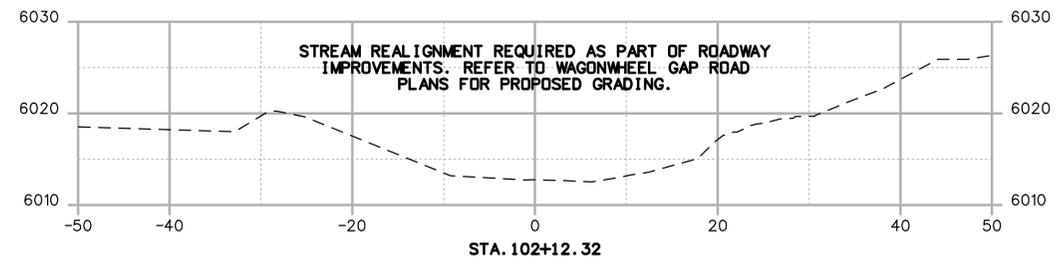
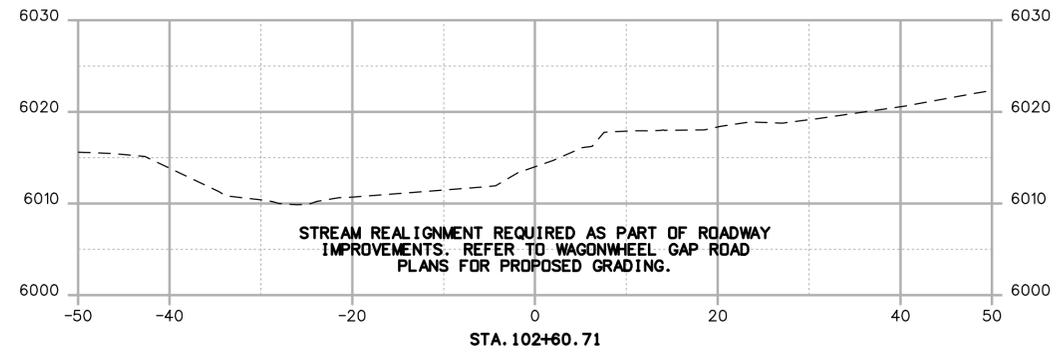
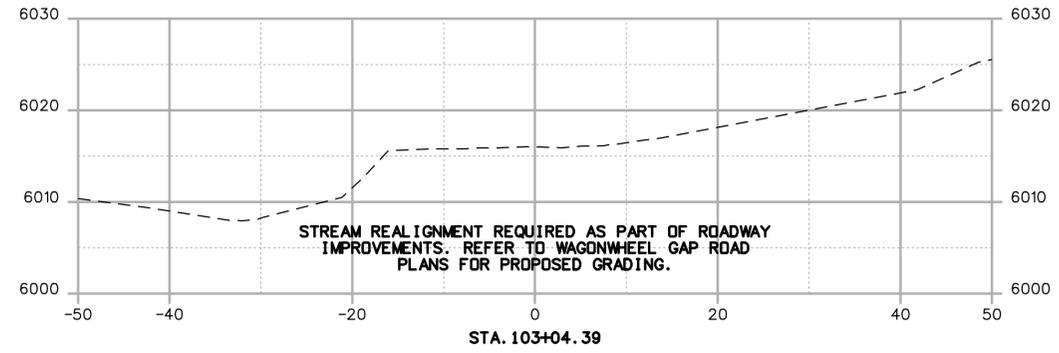
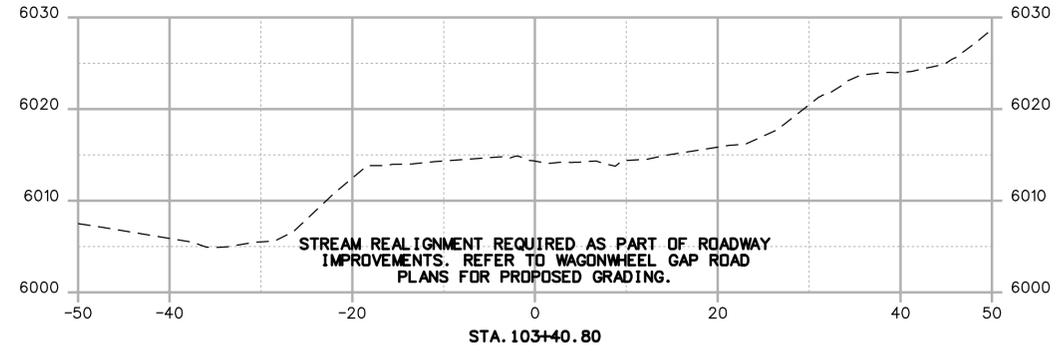
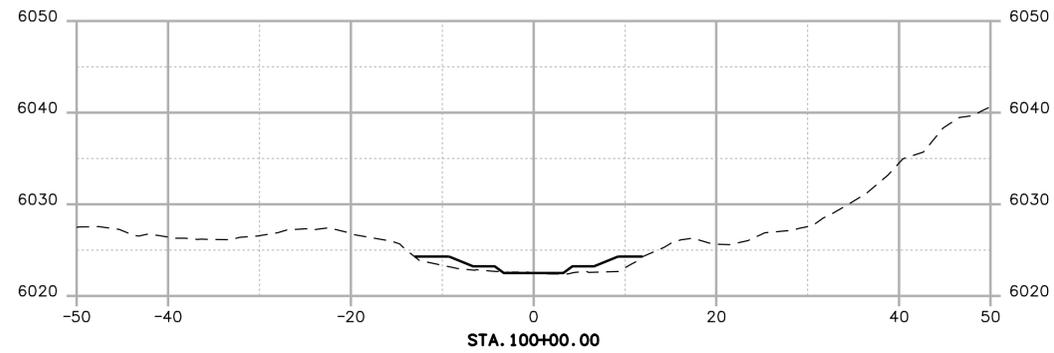
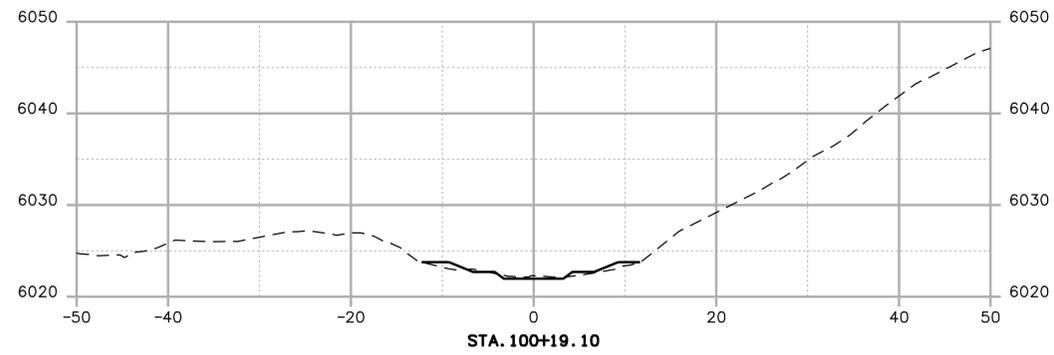
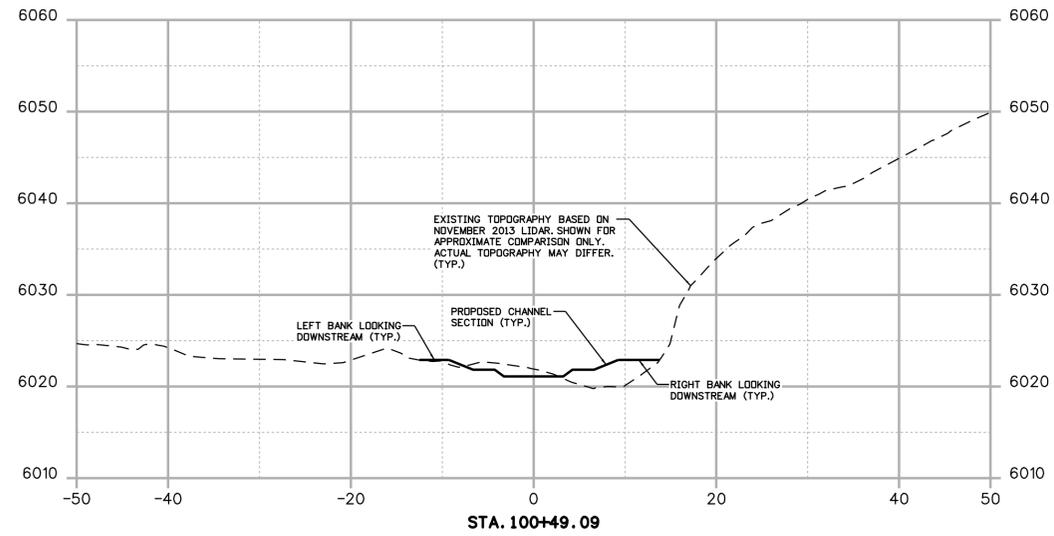
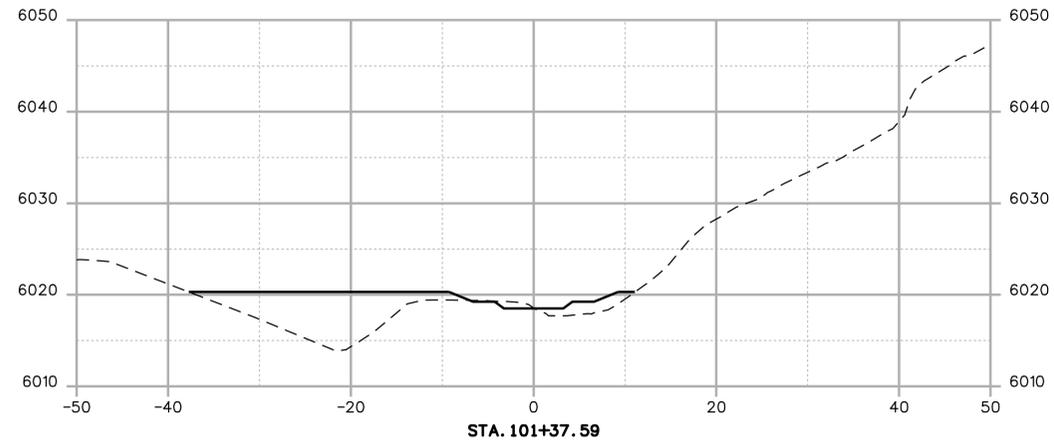


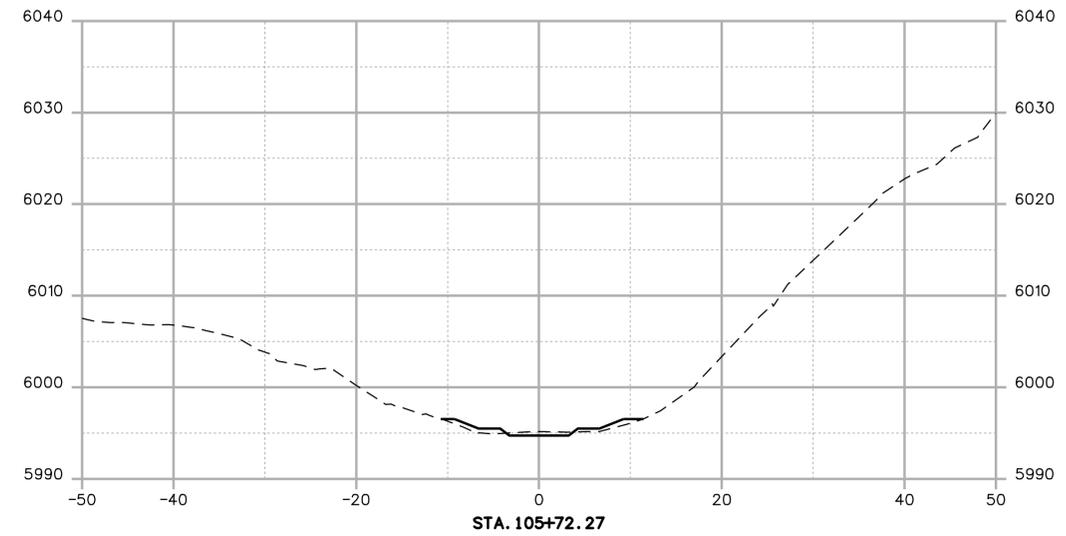
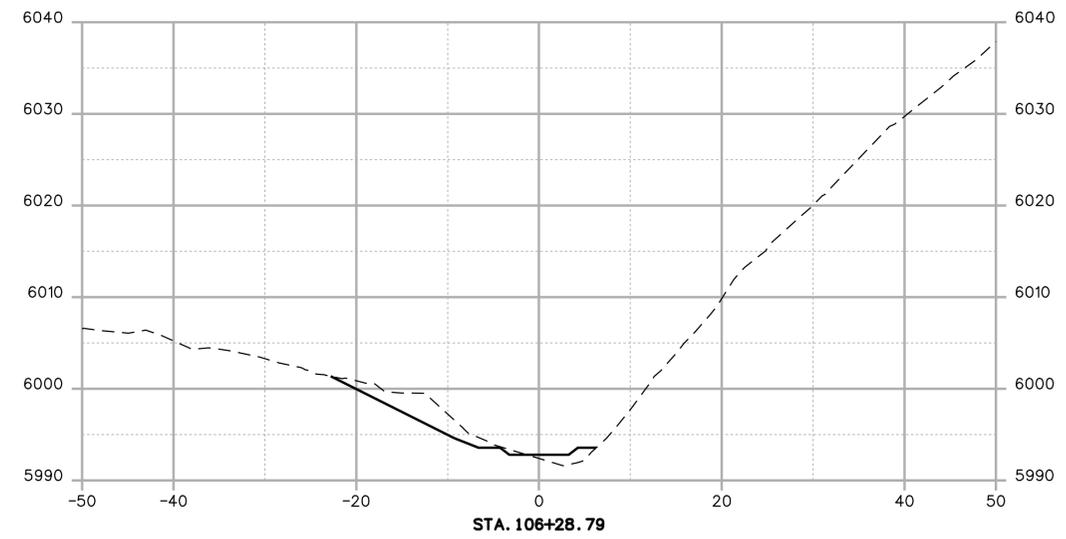
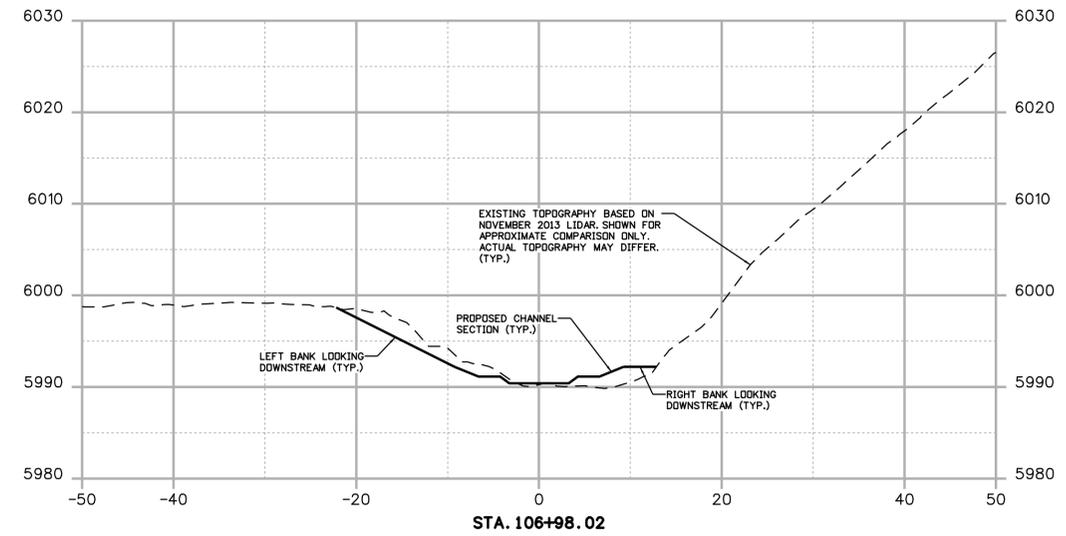
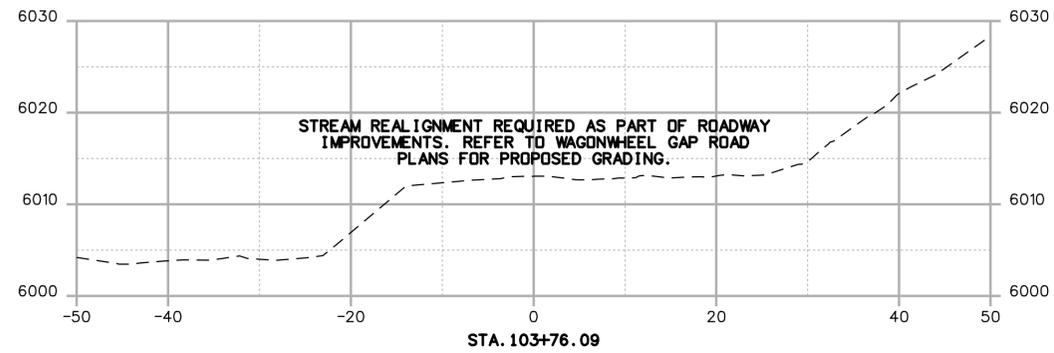
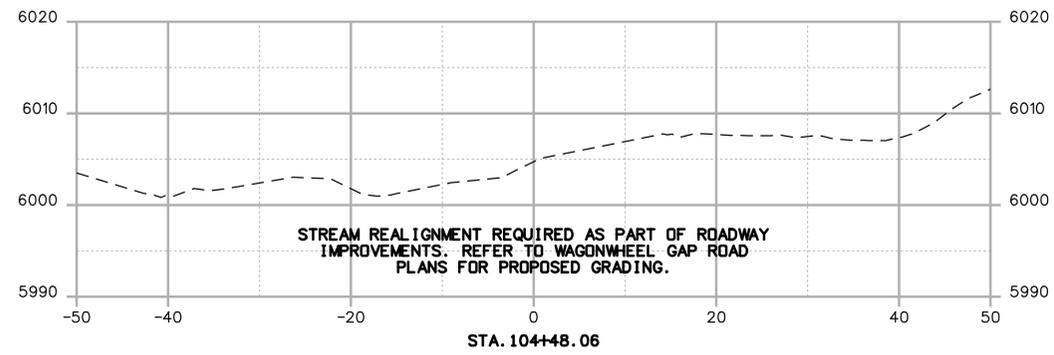
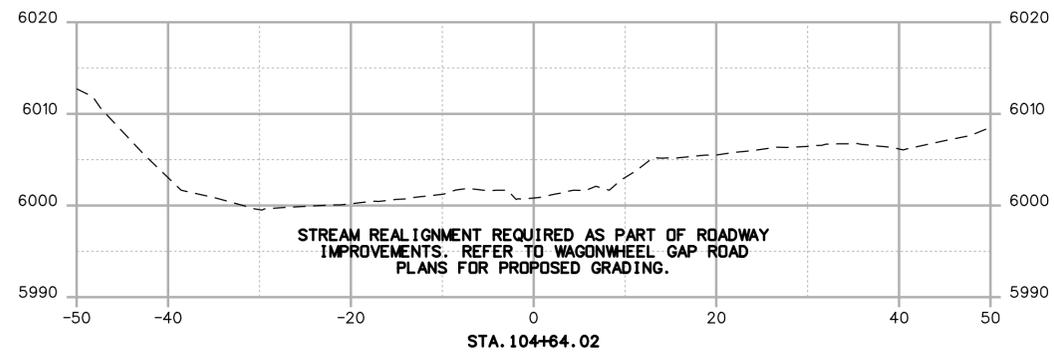
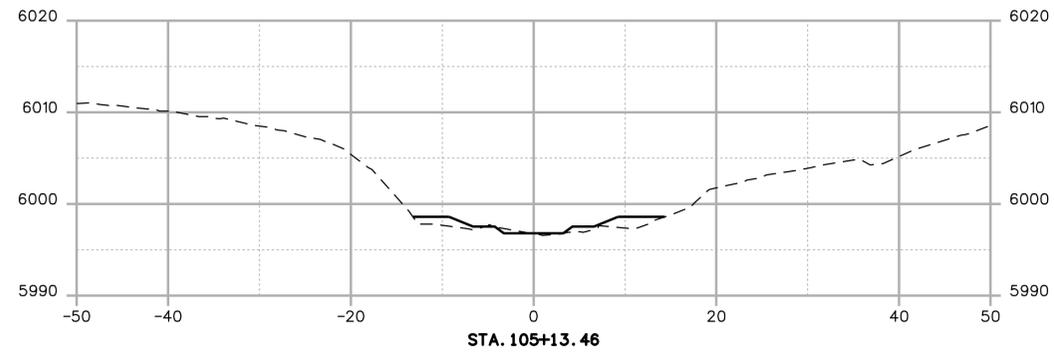
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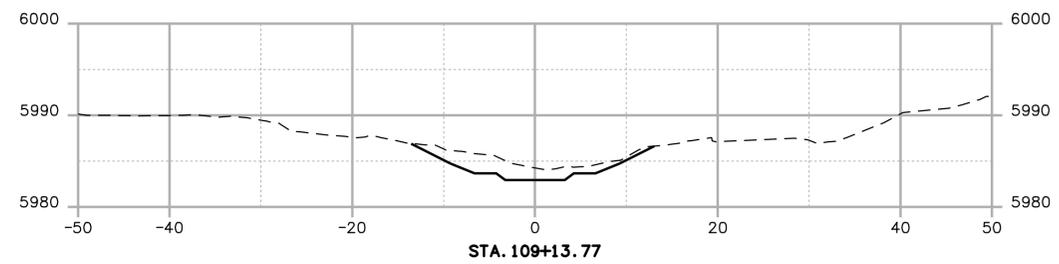
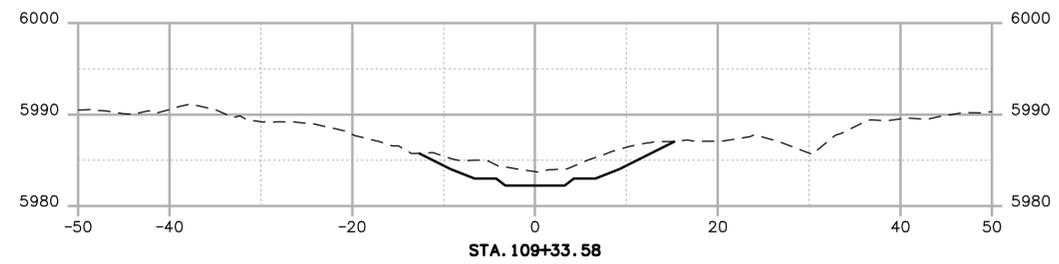
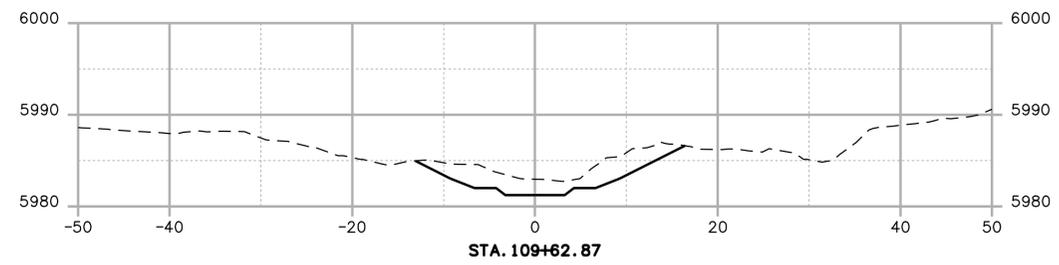
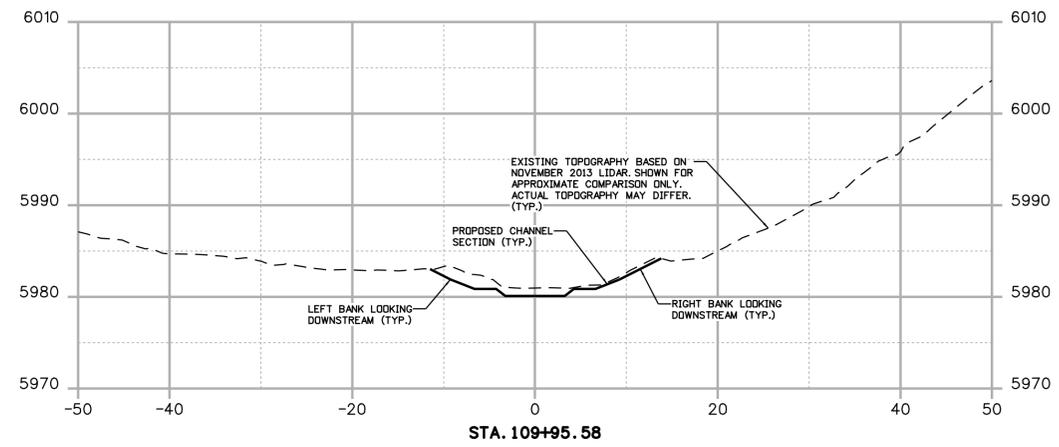
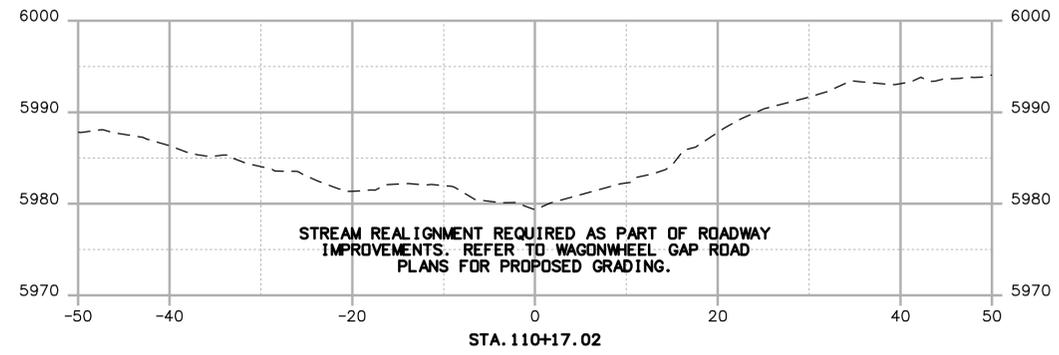
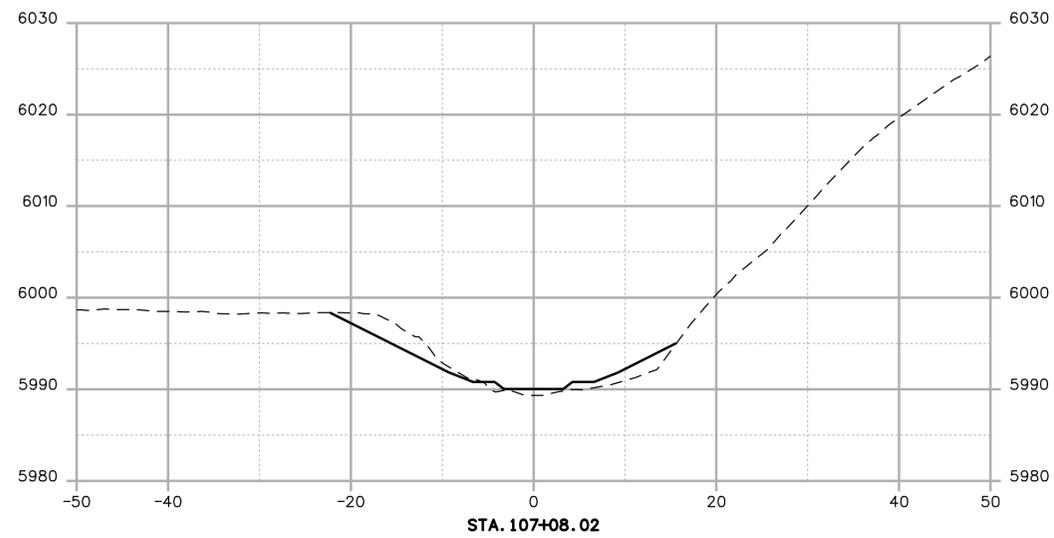
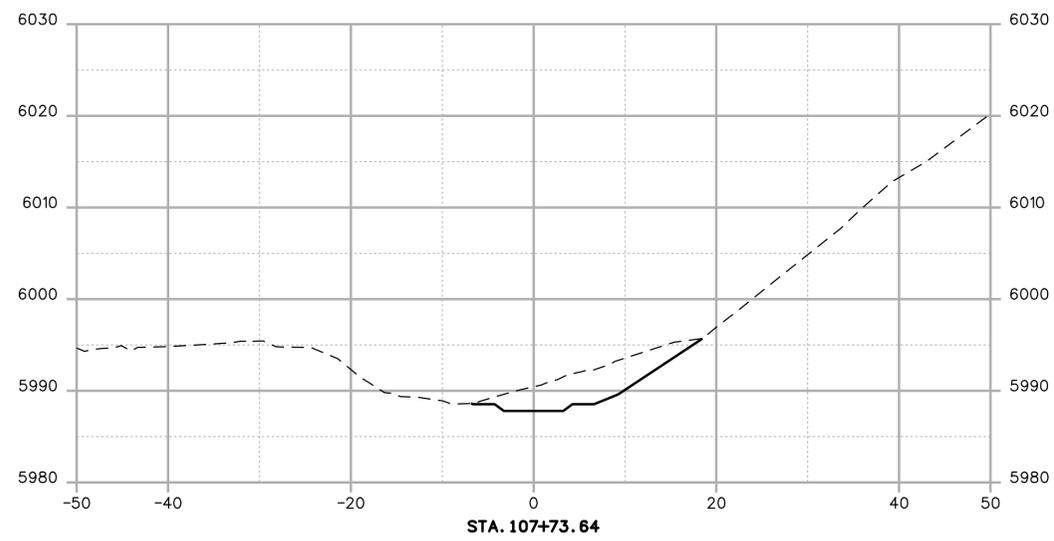
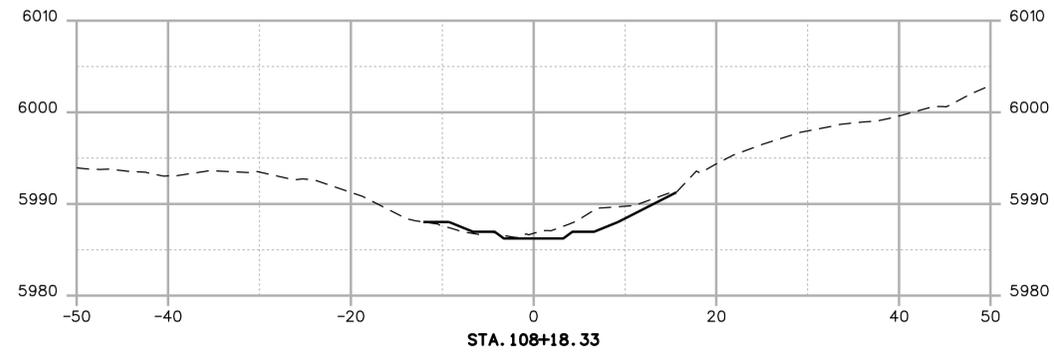
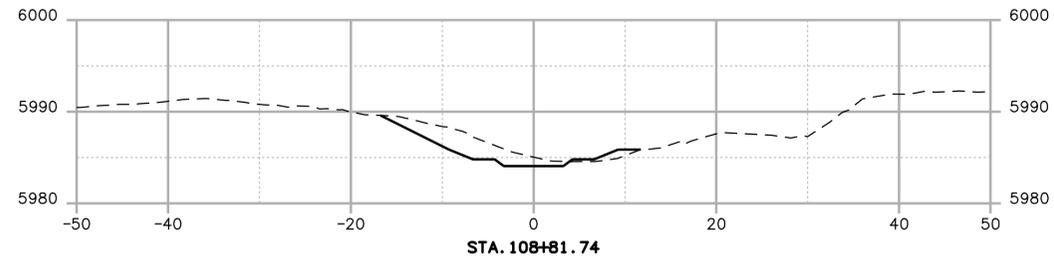


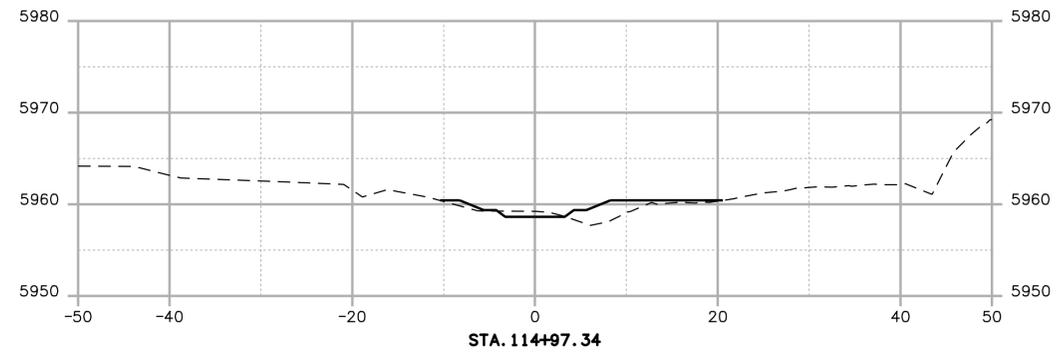
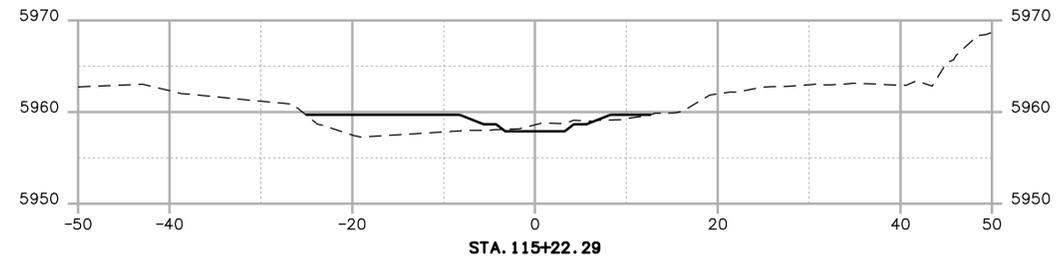
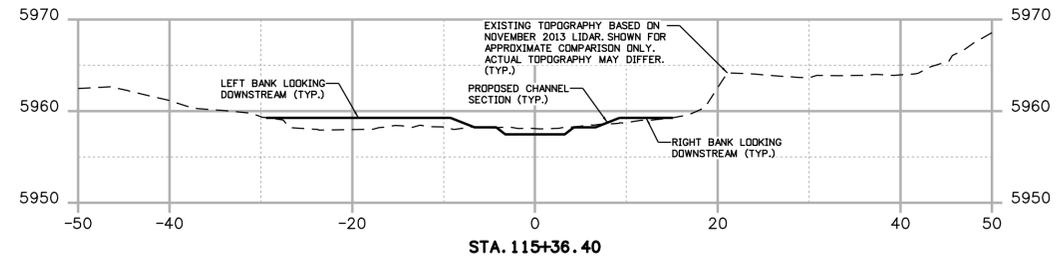
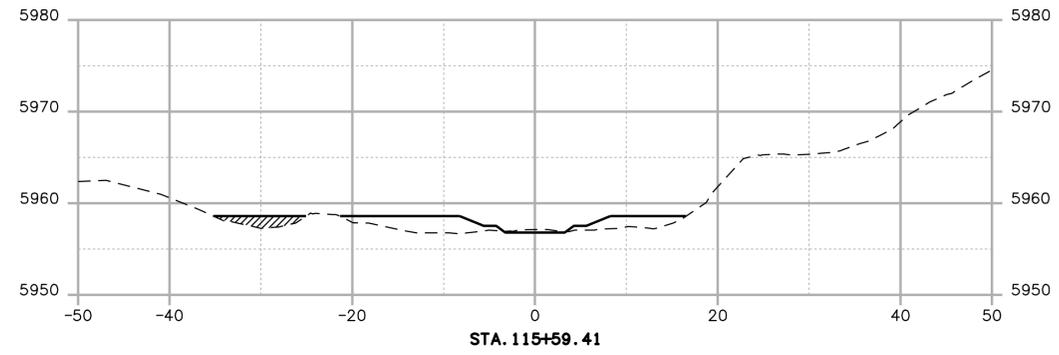
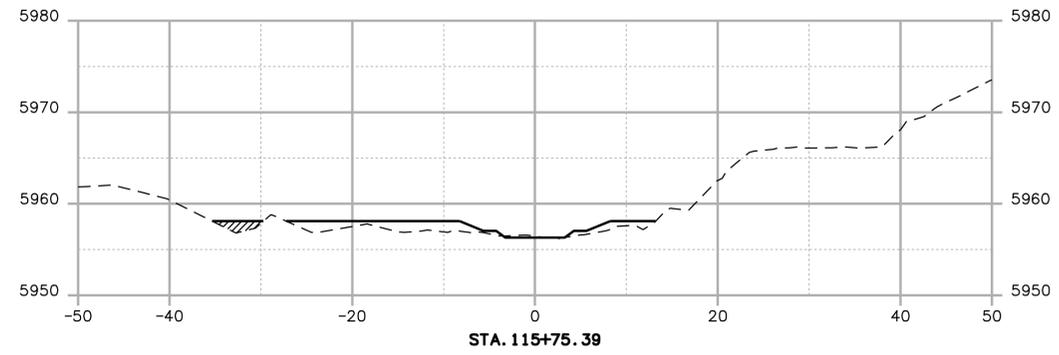
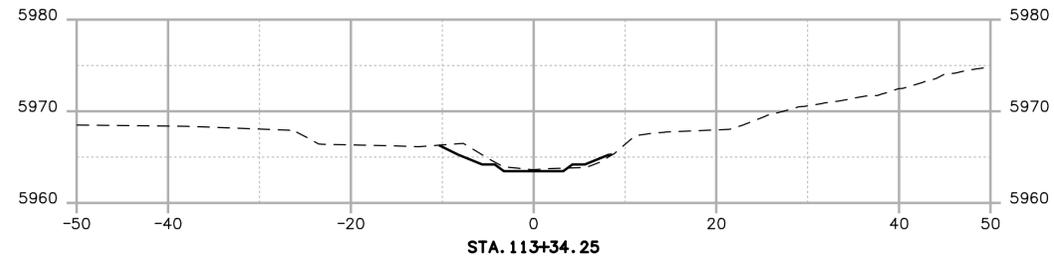
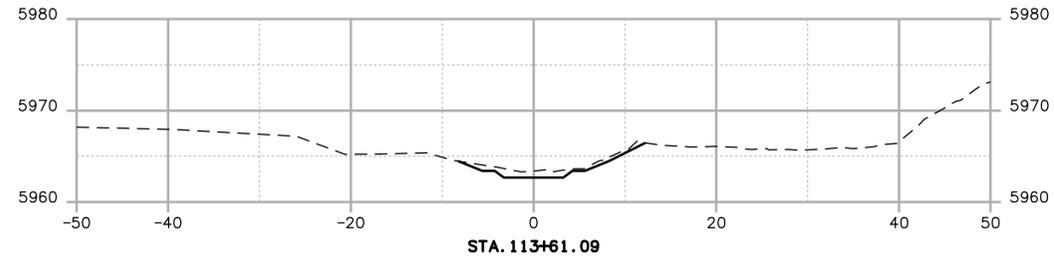
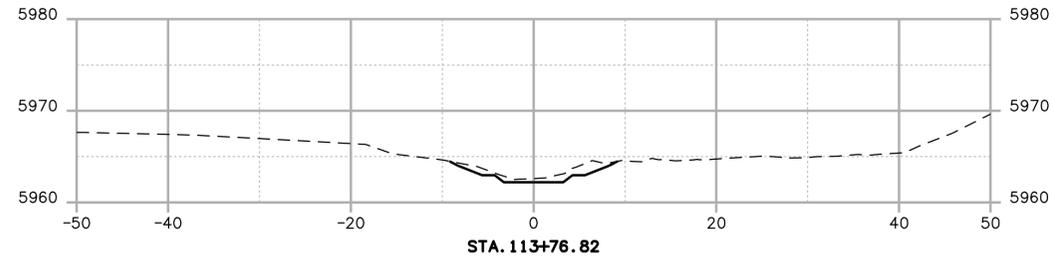
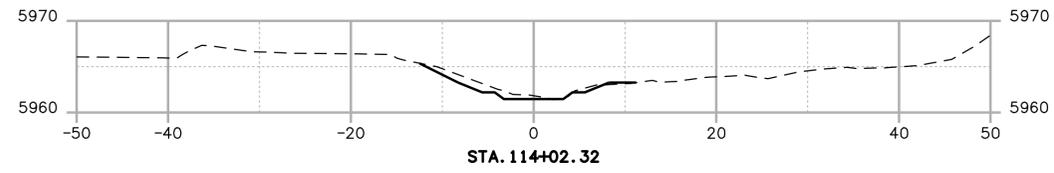
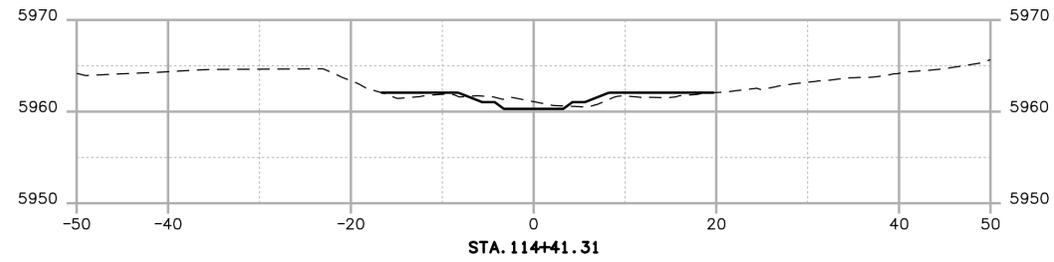
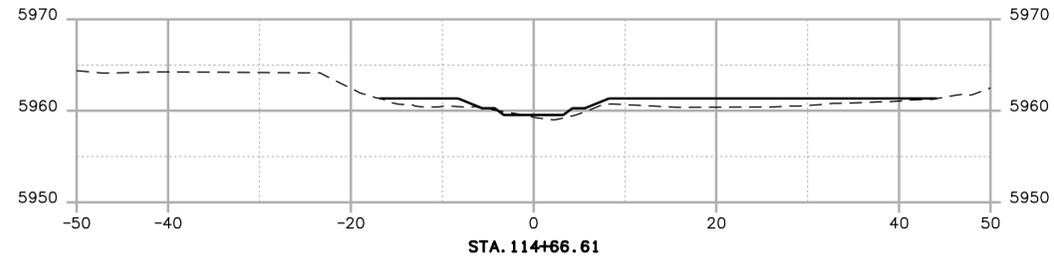


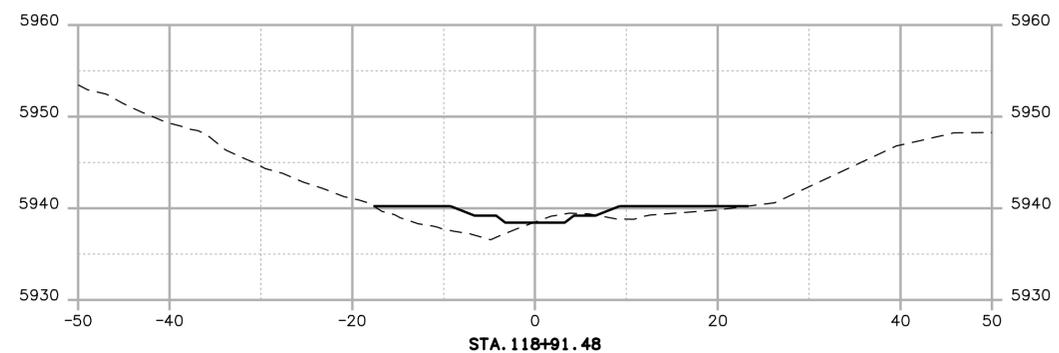
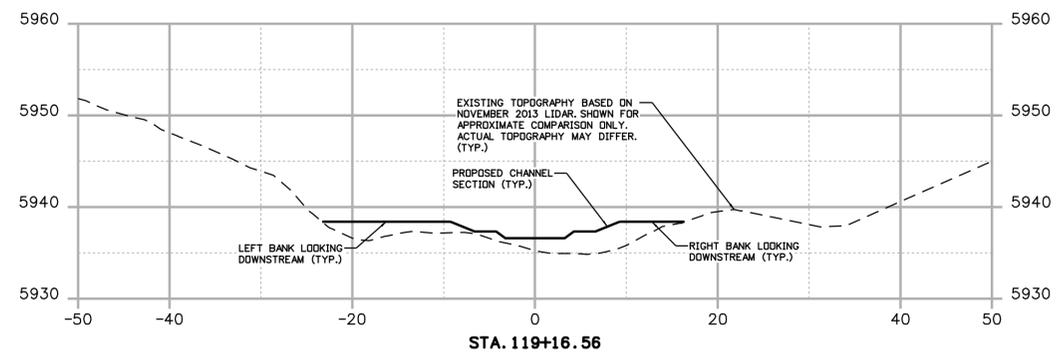
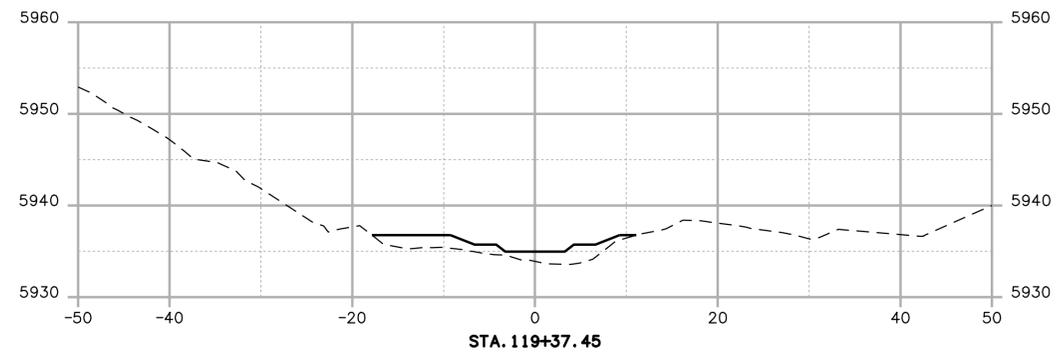
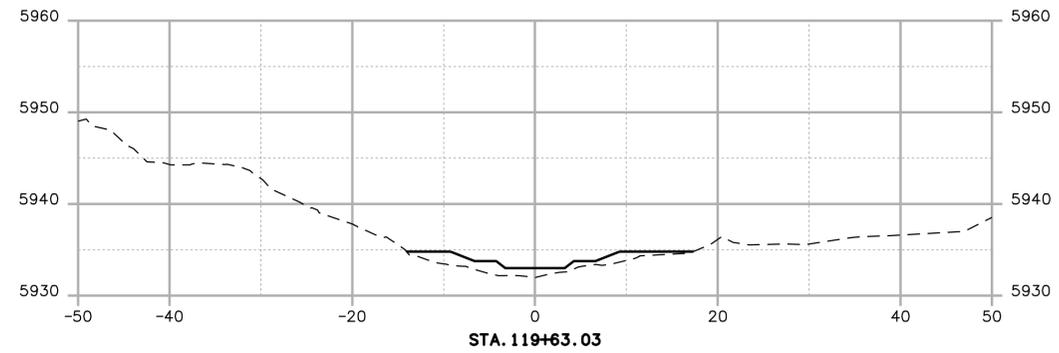
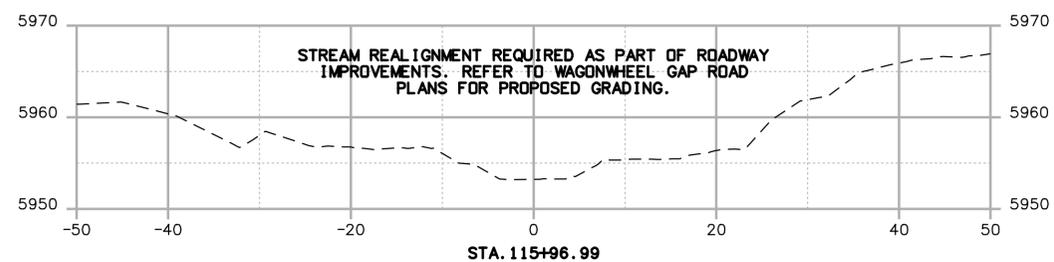
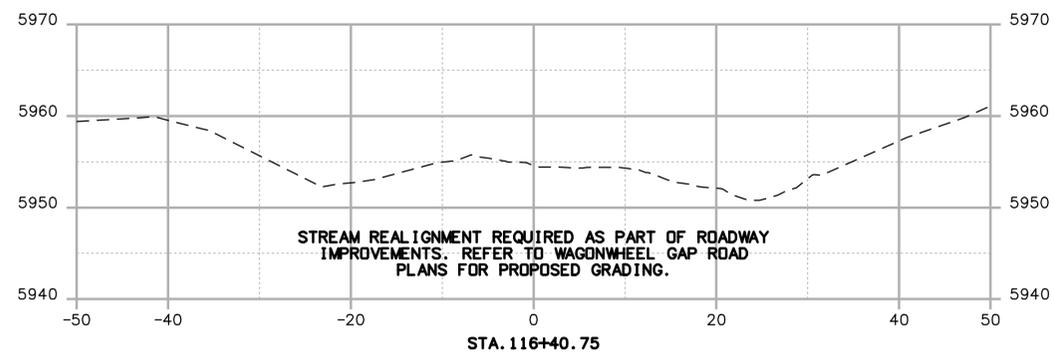
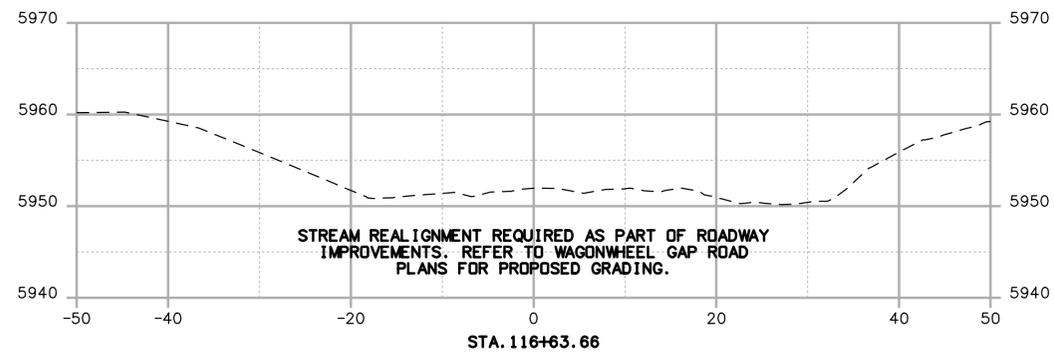
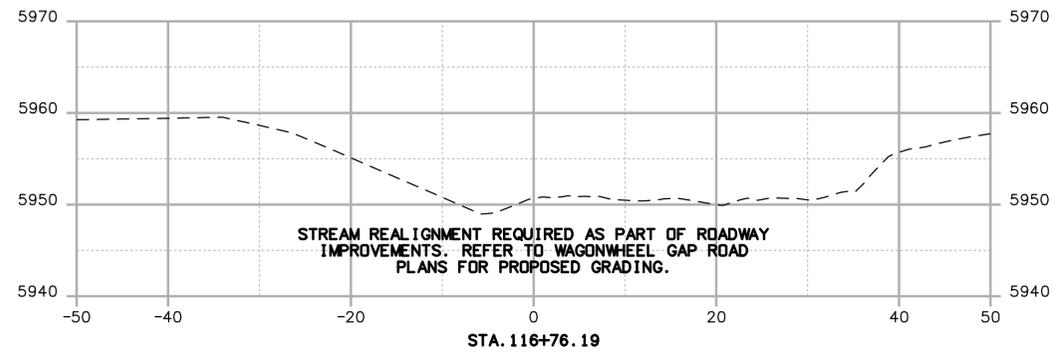
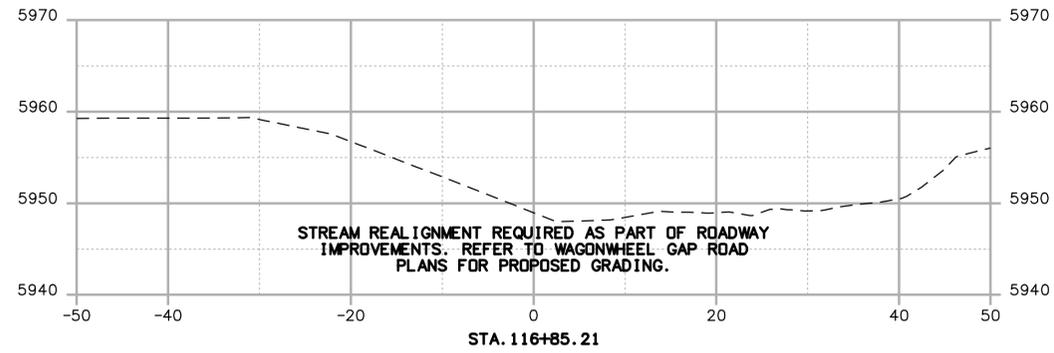
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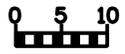




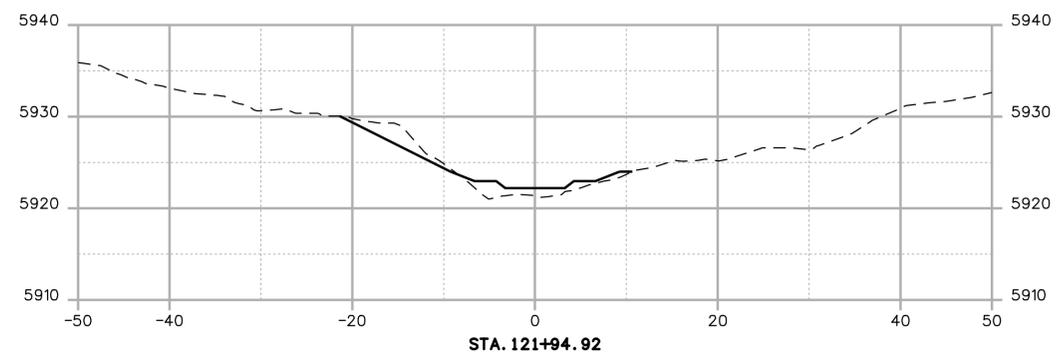
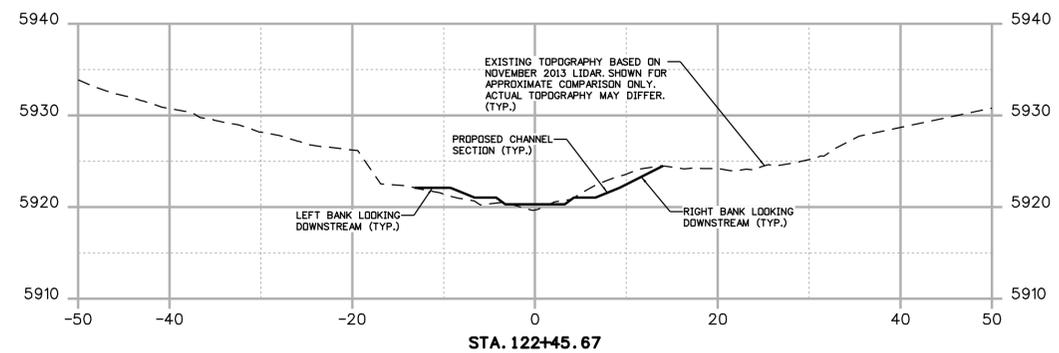
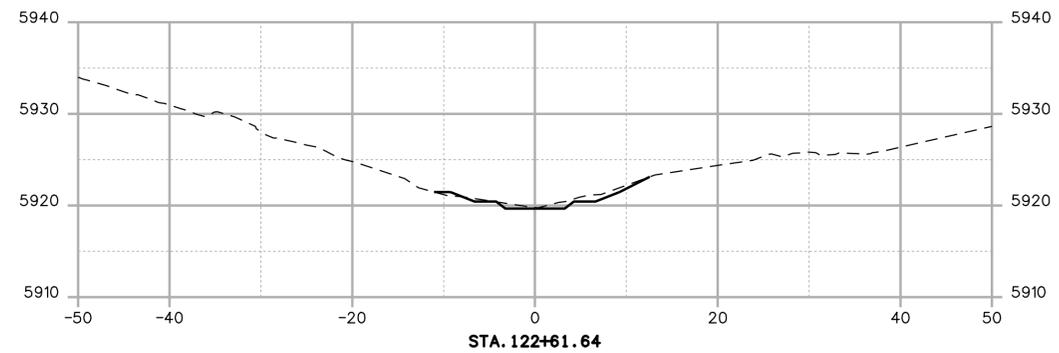
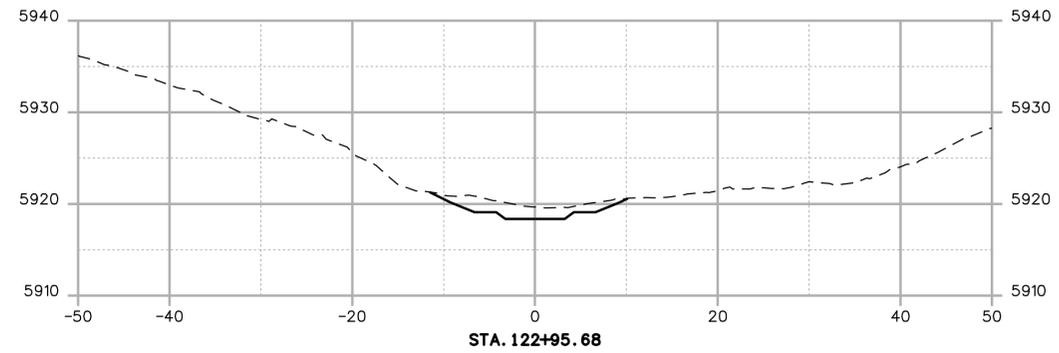
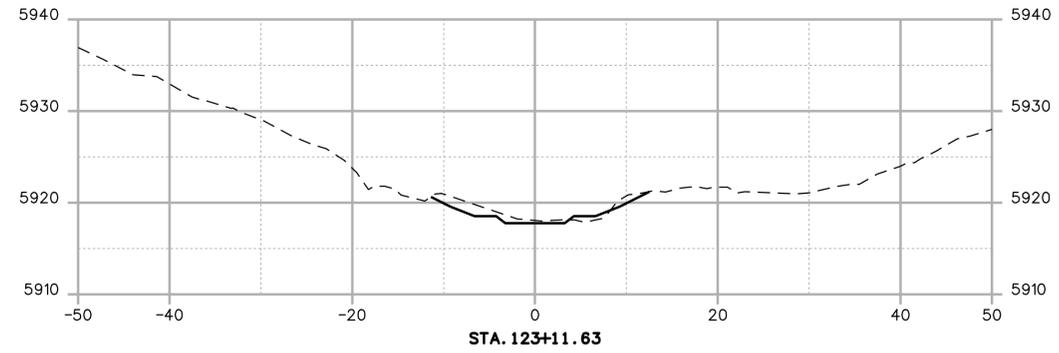
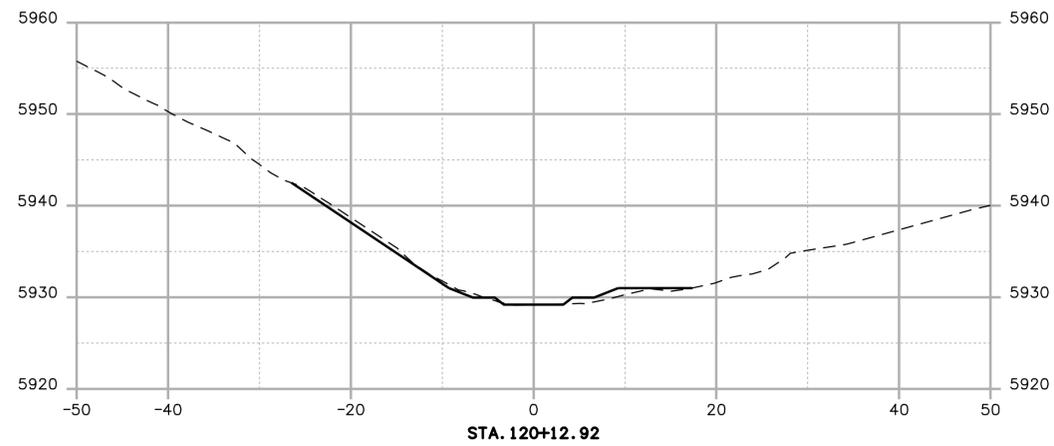
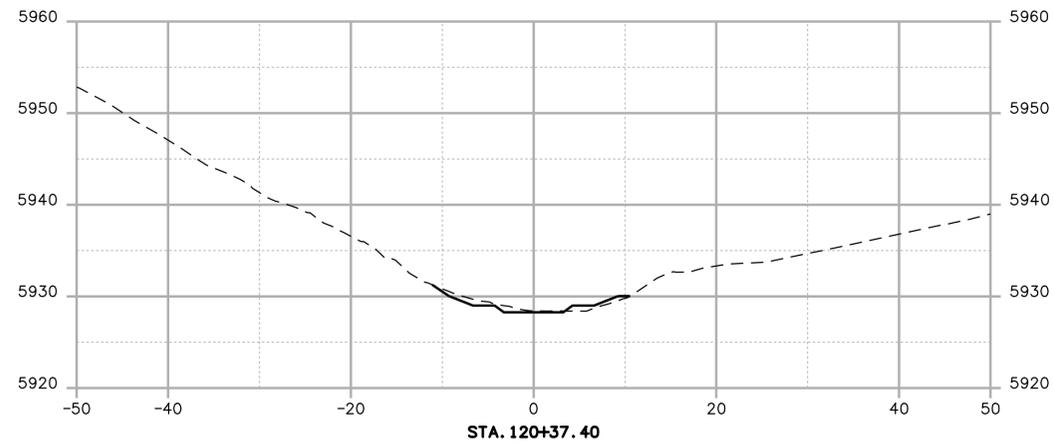
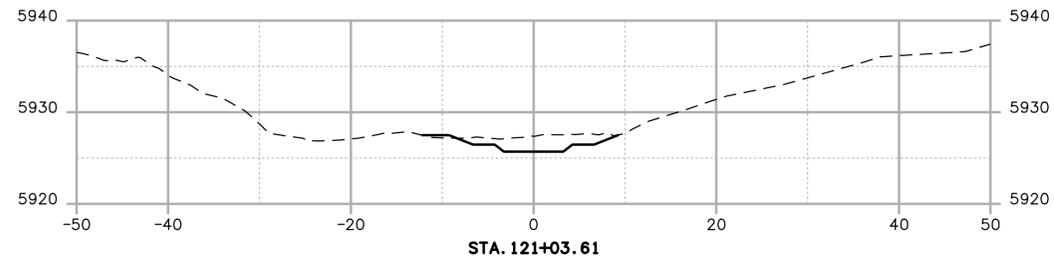
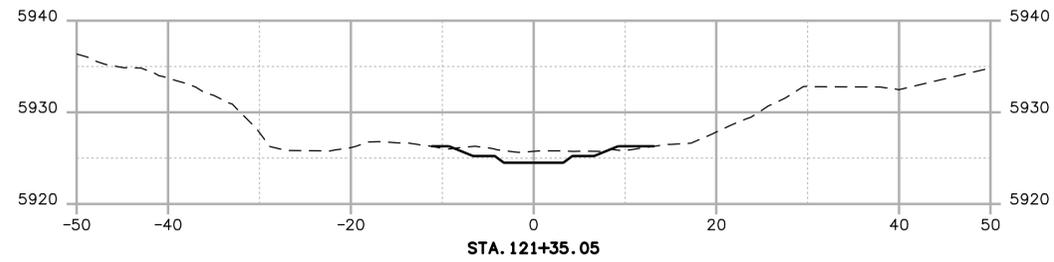
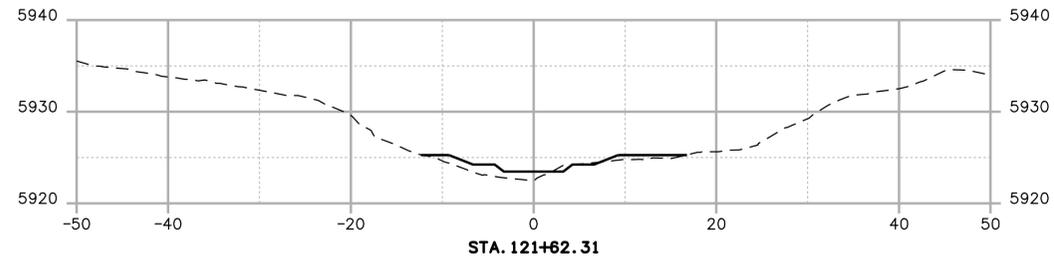




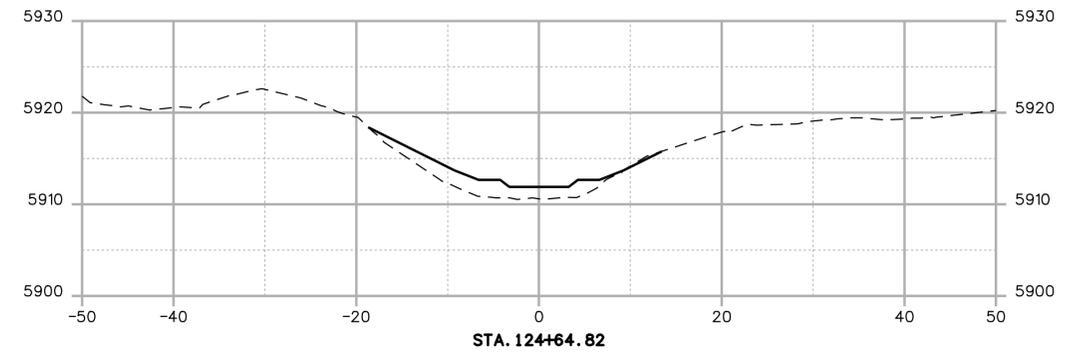
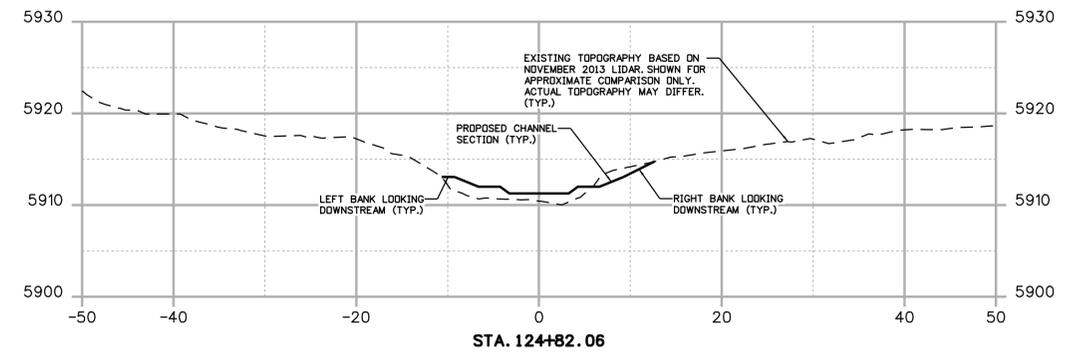
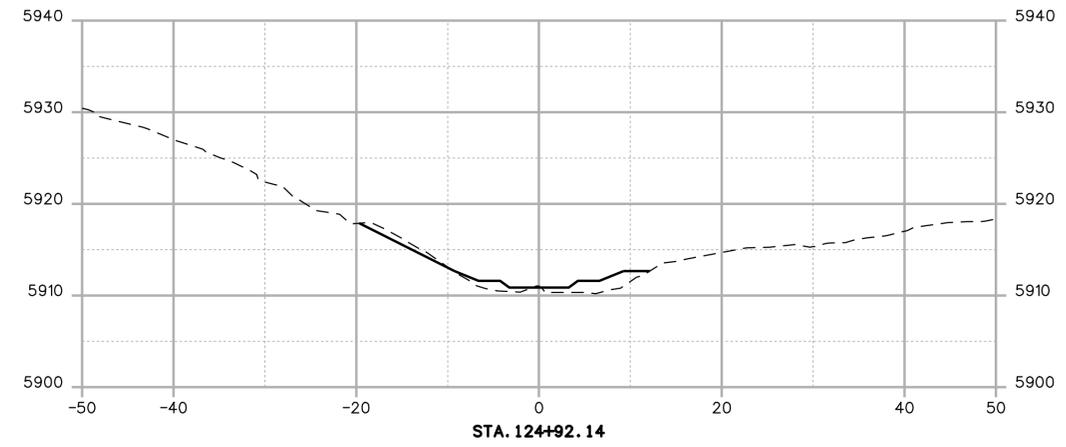
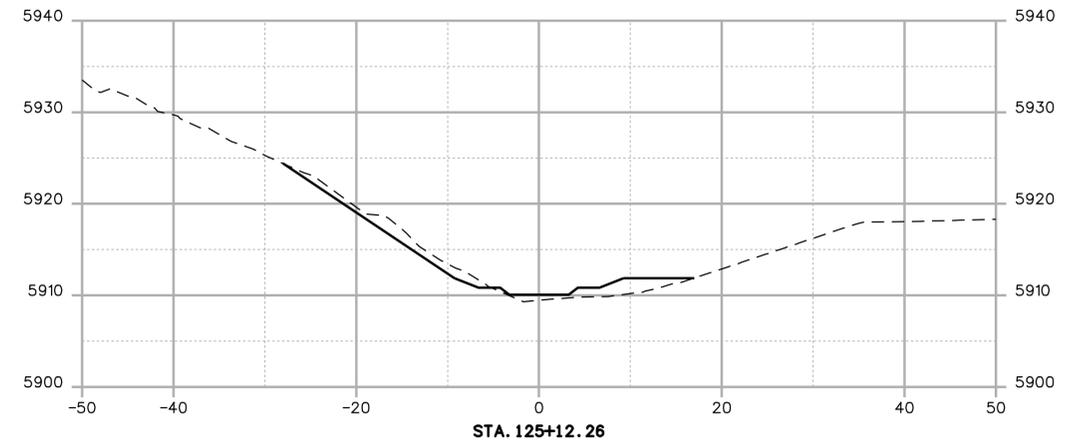
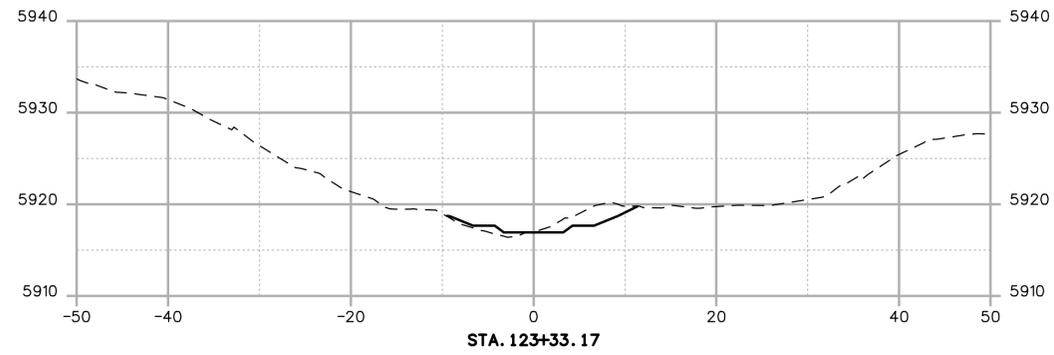
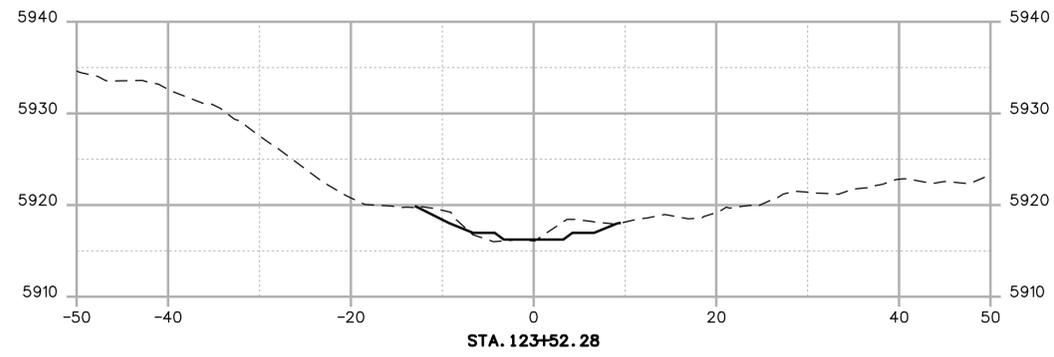
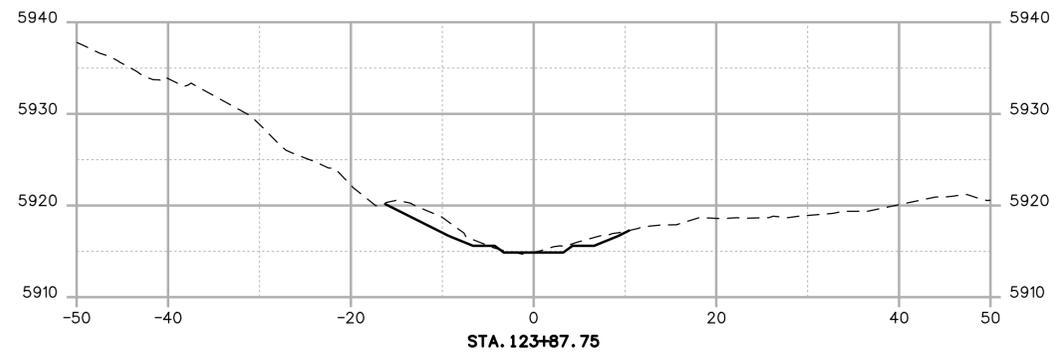
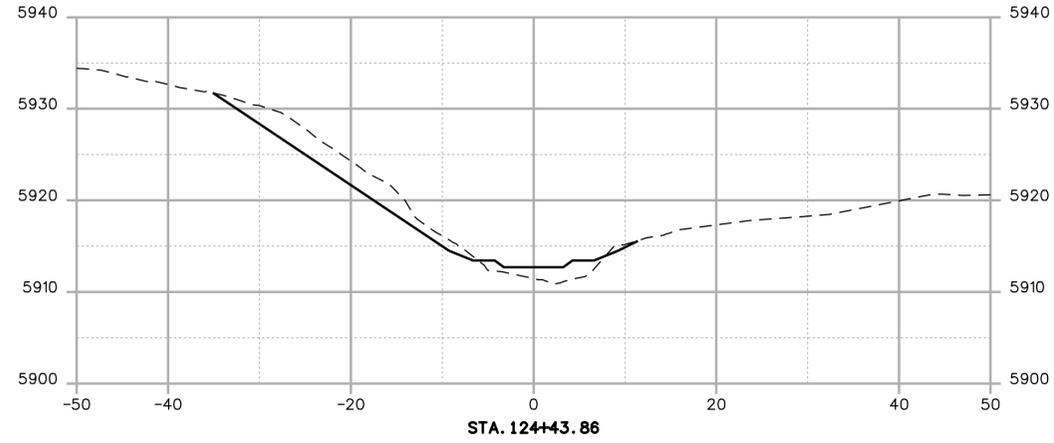


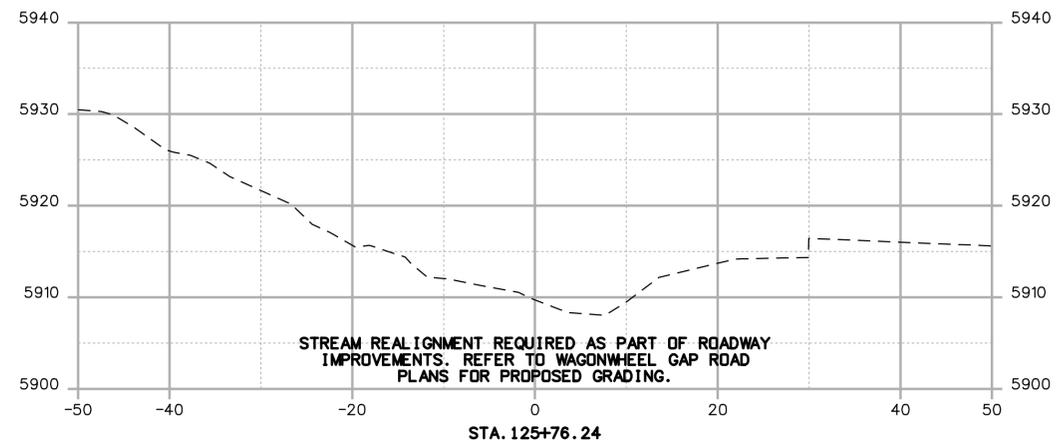
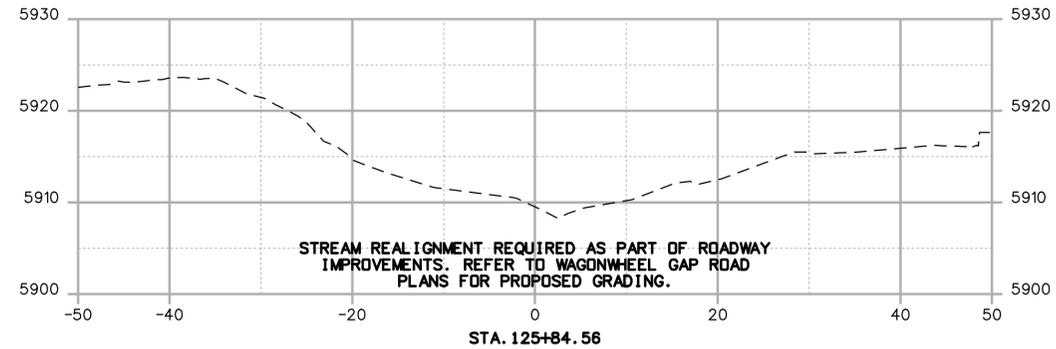
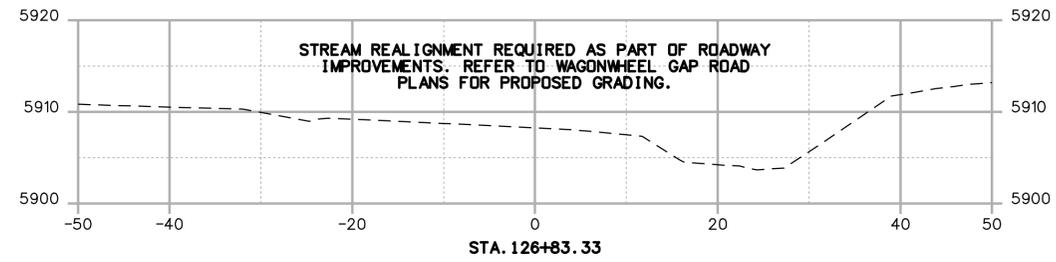
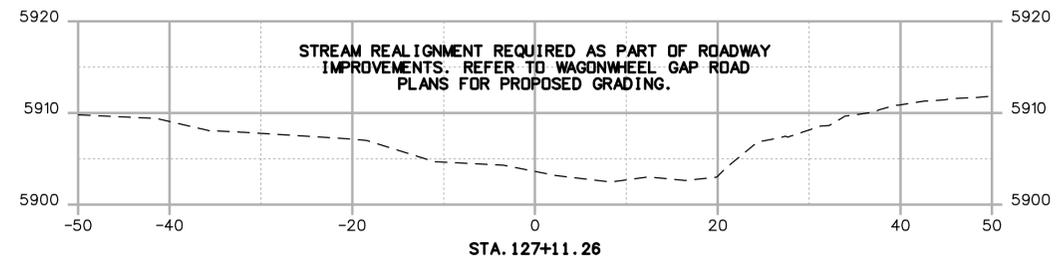
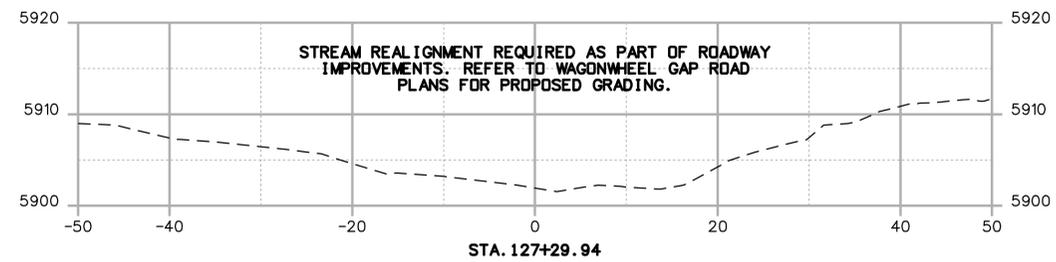
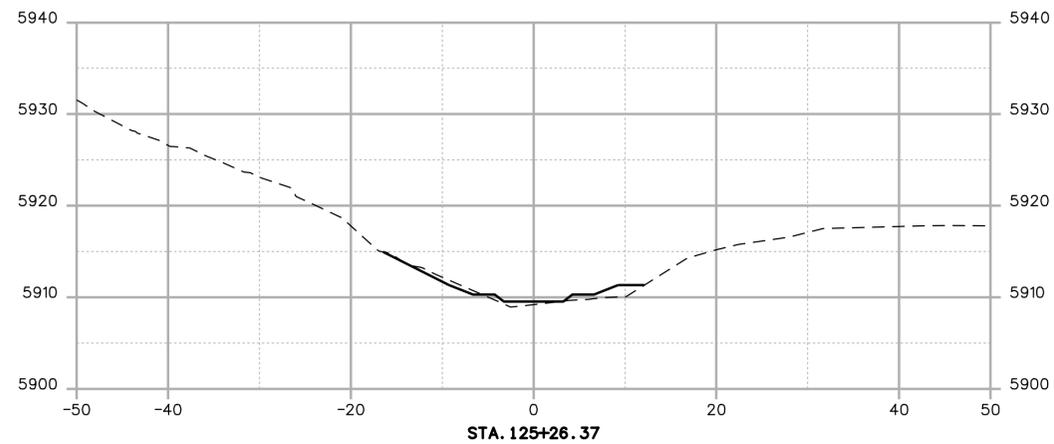
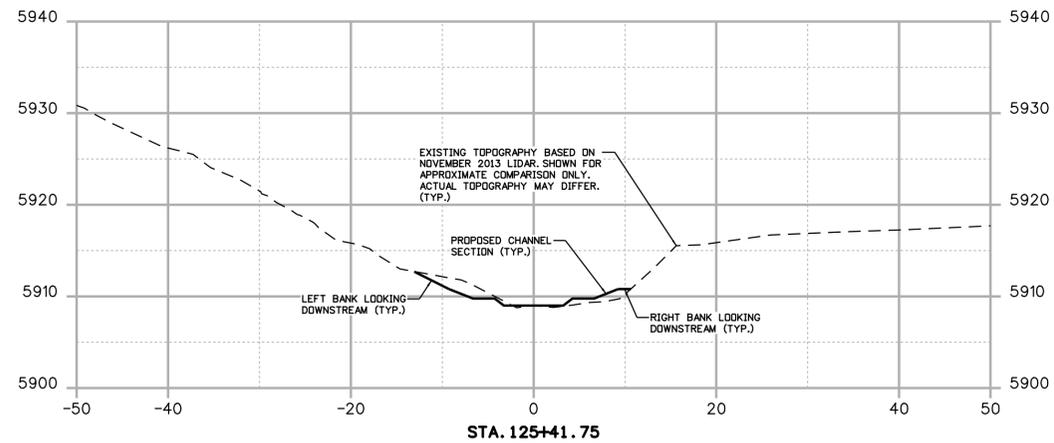
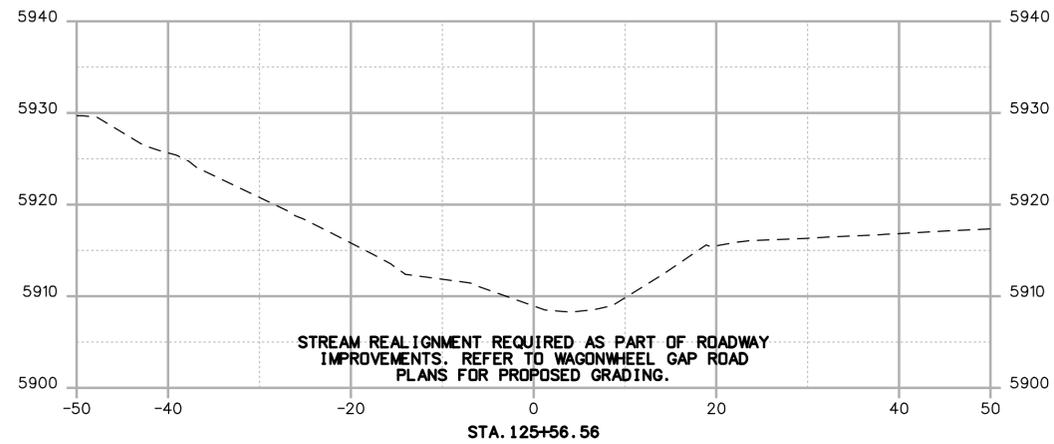
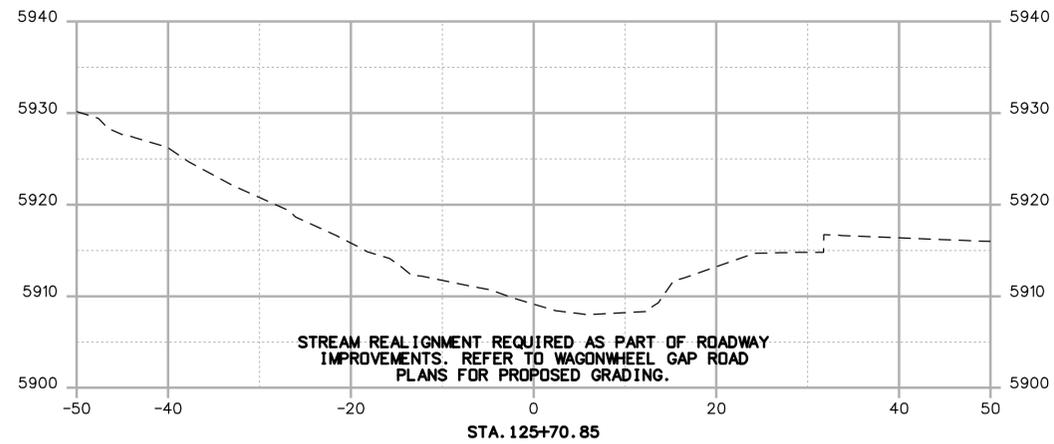


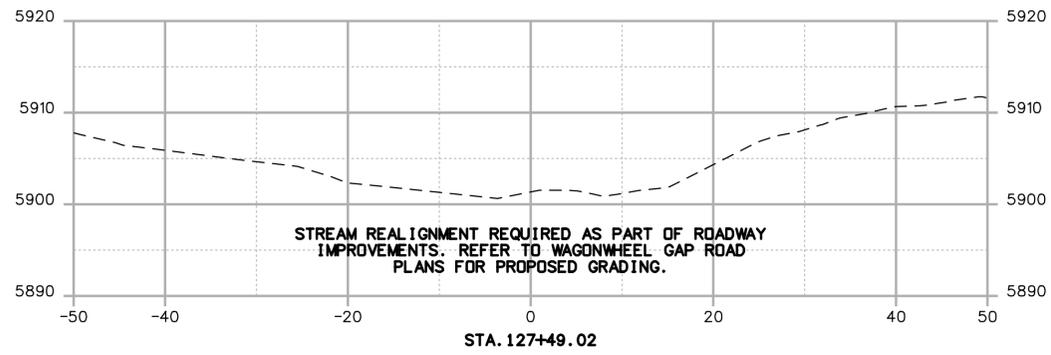
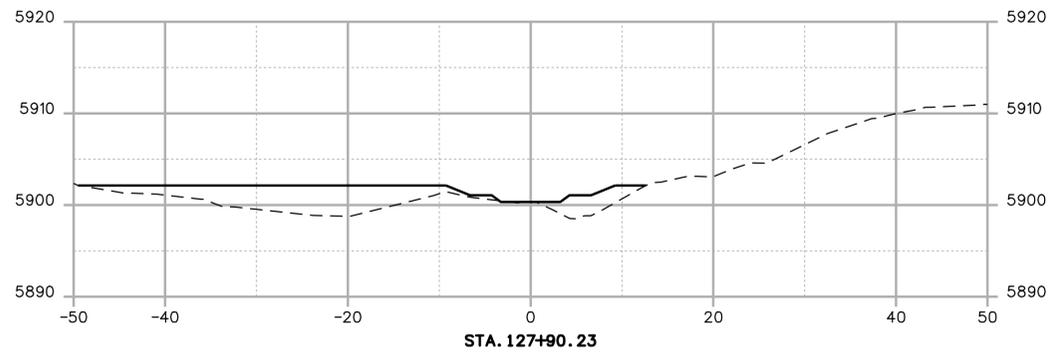
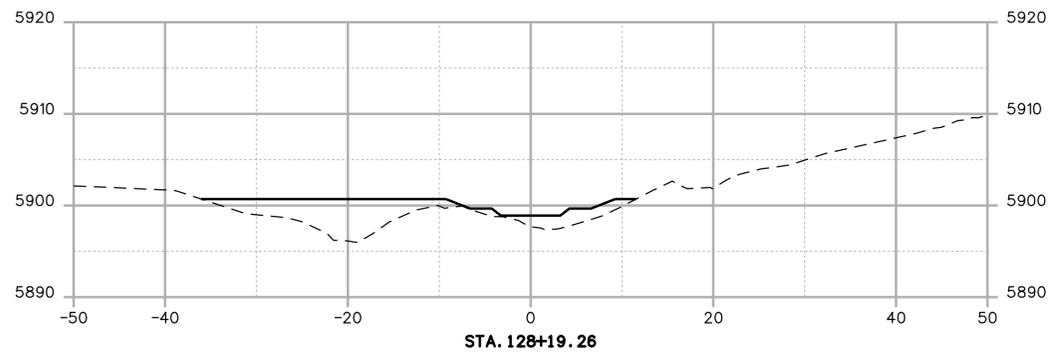
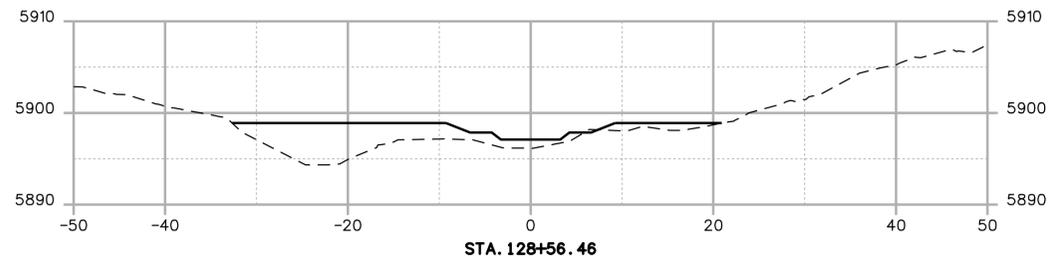
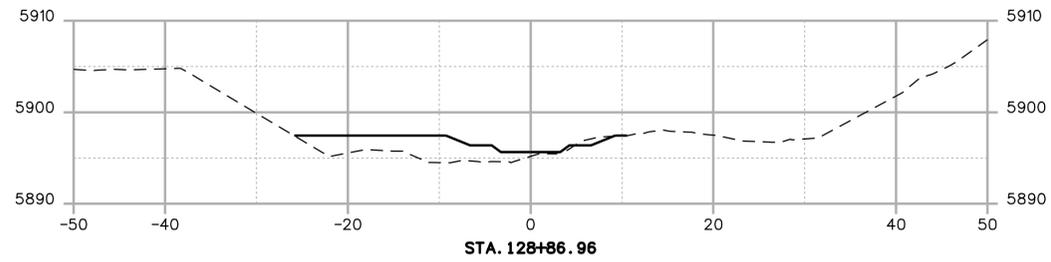
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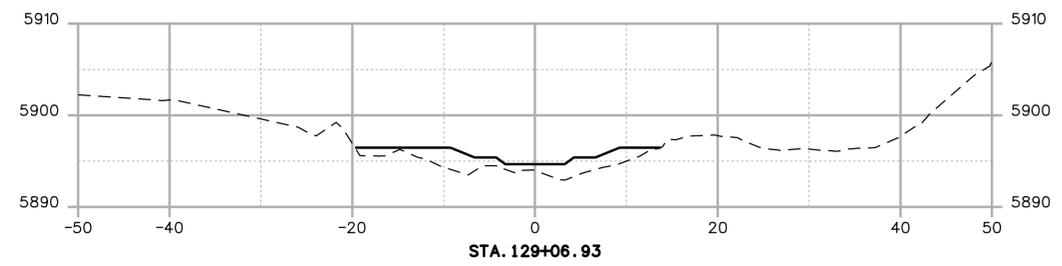
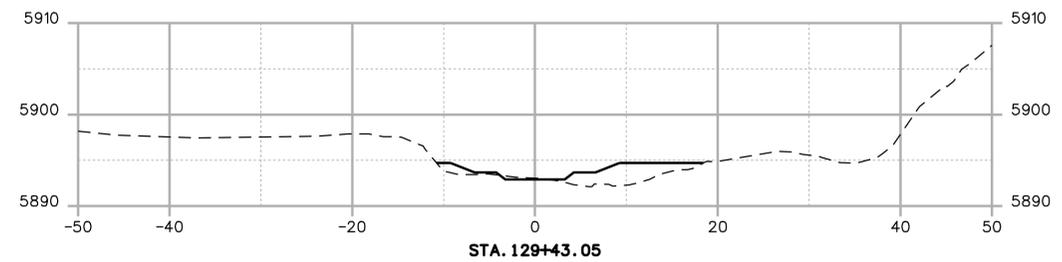
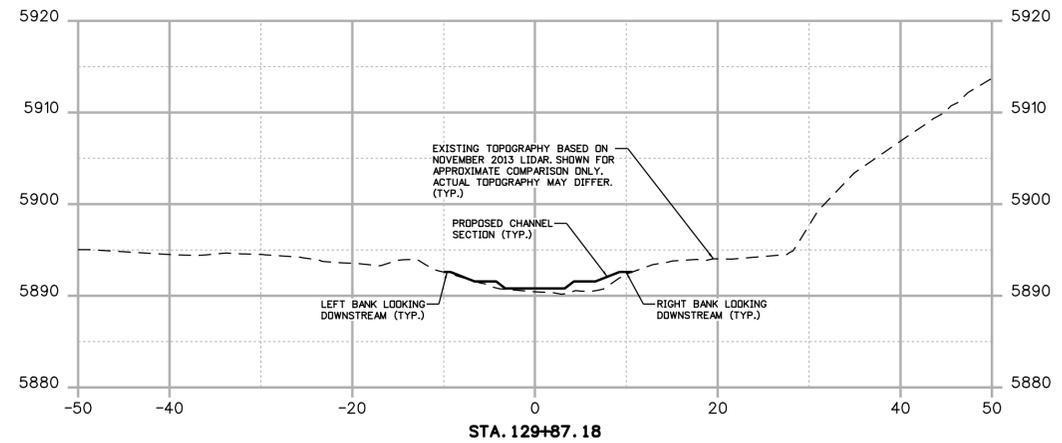
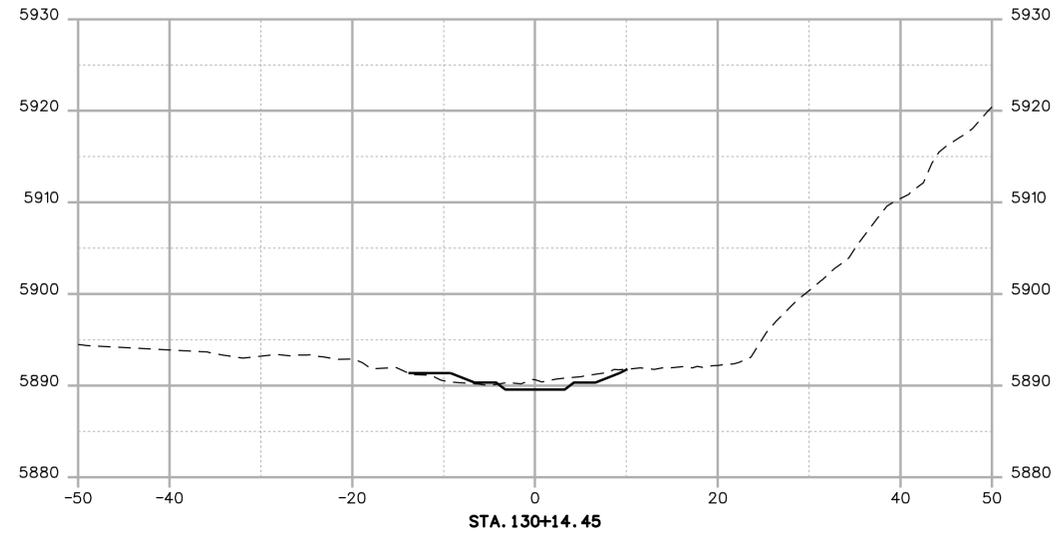
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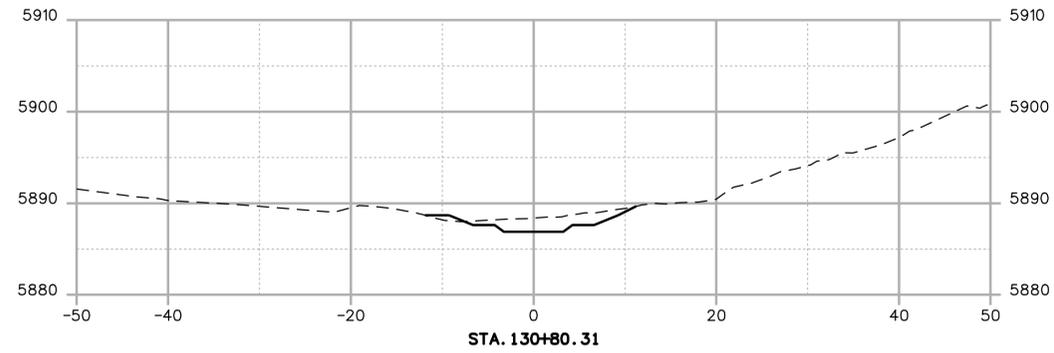




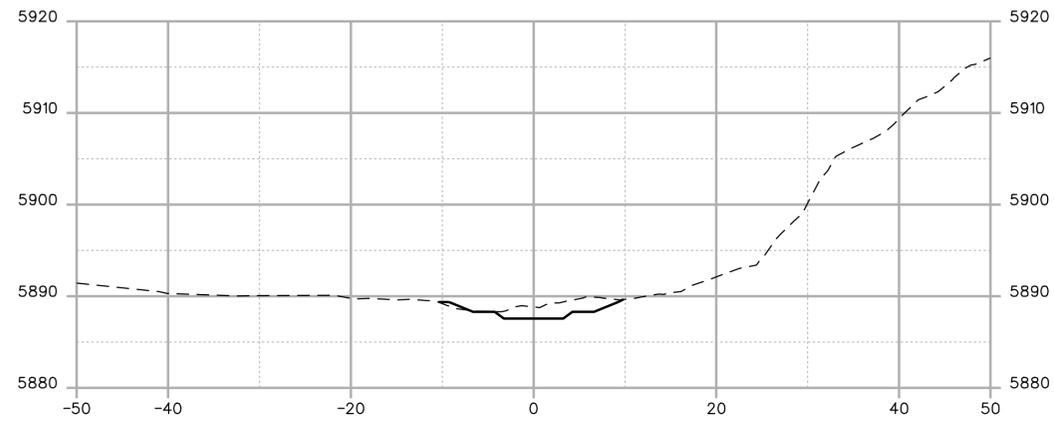


STREAM REALIGNMENT REQUIRED AS PART OF ROADWAY IMPROVEMENTS. REFER TO WAGONWHEEL GAP ROAD PLANS FOR PROPOSED GRADING.

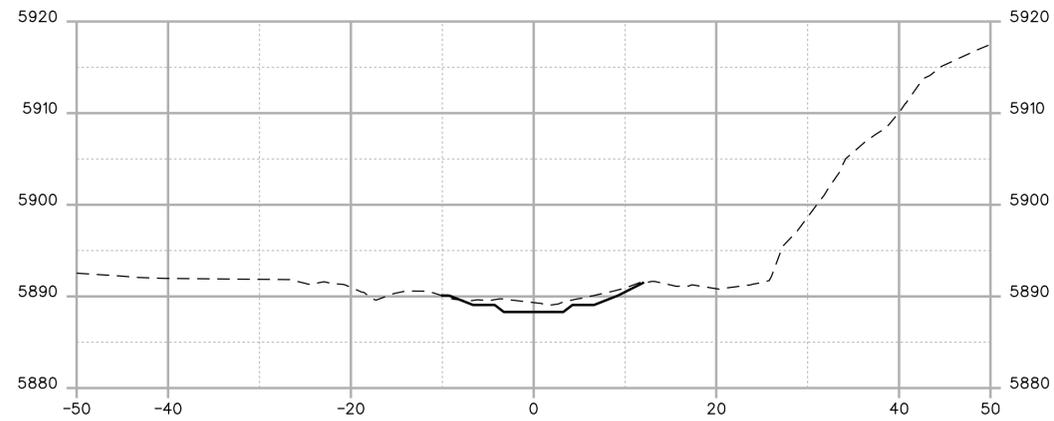




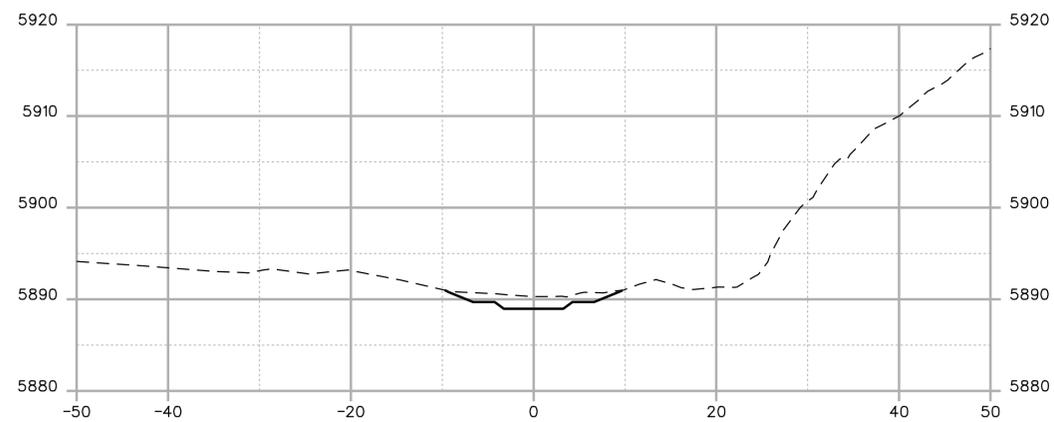
STA. 130+80.31



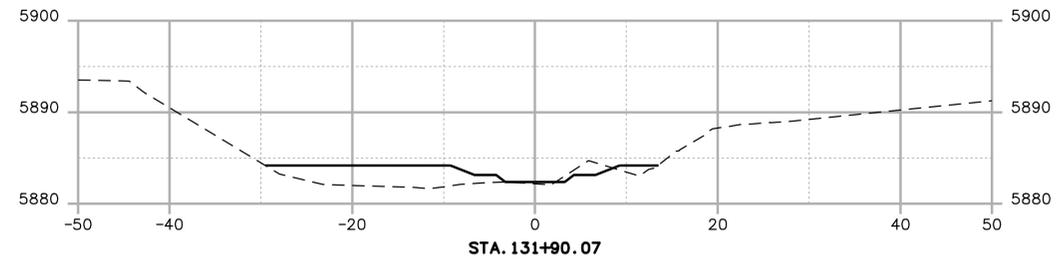
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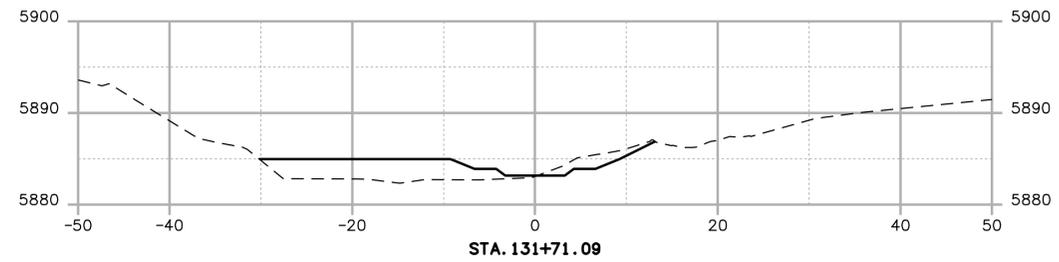
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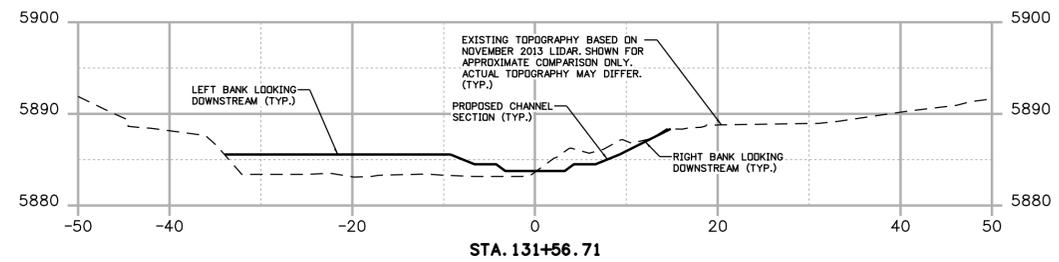
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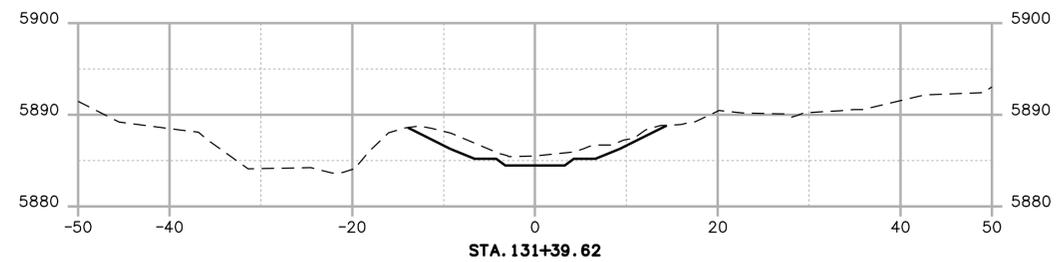
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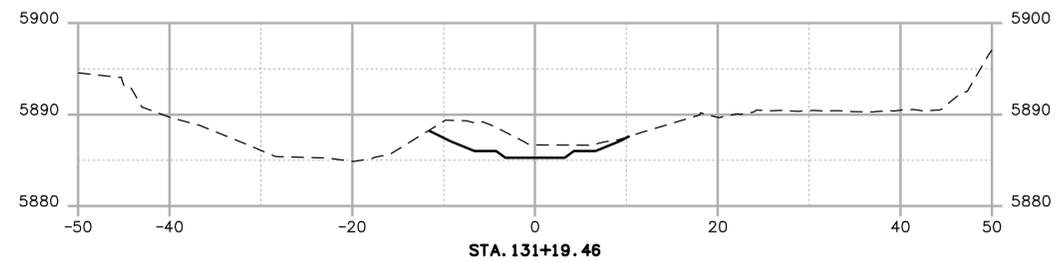
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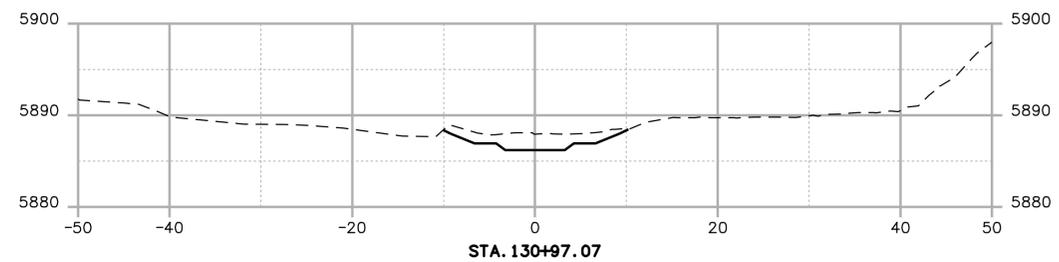
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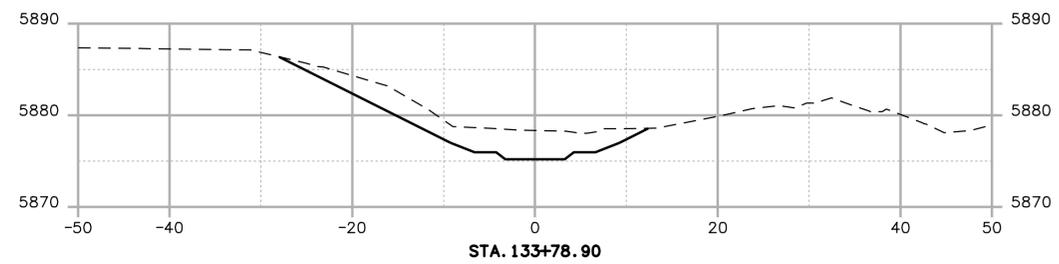
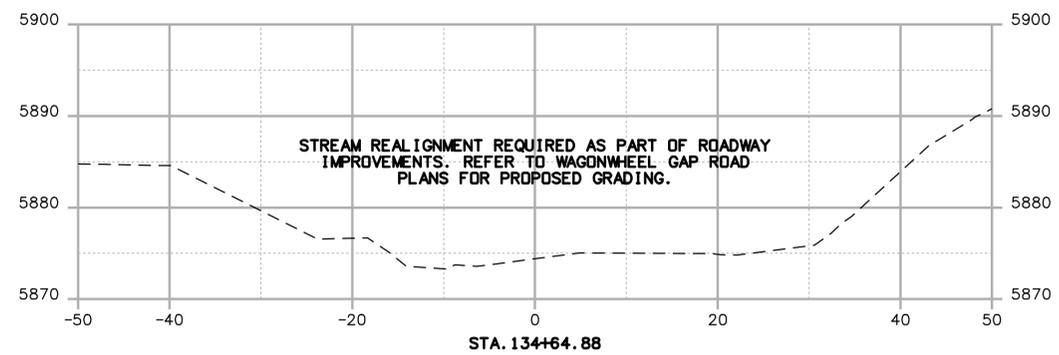
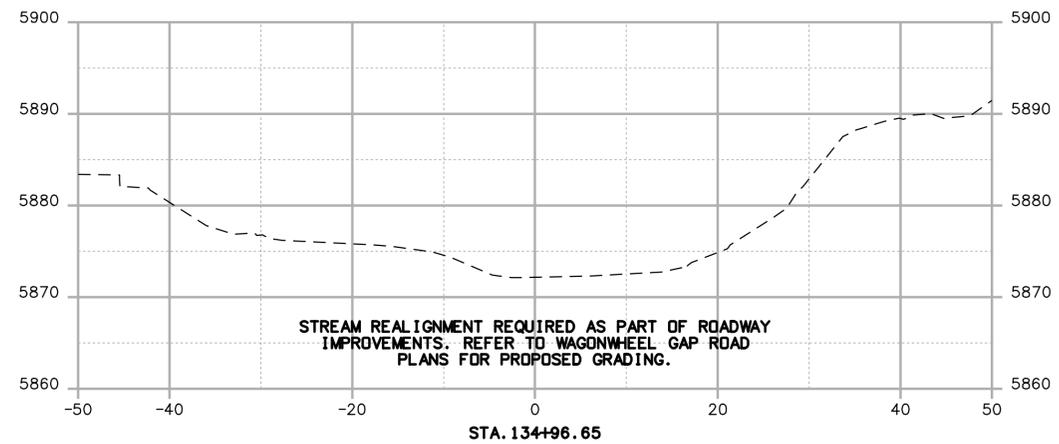
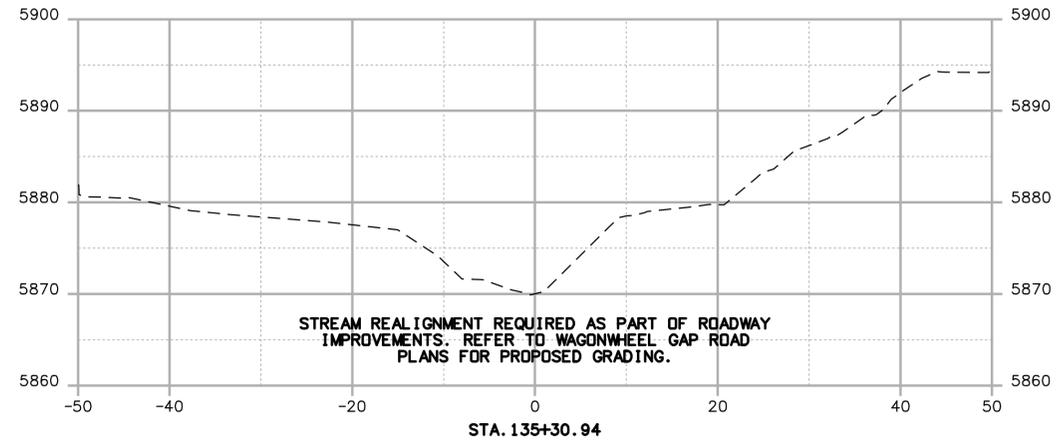
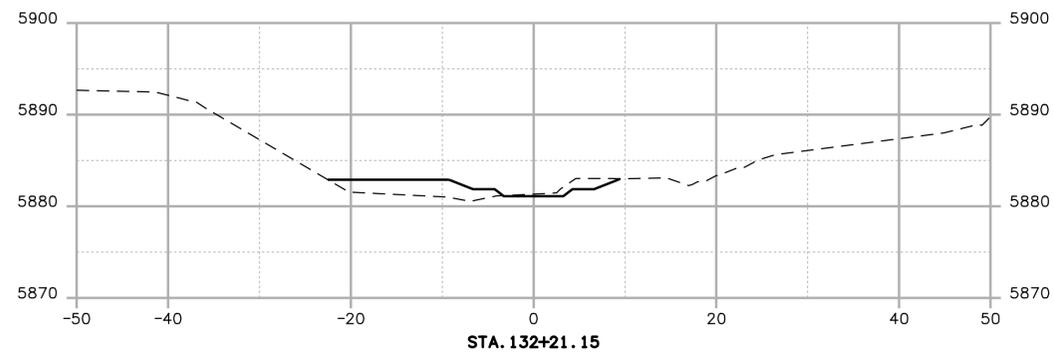
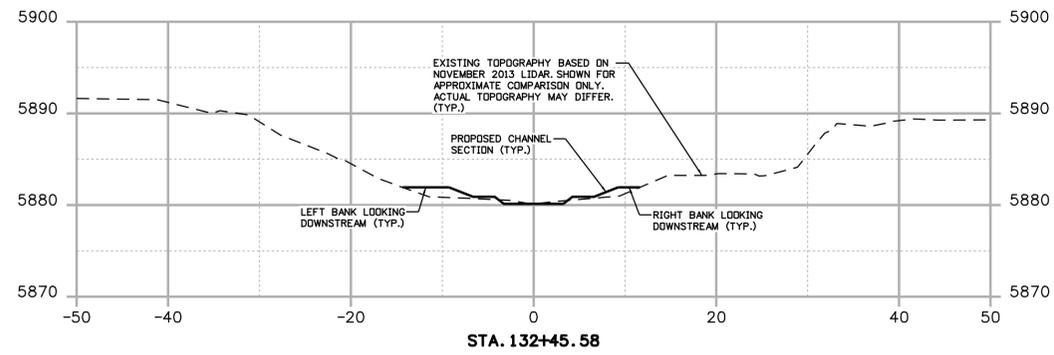
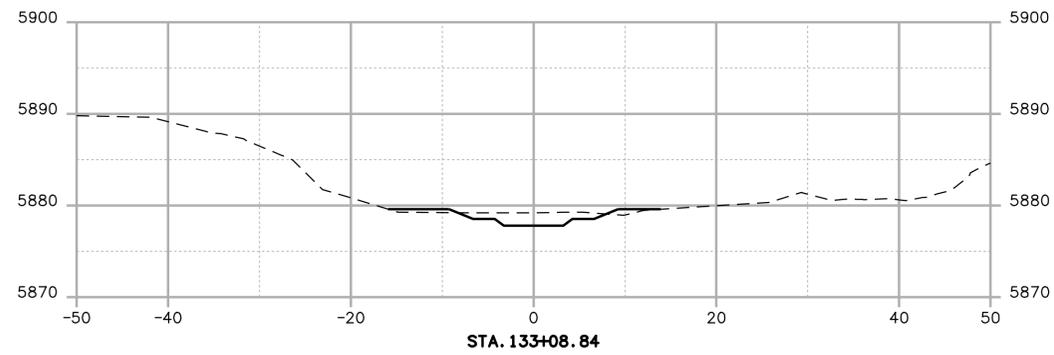
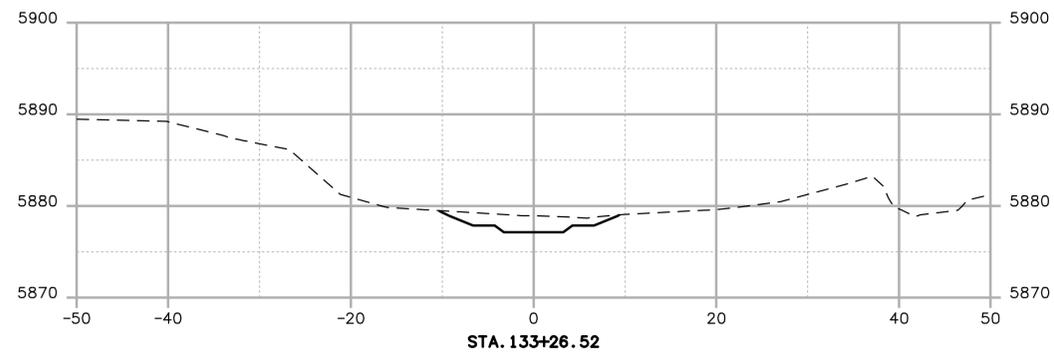
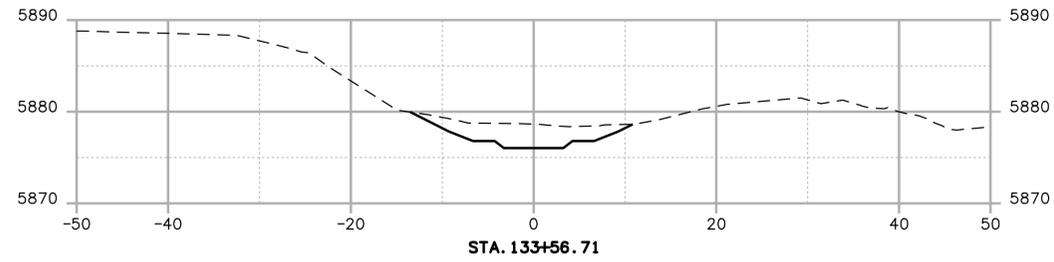
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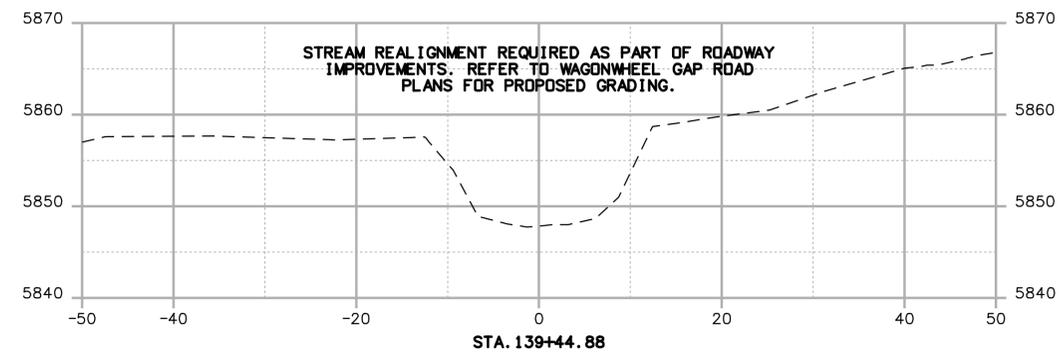
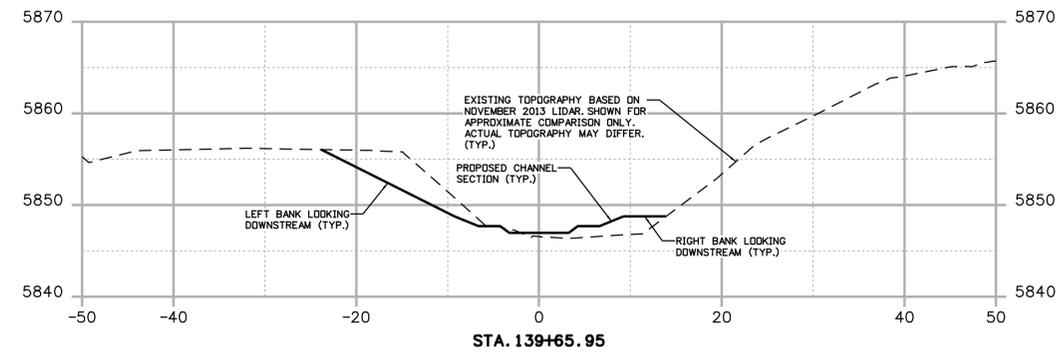
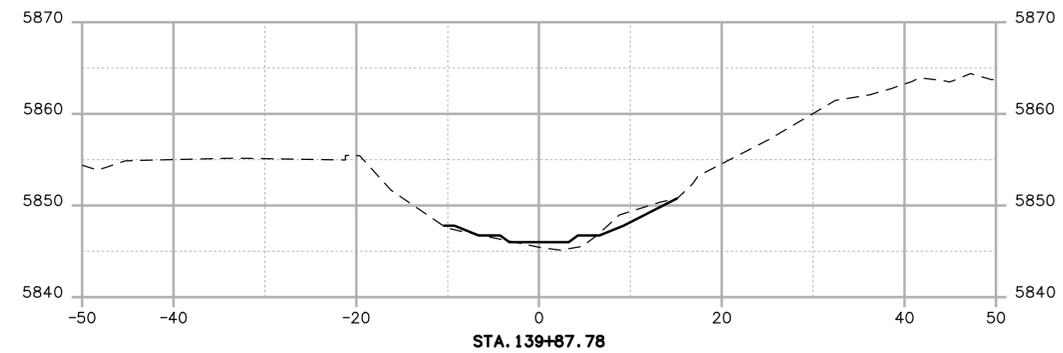
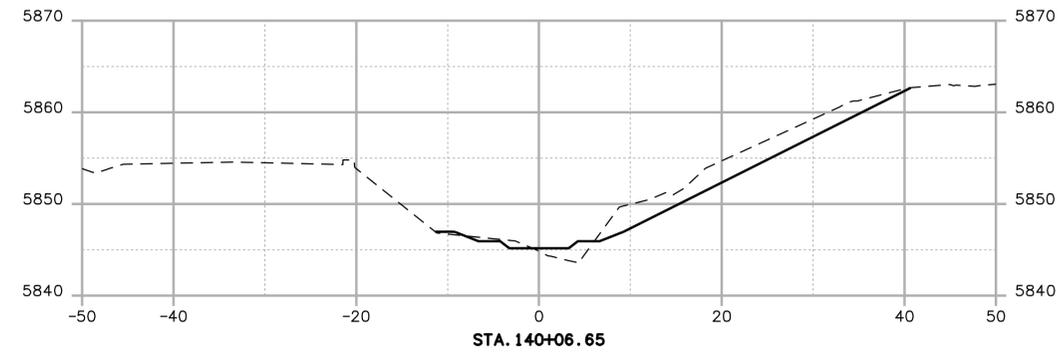
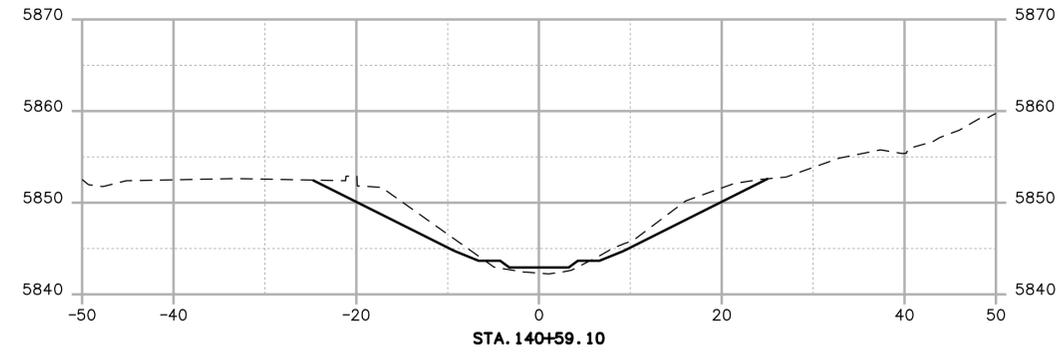
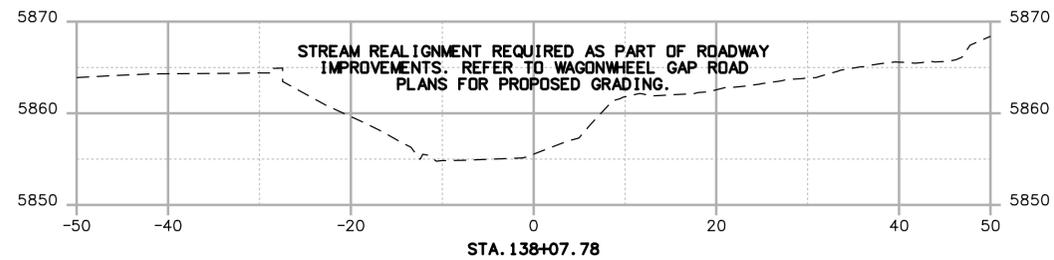
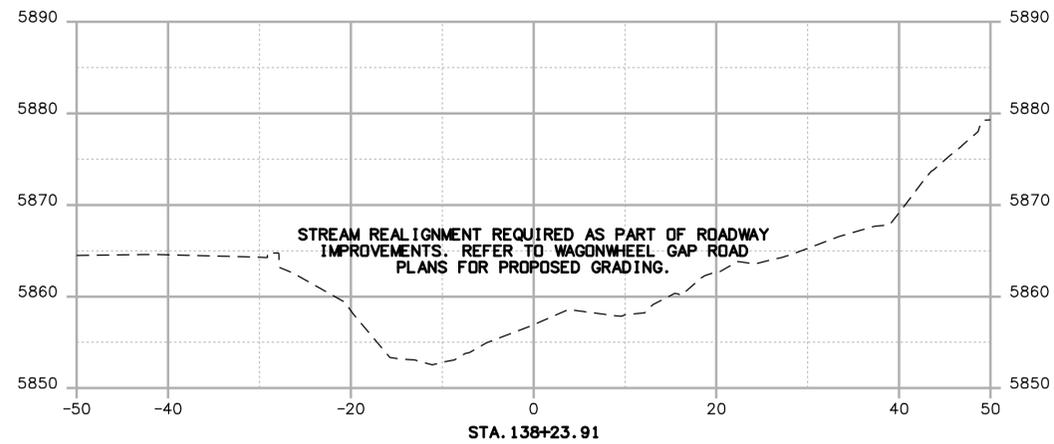
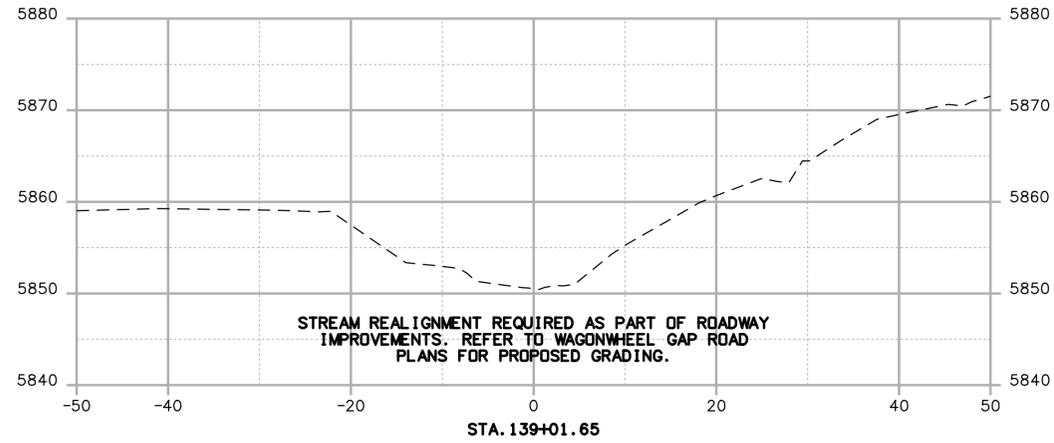
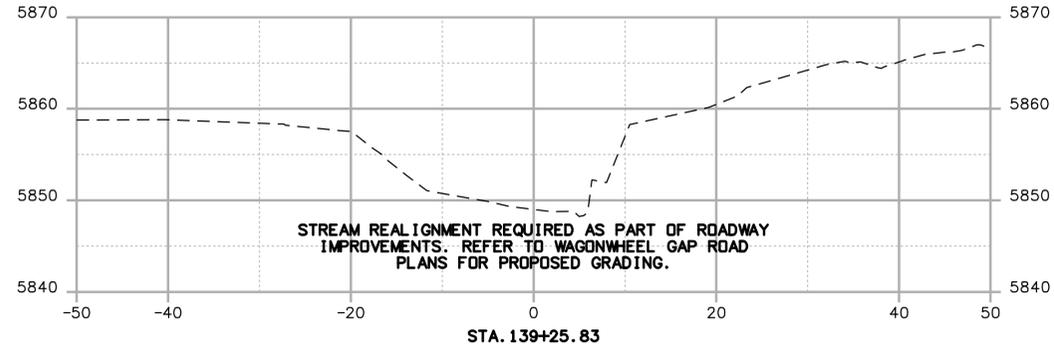
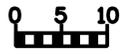


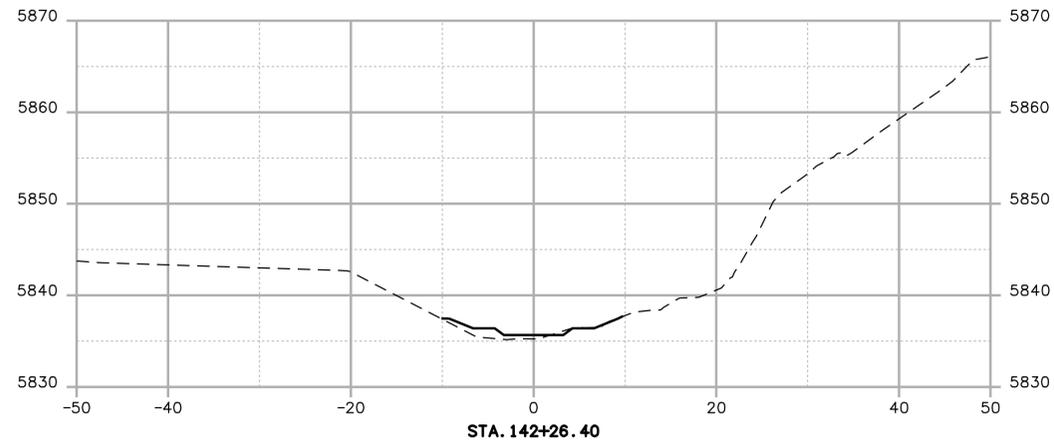
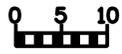
STA. 131+19.46



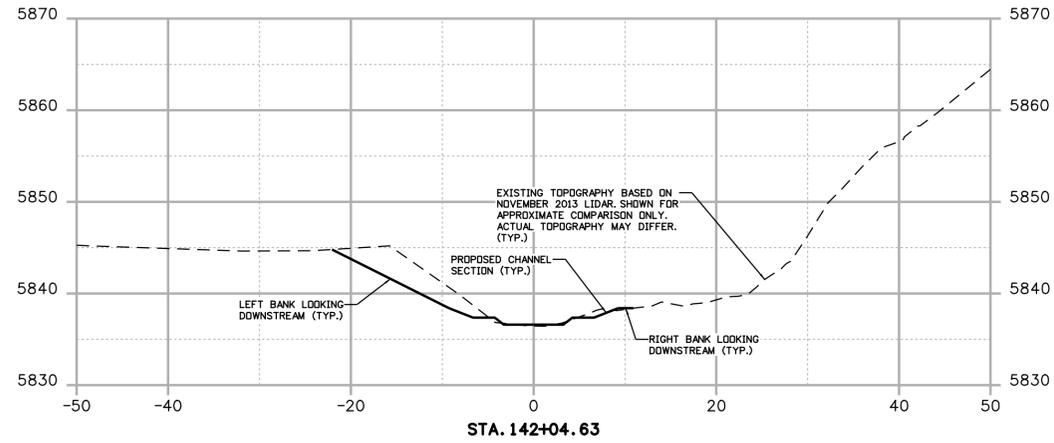
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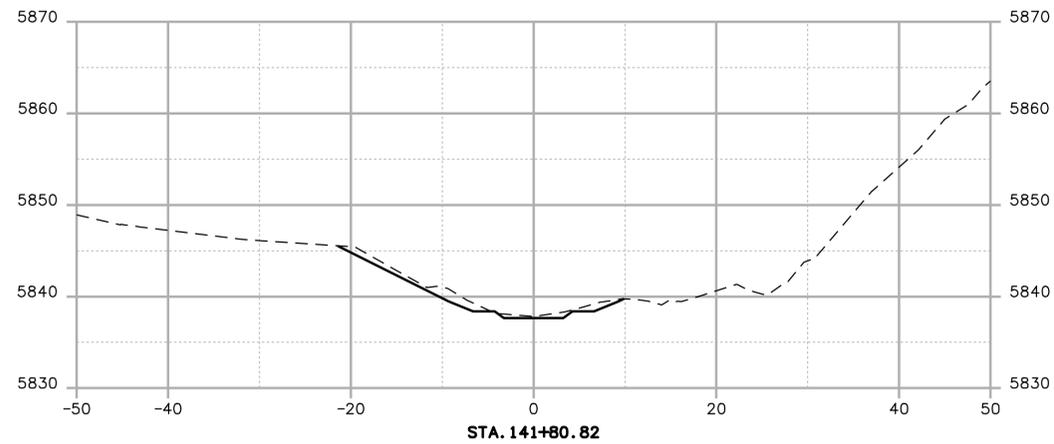




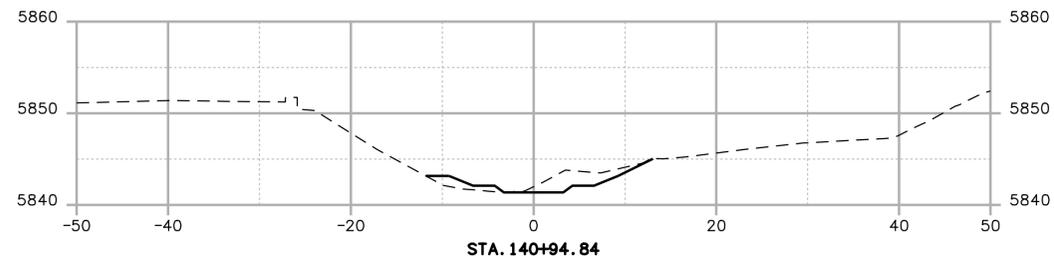
STA. 142+26.40



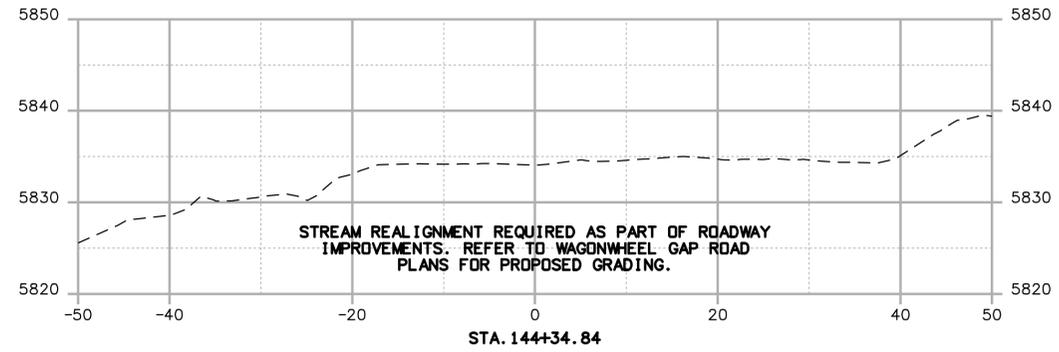
STA. 142+04.63



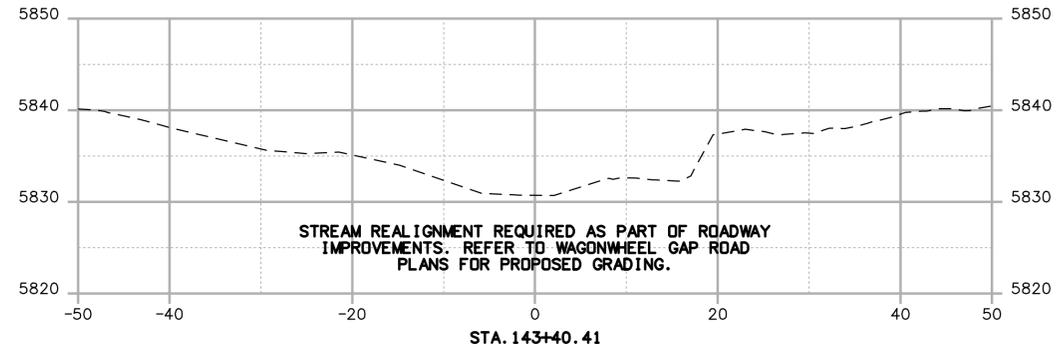
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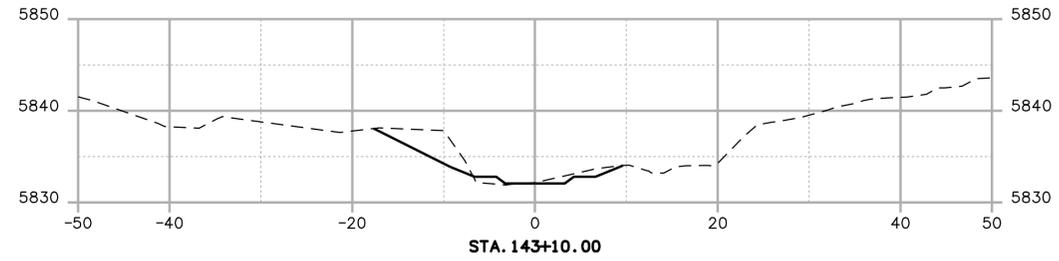
STA. 140+94.84



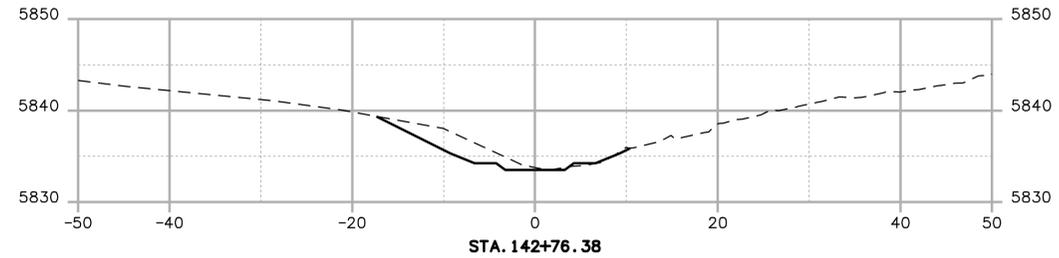
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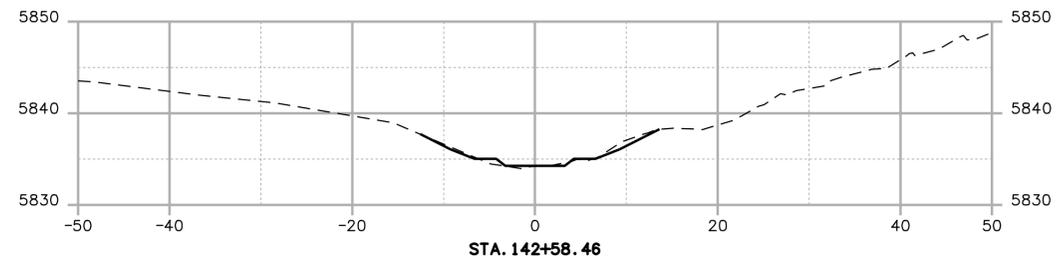
STA. 143+40.41



STA. 143+10.00



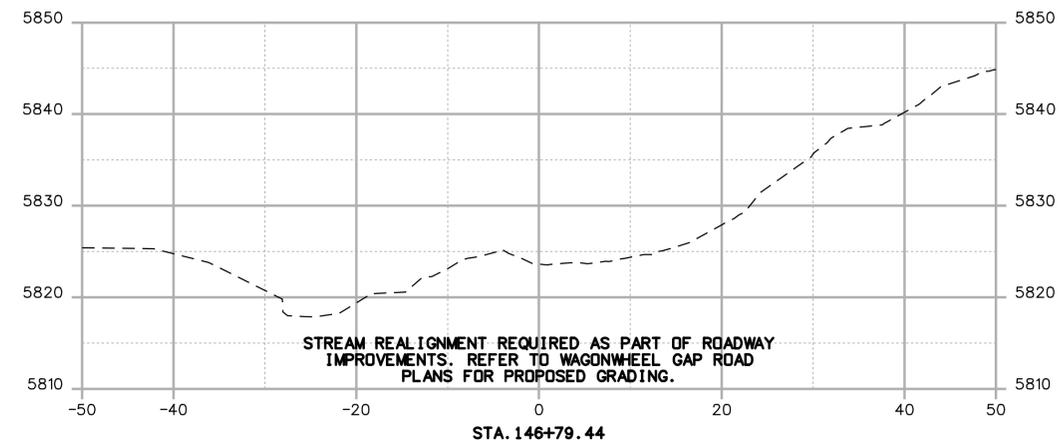
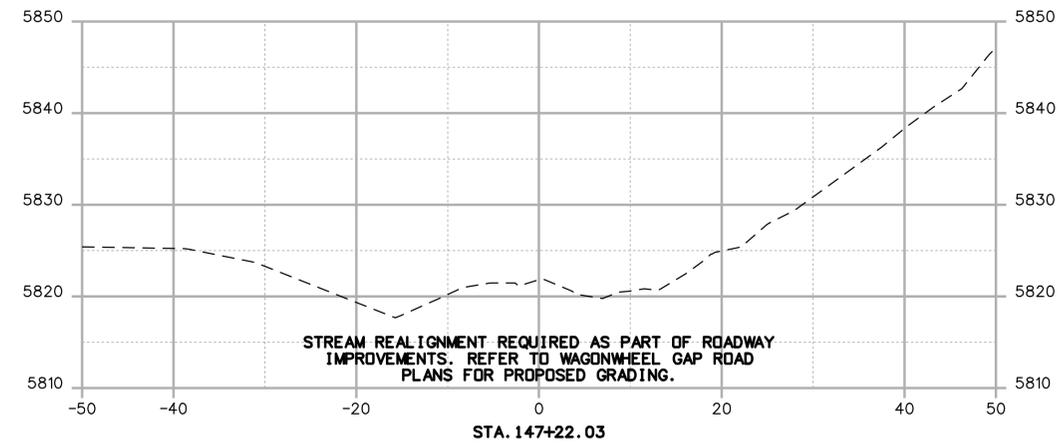
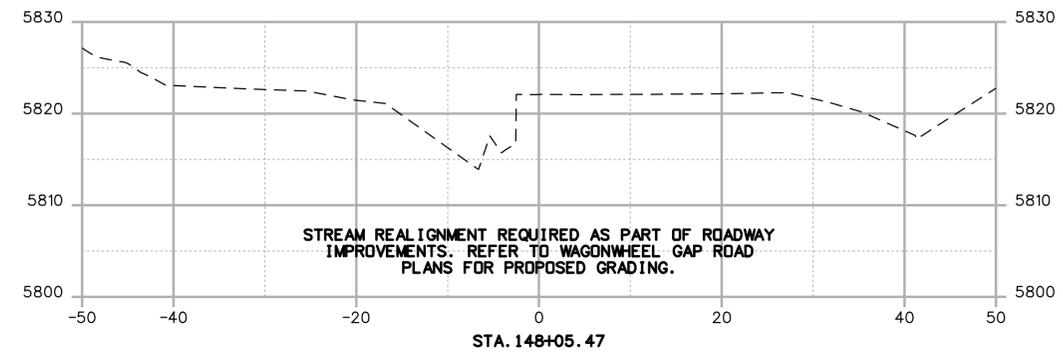
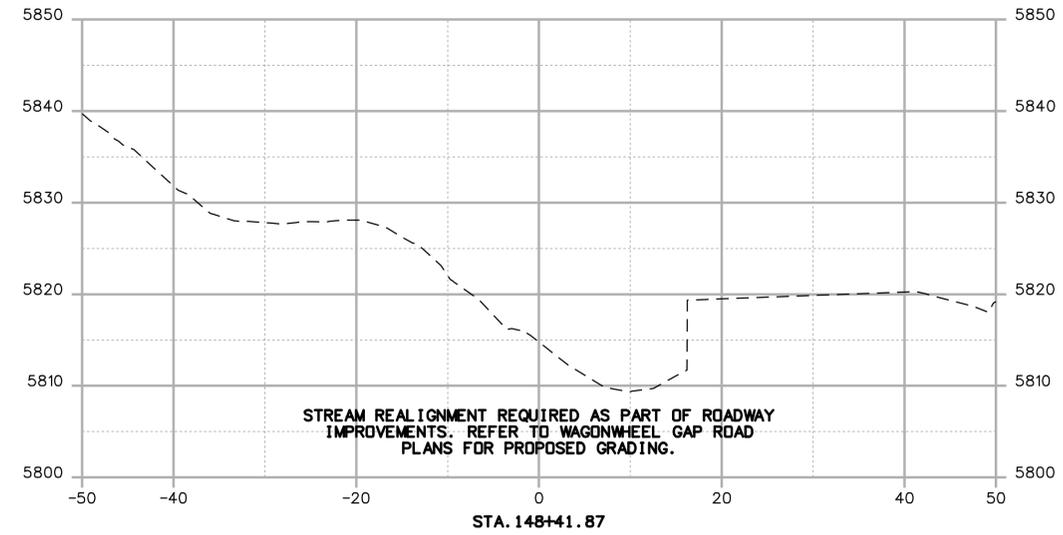
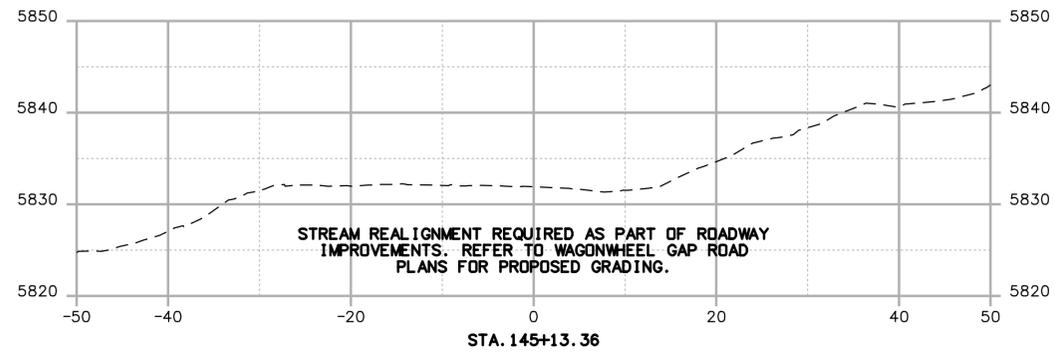
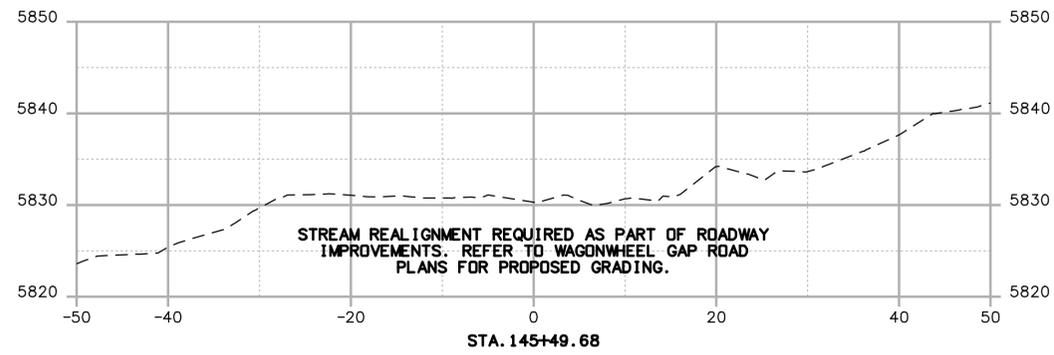
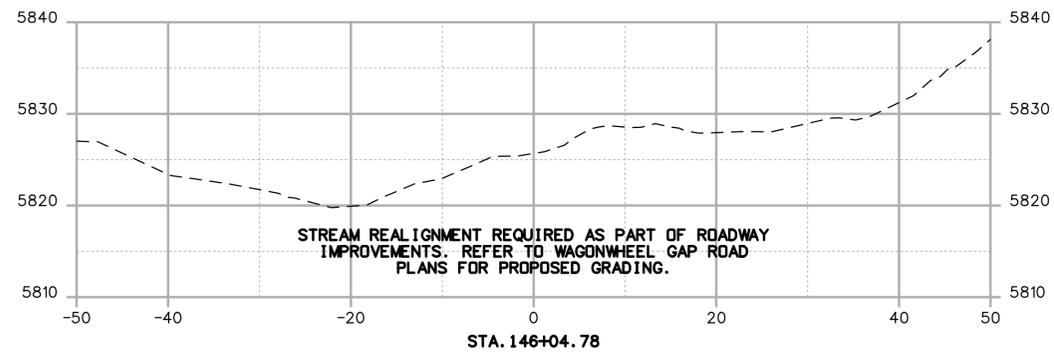
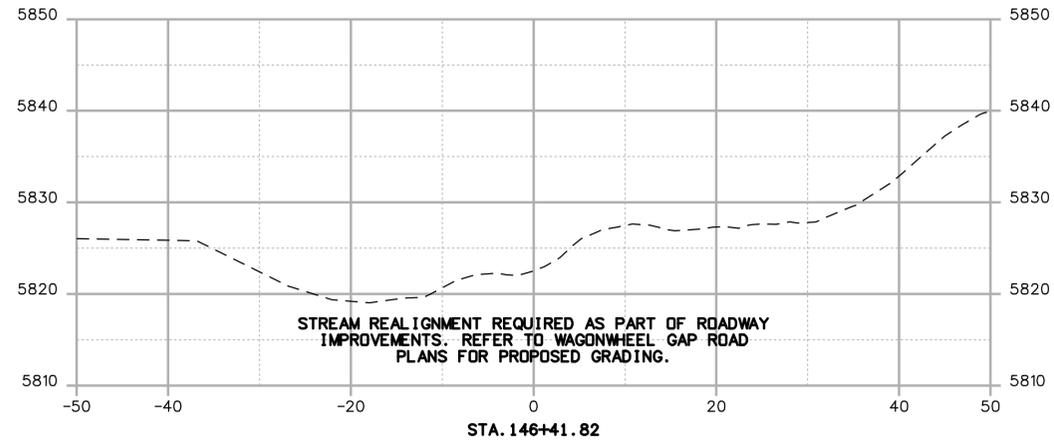
STA. 142+76.38



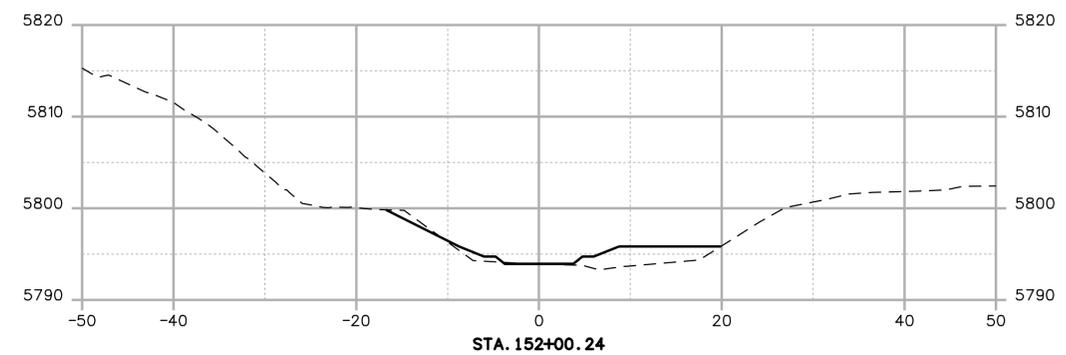
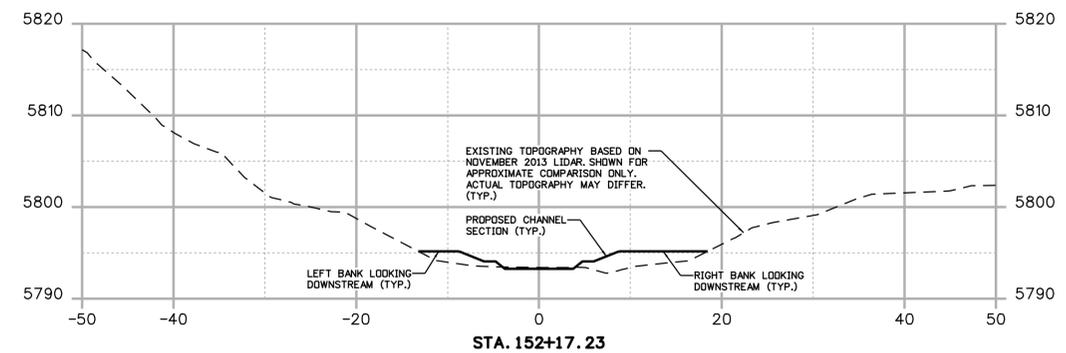
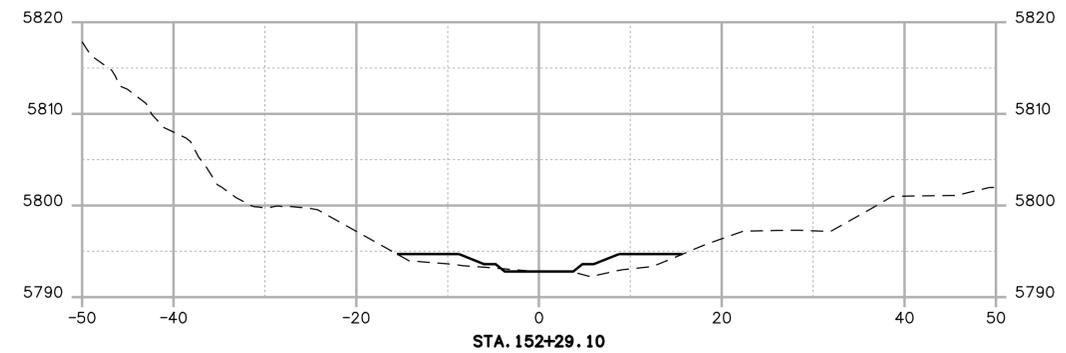
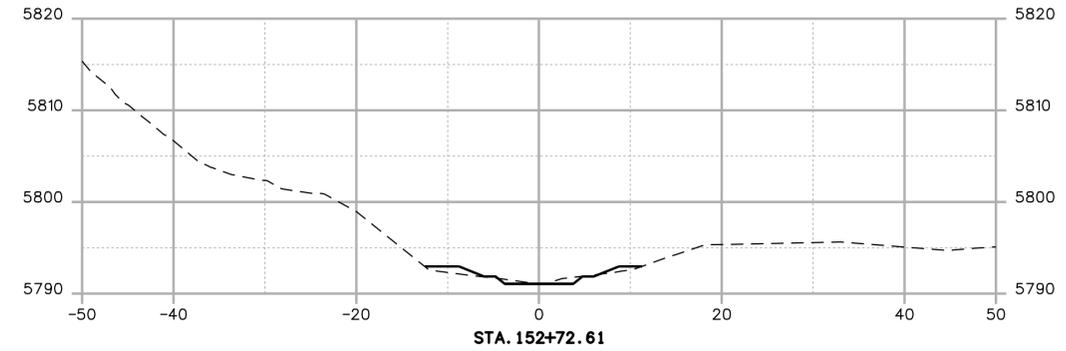
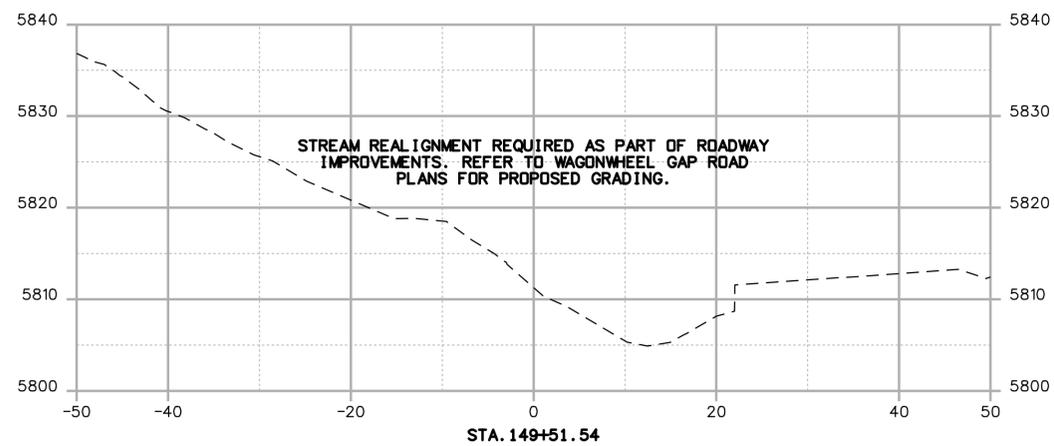
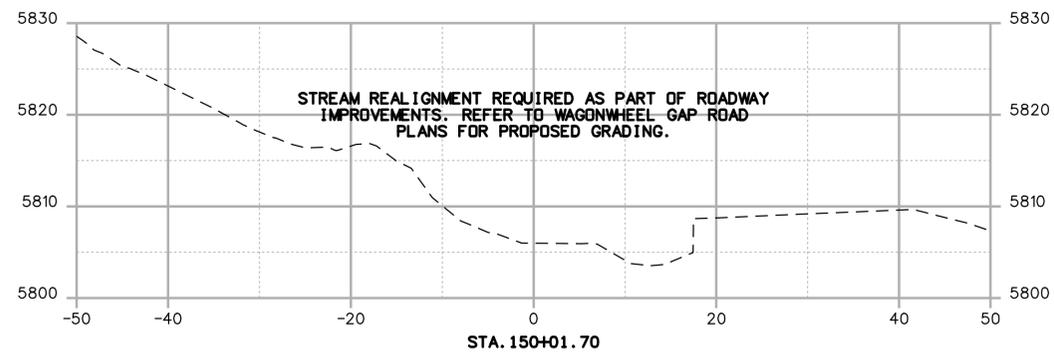
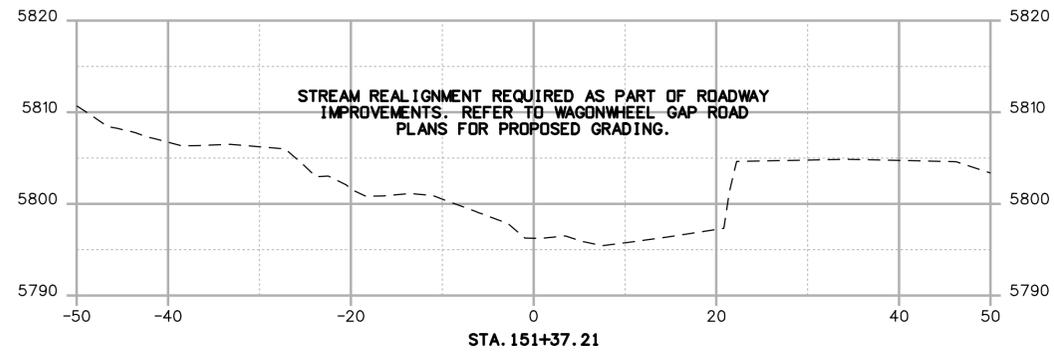
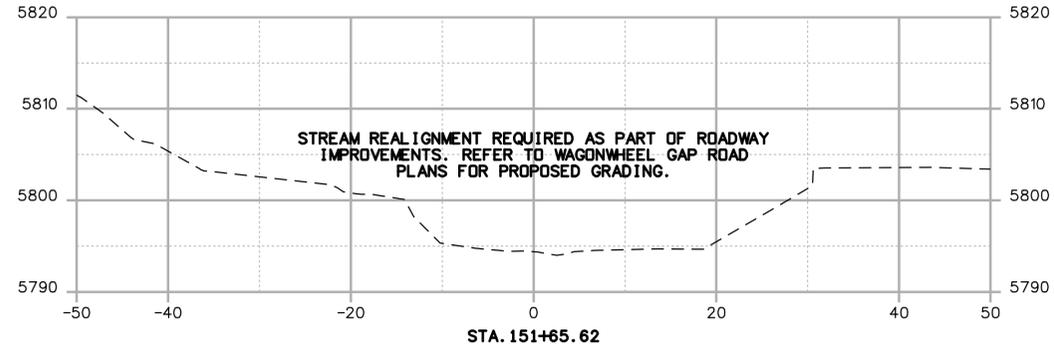
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BAKER PROJ. REFERENCE NO.	SHEET NO.
138200	X-16

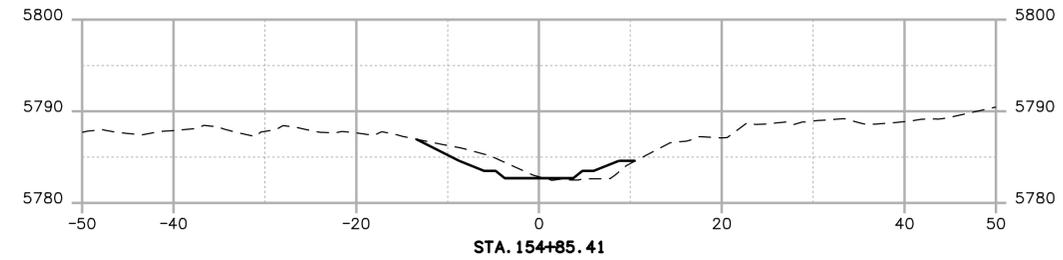
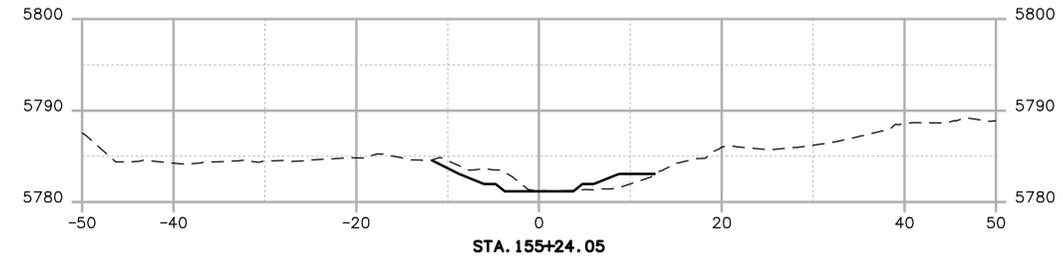
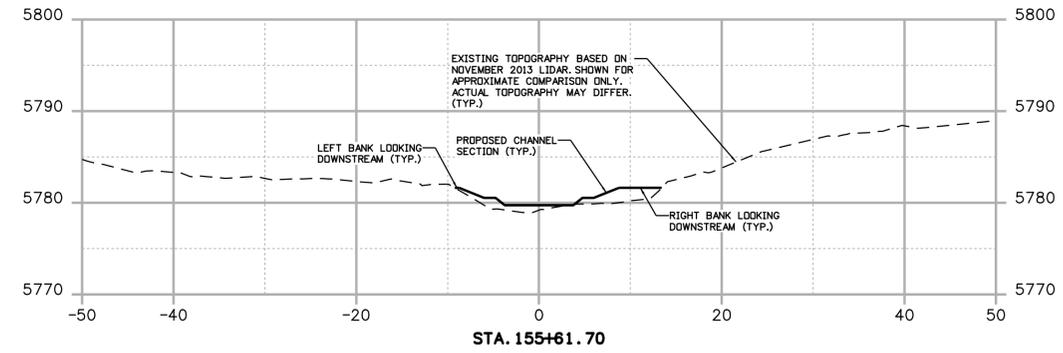
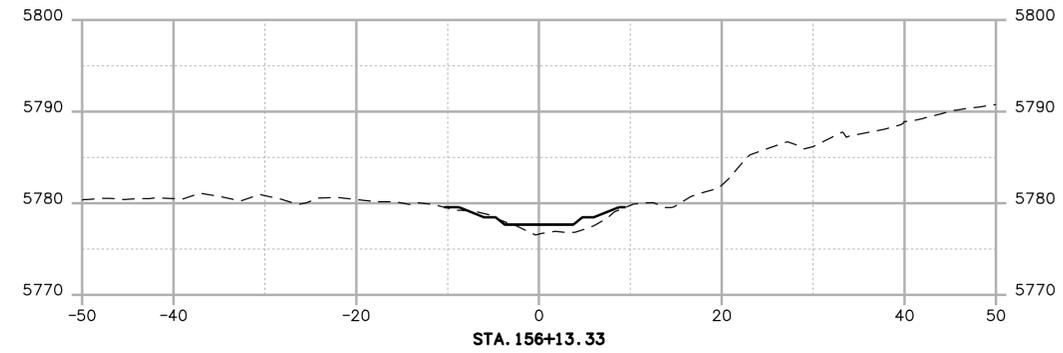
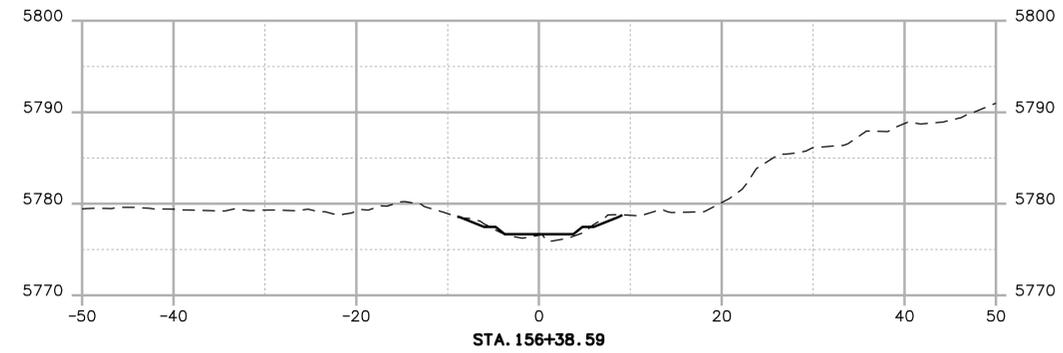
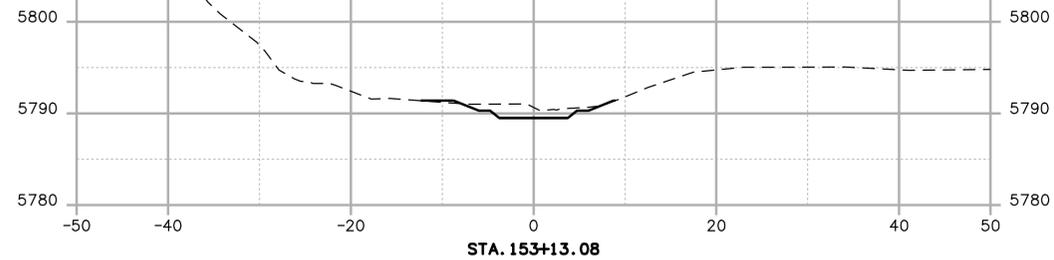
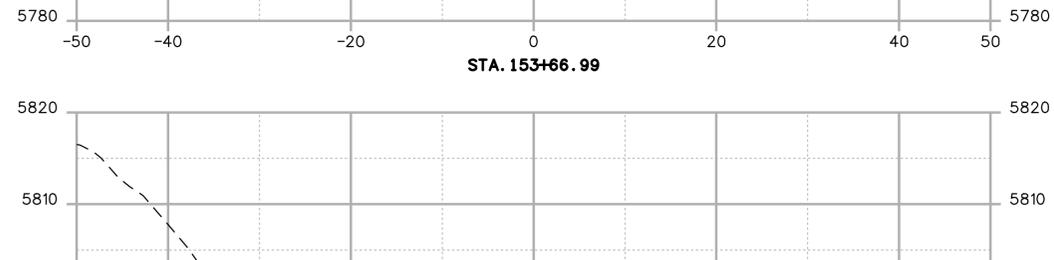
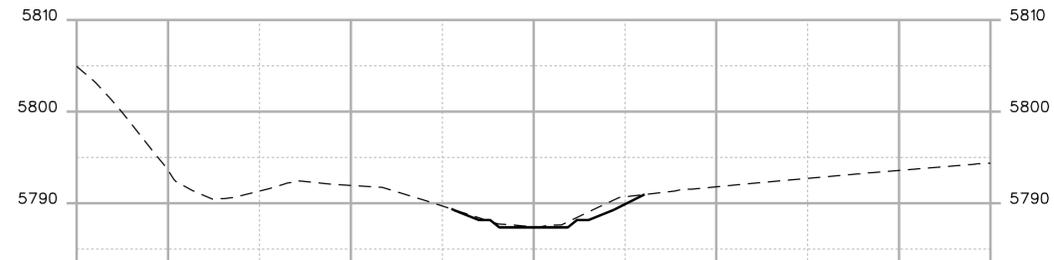
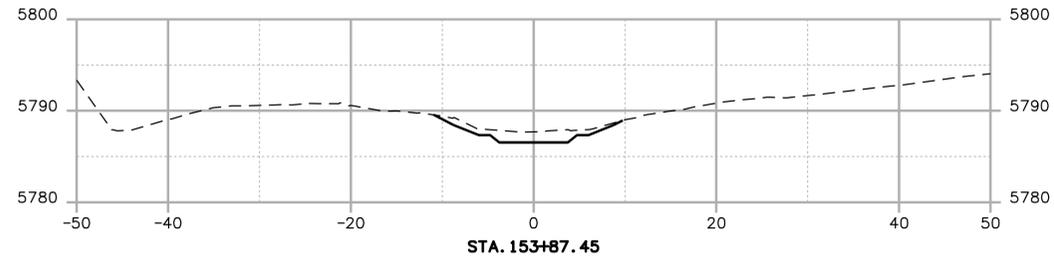
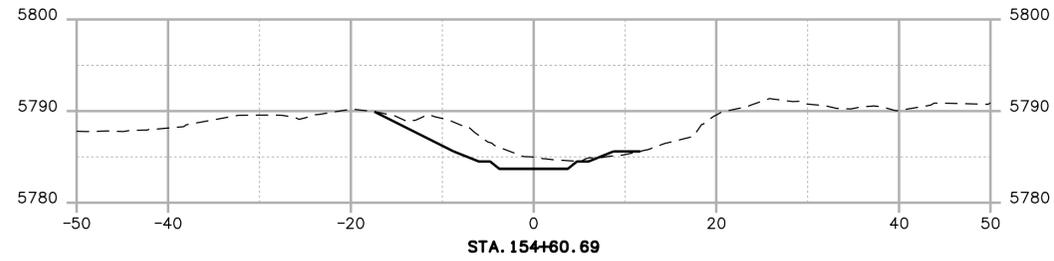


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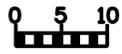




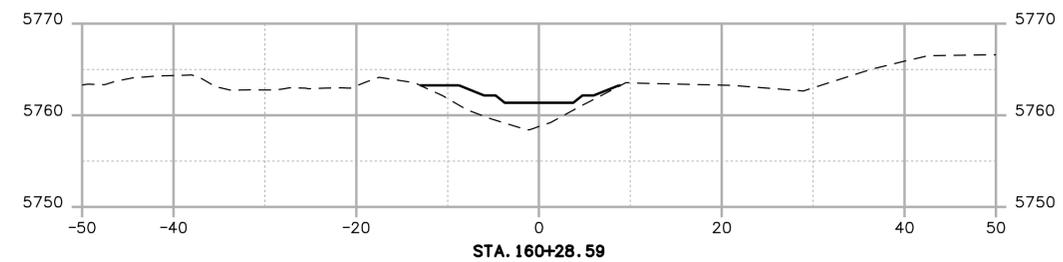
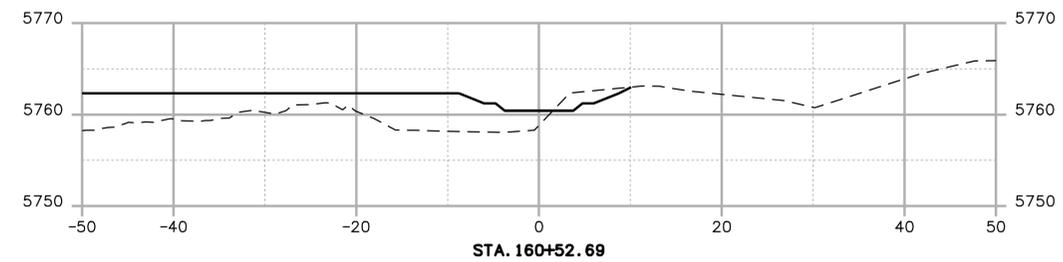
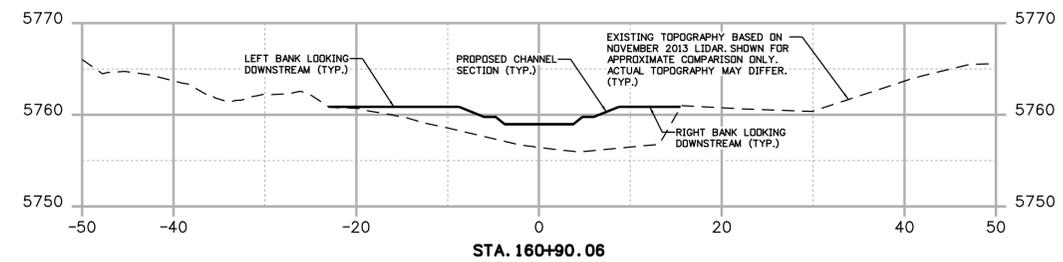
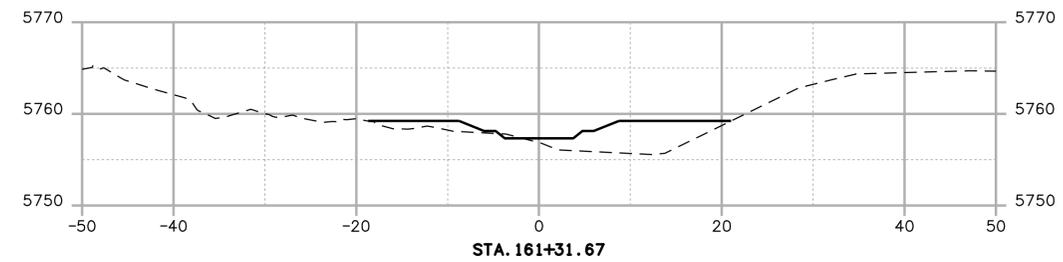
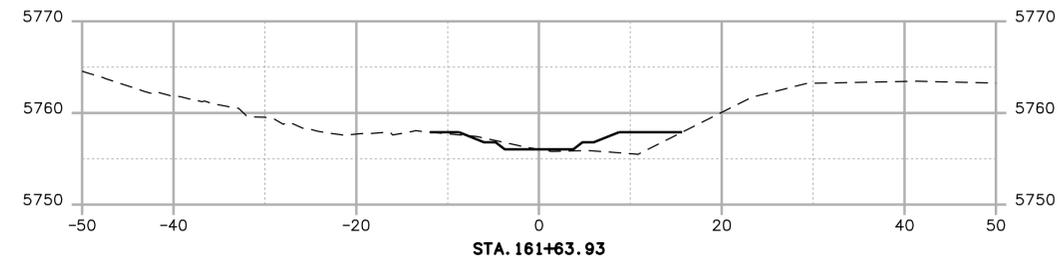
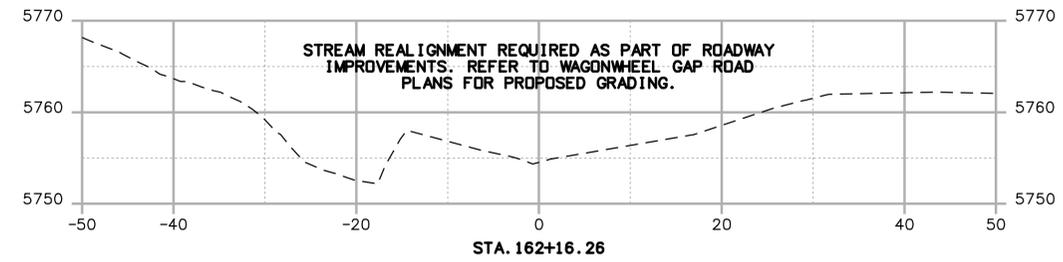
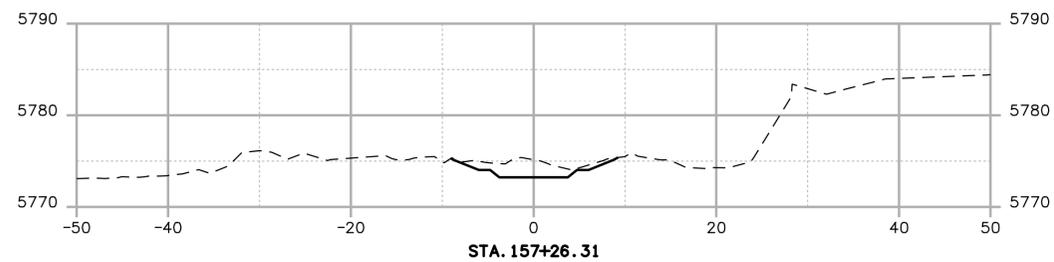
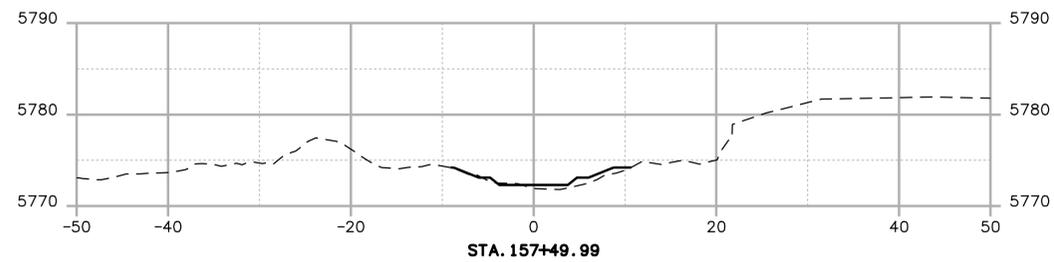
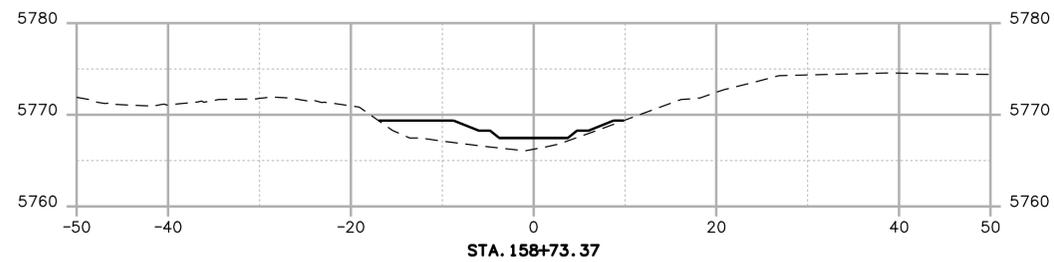
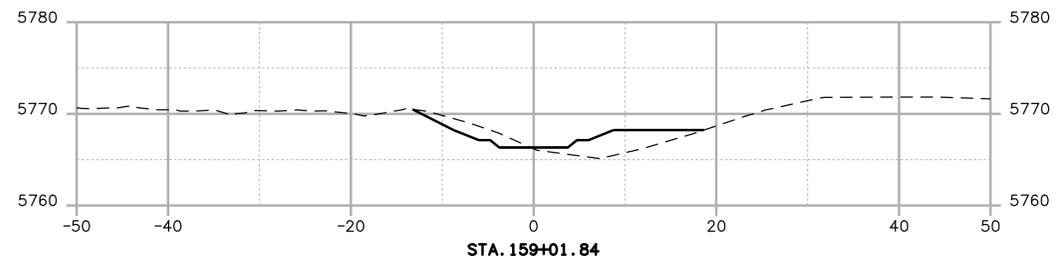
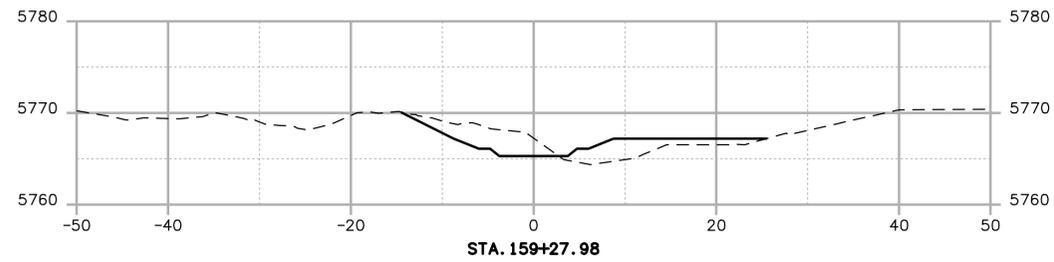
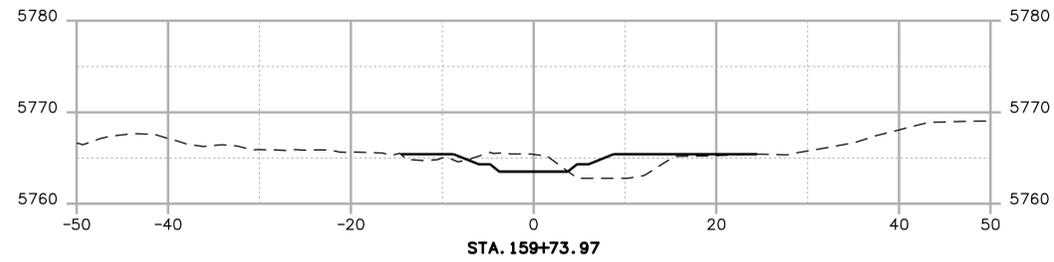
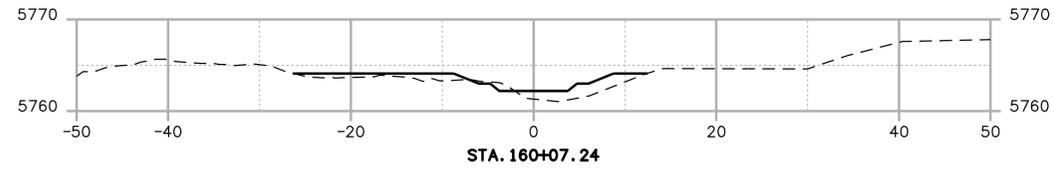
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138200	X-18



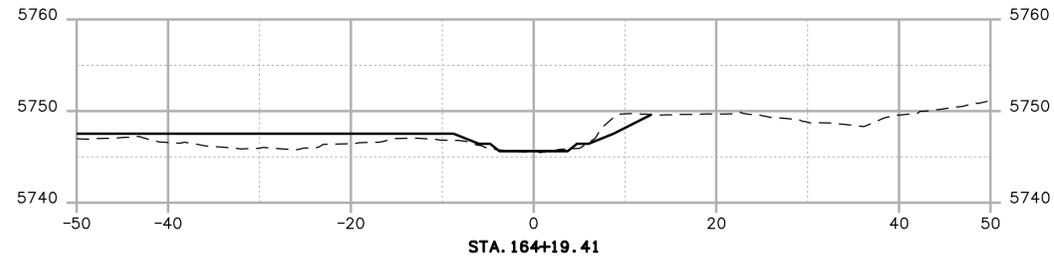
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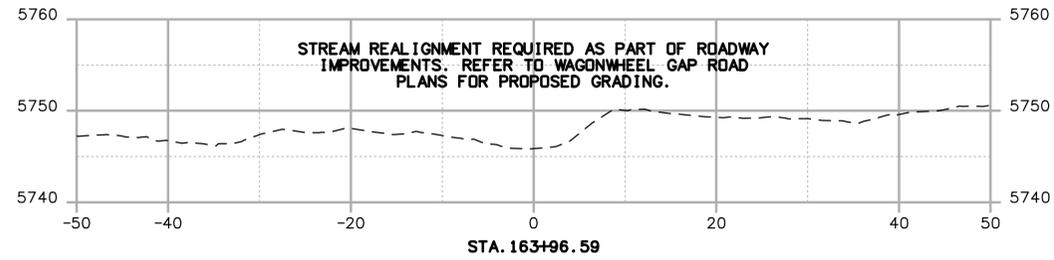
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138200	X-19



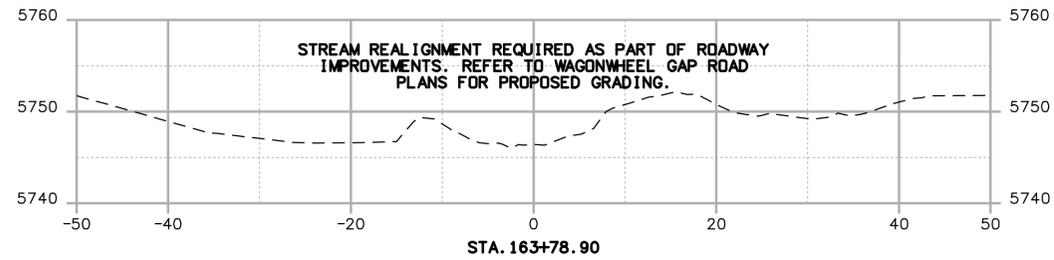
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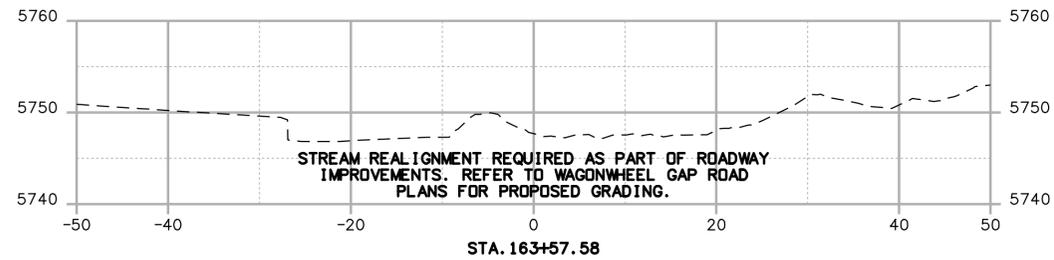
STA. 164+19.41



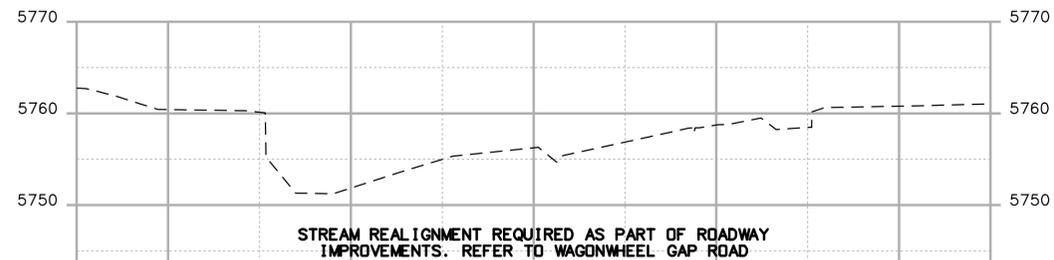
STA. 163+96.59



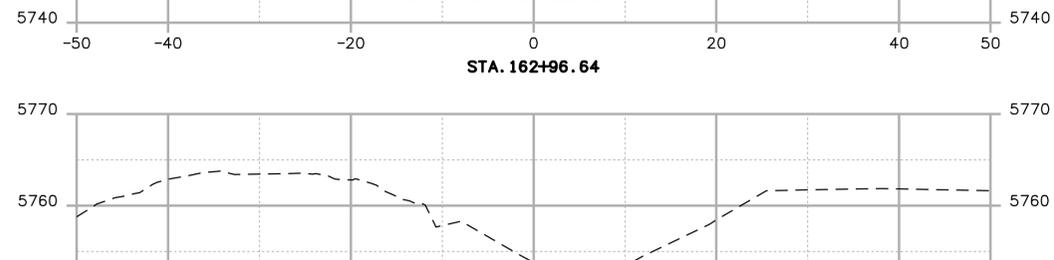
STA. 163+78.90



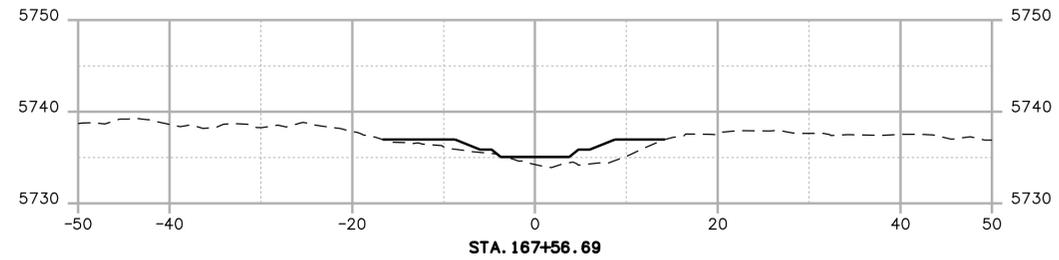
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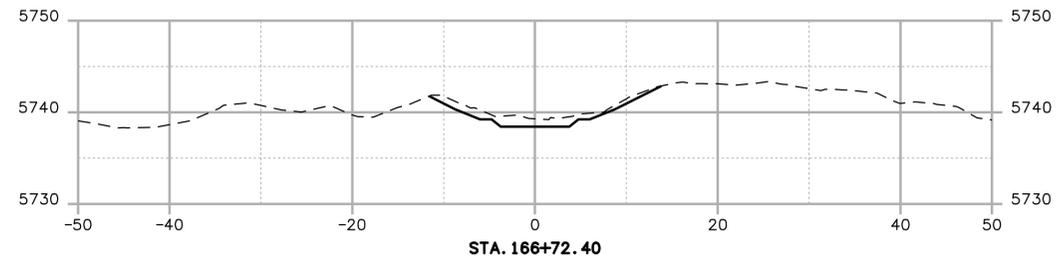
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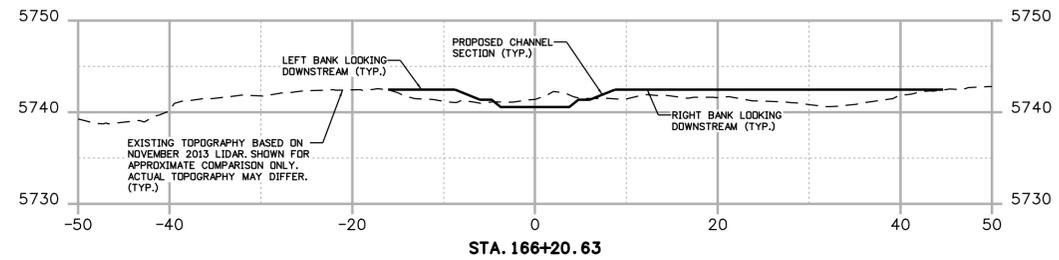
STA. 162+72.19



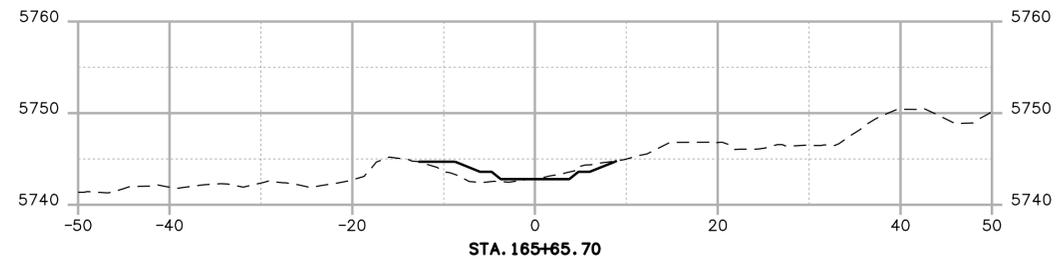
STA. 167+56.69



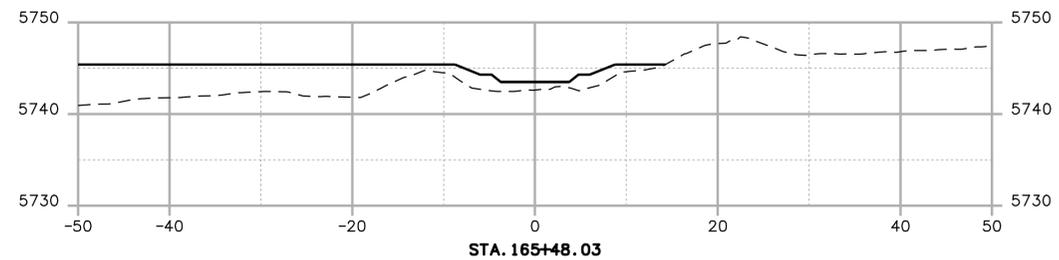
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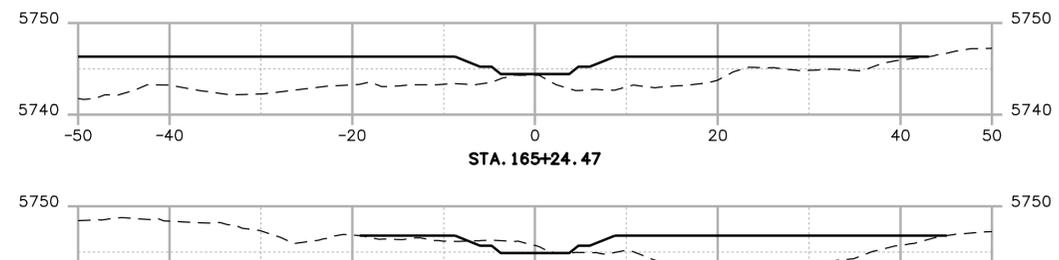
STA. 166+20.63



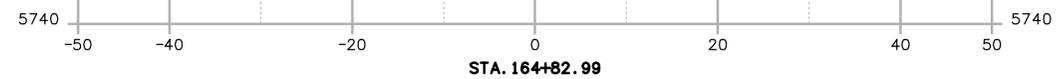
STA. 165+65.70



STA. 165+48.03

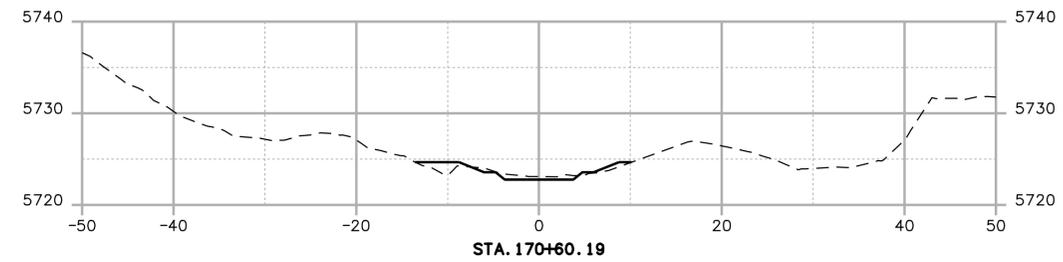
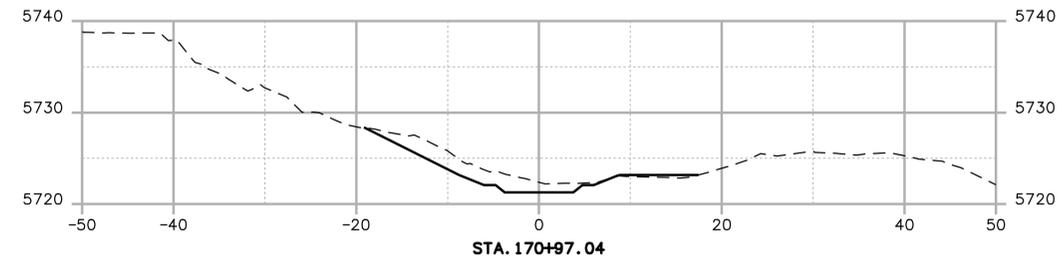
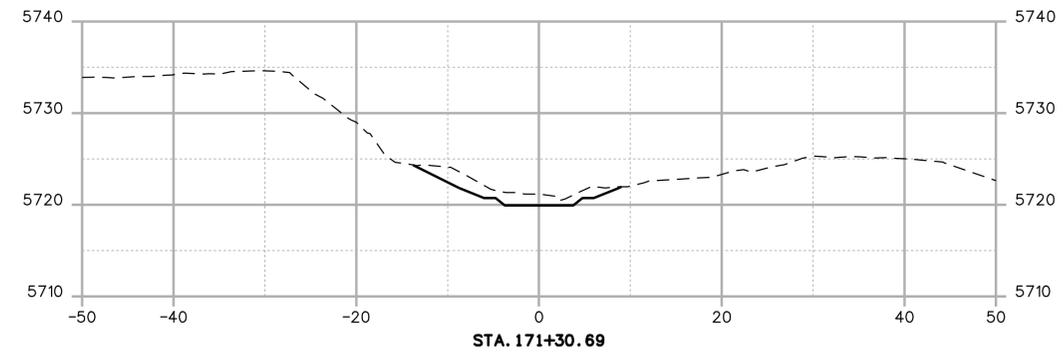
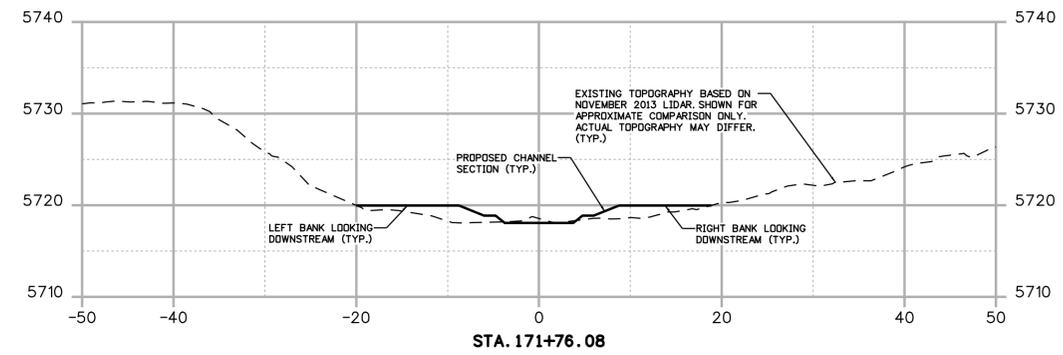
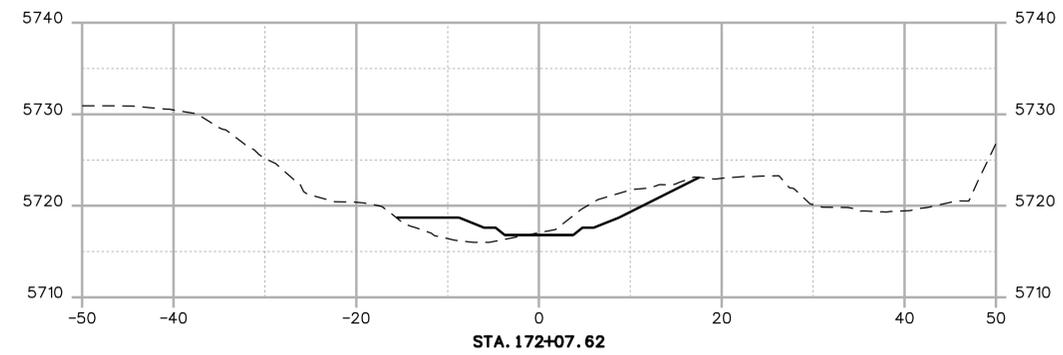
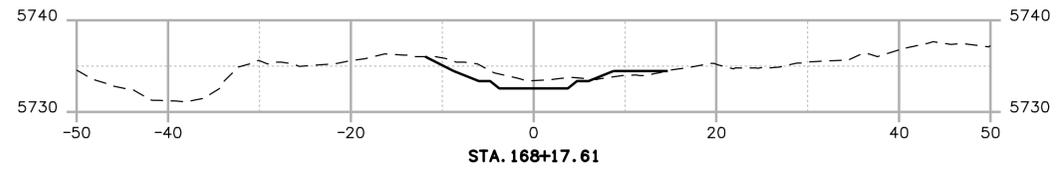
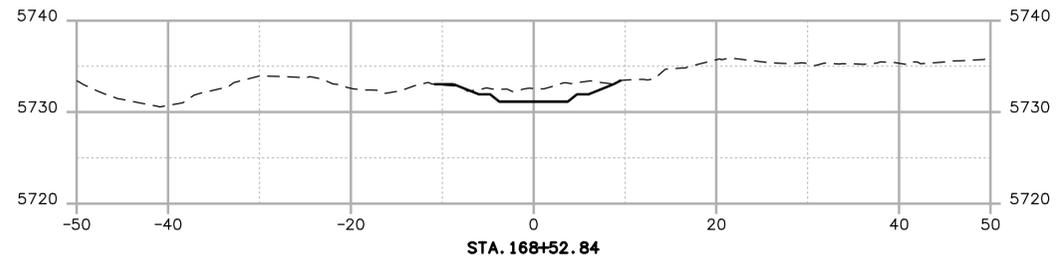
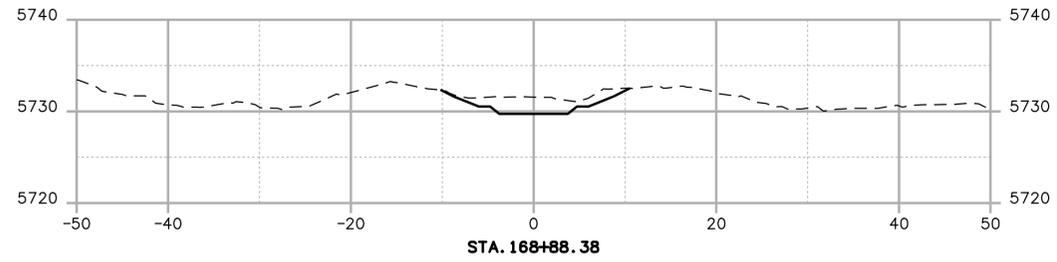
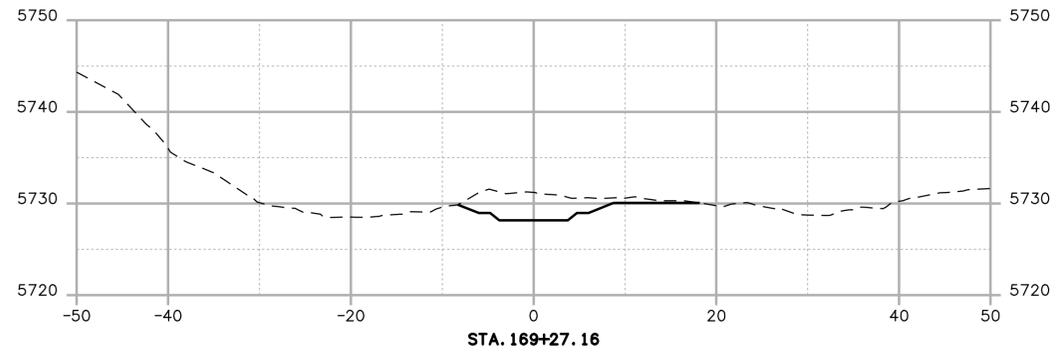
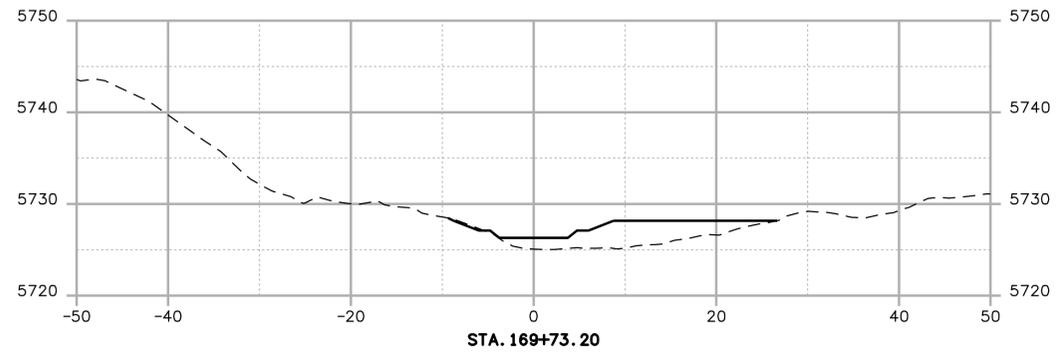
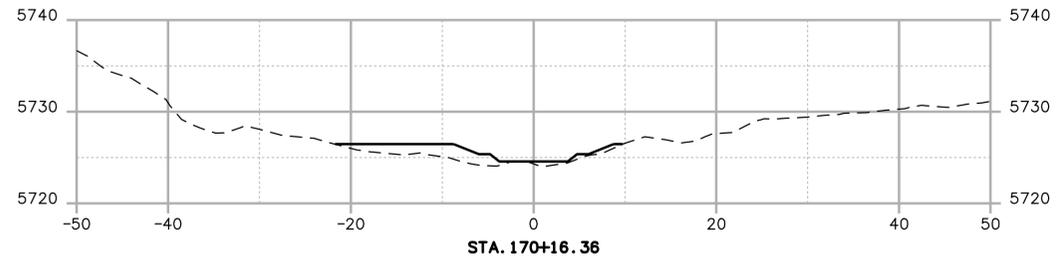


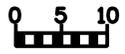
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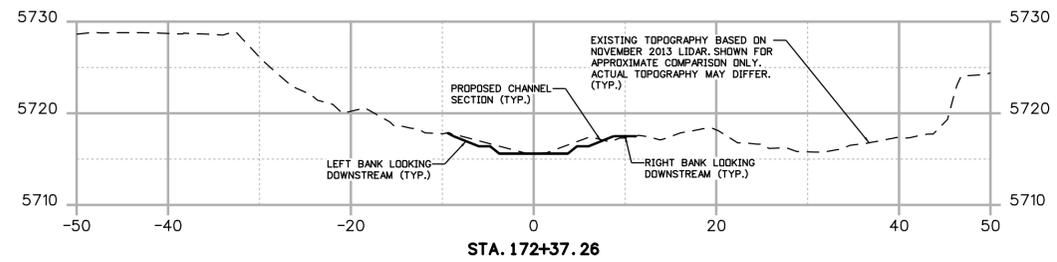
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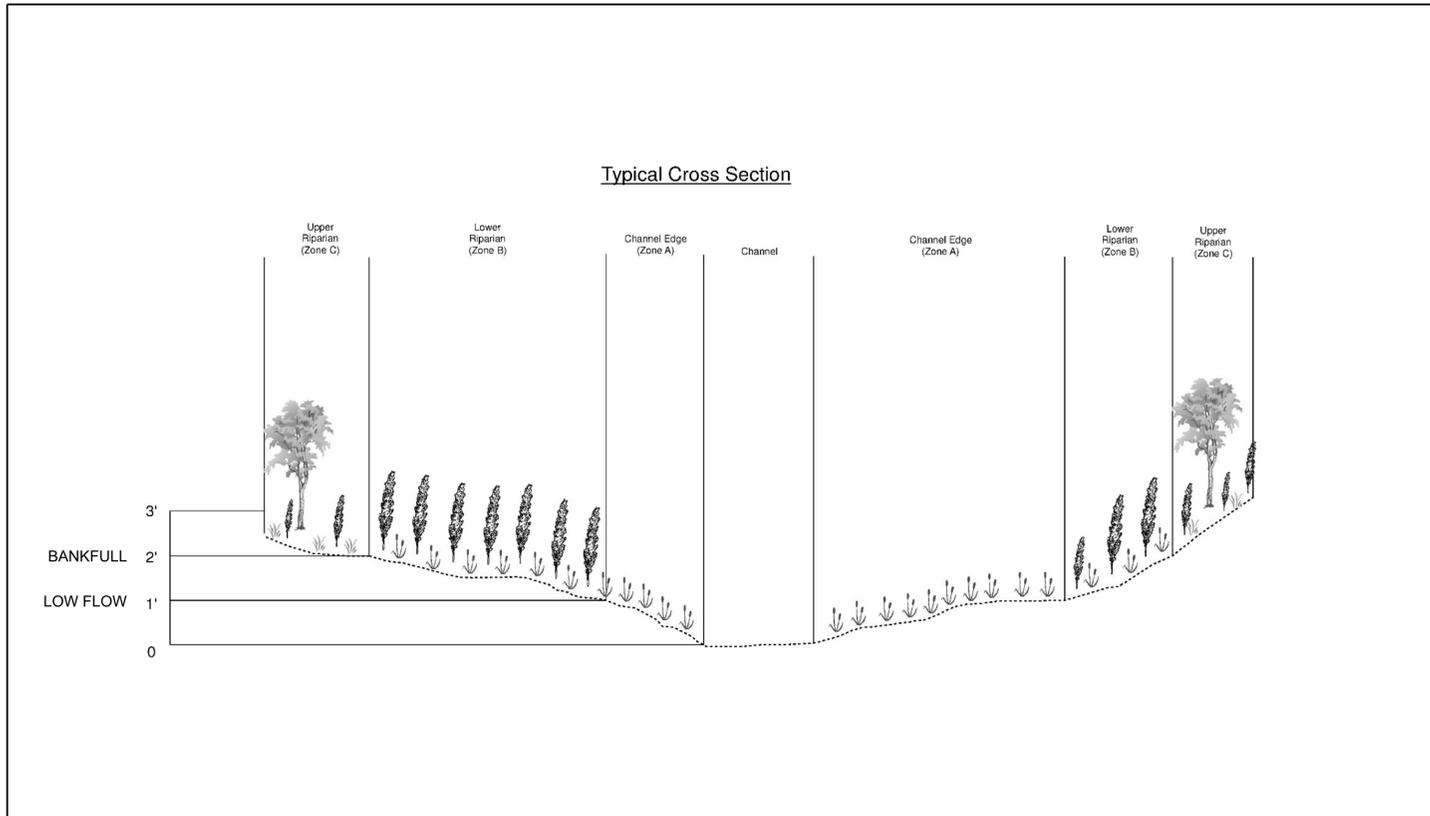




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REACH	CHANNEL EDGE ZONE A	LOWER RIPARIAN ZONE B	UPPER RIPARIAN ZONE C	RIPARIAN SEED
1		X	X	X
2		X	X	X
3		X	X	X
4	X	X	X	X
5	X	X	X	X
6	X	X	X	X
7	X	X	X	X
8	X	X	X	X
9	X	X	X	X
10	X	X	X	X

X = INDICATES TYPE OF PLANTINGS TO BE APPLIED TO EACH REACH

Table 1: Plants Needed for Restoration¹

Common Name	Scientific Name	Plant Size (cubic inch)	Plants per Acre
Zone A: Channel Edge²			
Nebraska sedge	<i>Carex nebrascensis</i>	10	882
Emory's sedge	<i>Carex emoryi</i>	10	1,470
Creeping spikerush	<i>Eleocharis palustris</i>	10	882
Baltic rush	<i>Juncus balticus</i>	10	1,470
Red-tinge bulrush	<i>Scirpus microcarpus</i>	10	882
	Total		5,586
Zone B: Lower Riparian²			
Peachleaf willow	<i>Salix amygdaloides</i>	40	1,000
Peachleaf willow	<i>Salix amygdaloides</i>	3' cutting	500
Narrowleaf willow	<i>Salix exigua</i>	40	2,500
Narrowleaf willow	<i>Salix exigua</i>	3' cutting	500
Dewsystem willow	<i>Salix irrorata</i>	40	2,000
Dewsystem willow	<i>Salix irrorata</i>	3' cutting	500
	Total		7,000
Zone C: Upper Riparian³			
Rubber rabbitbrush	<i>Ericameria nauseosus</i>	40	50
Narrowleaf cottonwood	<i>Populus angustifolia</i>	40	500
Plains cottonwood	<i>Populus deltoides</i>	40	500
American plum	<i>Prunus americana</i>	40	75
Chokecherry	<i>Prunus virginiana</i>	40	75
Common snowberry	<i>Symphoricarpos alba</i>	40	75
Golden current	<i>Ribes aureum</i>	40	50
Woods' rose	<i>Rosa woodii</i>	40	75
	Total		1,400

¹Zone A is 0-1', Zone B is 1-2', and Zone C is 2-2.5' above channel; planting will only occur in discrete pockets based on final grading
²Based on approximately 3-foot centers
³Based on approximately 6-foot centers

Table 2: Riparian Seed Mix¹

Type	Common Name	Scientific Name	Variety ²	Seeds per Pound ³	Seeds per Square Foot	Pounds of Pure Live Seed/Acre
Graminoids	Indian ricegrass	<i>Acnatherum hymenoides</i>	Paloma	141,000	3.9	1.2
	Sideoats grama	<i>Bouteloua curtipendula</i>	Butte or Pierre	191,000	5.3	1.2
	Blue grama ⁴	<i>Bouteloua gracilis⁴</i>	Birds Eye, Alma, or Lovington	825,000	11.4	0.6
	Slender wheatgrass	<i>Elymus trachycandus</i>	White River or San Luis	159,000	4.4	1.2
	Idaho fescue ⁵	<i>Festuca idahoensis⁵</i>	Winchester	450,000	8.3	0.8
	Fowl mannagrass	<i>Glyceria striata</i>	-	180,000	8.3	2.0
	Needle and thread	<i>Hesperostipa comata</i>	-	115,000	5.3	2.0
	Prairie junegrass ⁵	<i>Koeleria macrantha⁵</i>	-	2.3 million	5.3	0.1
	Baltic rush ¹	<i>Juncus balticus⁵</i>	-	10.9 million	25.0	0.1
	Torney's rush ¹	<i>Juncus torreyi⁵</i>	-	12.3 million	28.2	0.1
	Green needlegrass	<i>Nassella viridula</i>	Cucharas or Lodorn	181,000	4.2	1.0
	Western wheatgrass	<i>Pascopyrum smithii</i>	Arriba	110,000	10.1	4.0
	Fowl bluegrass ⁵	<i>Poa palustris⁵</i>	-	3.2 million	7.3	0.1
	Sandberg bluegrass ⁵	<i>Poa secunda⁵</i>	Sims Mesa or High Plains	1 million	6.9	0.3
	Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	P7	140,000	6.4	2.0
Forbs	Little bluestem	<i>Schizachyrium scoparium</i>	Pastura, Cimarron, or Camper	260,000	6.0	1.0
	Prairie cordgrass	<i>Sporina pectinata</i>	-	197,000	4.5	1.0
	Common yarrow ⁵	<i>Achillea millefolium⁶</i>	-	2.7 million	6.2	0.1
	Rocky Mountain bee plant	<i>Cleome serrulata</i>	-	66,000	3.0	2.0
	Golden tickseed ¹	<i>Coreopsis tinctoria⁵</i>	-	1.4 million	3.2	0.1
	Blanketflower	<i>Gaillardia aristata</i>	Merweather	132,000	1.5	0.5
	Showy goldeneye ⁵	<i>Heliomeris multiflora⁶</i>	-	1 million	2.3	0.1
	Rocky Mountain penstemon	<i>Penstemon strictus</i>	Banders	490,000	2.2	0.2
	American vetch	<i>Vicia americana</i>	-	33,000	0.8	1.0
	Rice hulls	-	-	-	-	2.3
Bulk				Total	170.0	25.0

¹US or Canada seed source.
²Sources: NRCS 2015, Granite Seed 2015, Western Native Seed 2015, NSN 2015
³Bag separately if drill-seeding

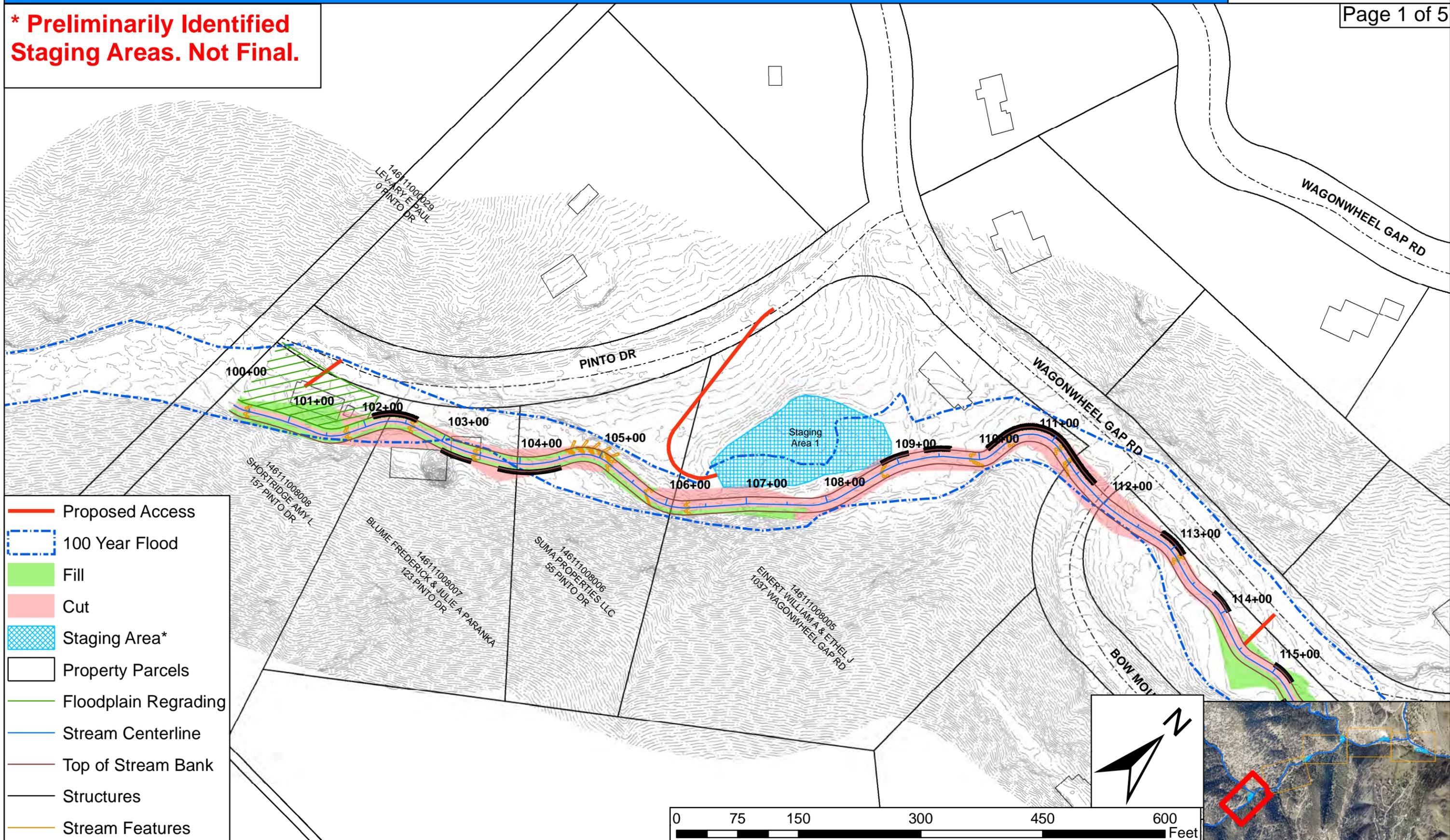
Notes:

- All planting zones will be seeded with the Riparian Seed Mix (Table 2). Seeding will only be performed between September 1 and when the ground is frozen, and when the ground is thawed and June 1, unless approved by a qualified ecologist.
- Woody plants (Zones B and C) will be installed in discrete pockets. The exact locations will be based on the final grading and determined after grading is complete.
- Compost (300 cubic yards per acre) will be mixed with native soil in discrete pockets within the restoration areas. Exact locations will be determined by the presence of adequate native soil.
 - Compost will have the following characteristics:
 - pH: 5.5-8.0
 - Moisture content: 35-55 percent
 - Particle size: pass through 1-inch screen or smaller
 - Stability: stable to highly stable, providing nutrients for plant growth
 - Maturity/growth screening: demonstrate ability to enhance plant growth
 - Soluble salt concentration: 2.5 dS (mmhos/cm) or less preferred
 - Organic matter content: 30-70 percent
 - Suggested compost source: A-1 Organic, Eaton, Colorado 970-454-3492 or an approved equal.
- All willow cuttings must be harvested while dormant and planted within 3 to 14 days (after soaking—completely submerged)
- All containerized plants will be inspected by a qualified ecologist prior to planting. Any dead, dying, stressed, or badly "rootbound" plants will be rejected.
- A qualified ecologist will direct and supervise all plantings
- All seed will be hand-broadcast and lightly raked by hand to encourage contact with the soil
- All seeded areas will be mulched with certified weed-free straw and tackified with a cellulose-based tackifier (or hydromulched). No hay mulch will be used on the site.
- No fertilizers will be used on the site
- In an attempt to avoid the continued spreading of noxious weeds, all discrete populations of Colorado List A or B noxious weeds found in or within 100 feet of the restoration area will be sprayed with the appropriate herbicide(s) prior to construction
- All finish grades will be rough (plus or minus 4 inches), and all straight edges and right angles will be avoided
- No equipment will be allowed in the restoration area after seeding or planting.
- Any trees to be removed for the project will be removed during the non-nesting season for migratory birds (between September 1 and March 31)
- All best management practices (BMPs) used shall be selected, installed, implemented, and maintained according to good engineering, hydrologic and pollution control practices.
- The use of chemicals such as soil stabilizers, dust palliatives, herbicides, growth inhibitors, fertilizers, deicing salts, etc., shall be in accordance with the manufacturer's recommended application rates, frequency, and instructions. These chemicals shall not be used, stored, or stockpiled within 50 horizontal feet of Fourmile Canyon Creek.
- Construction equipment, fuels, lubricants, and other petroleum distillates shall not be stored or stockpiled within 50 horizontal feet of Fourmile Canyon Creek. Equipment fueling and servicing shall occur only within approved designated areas.

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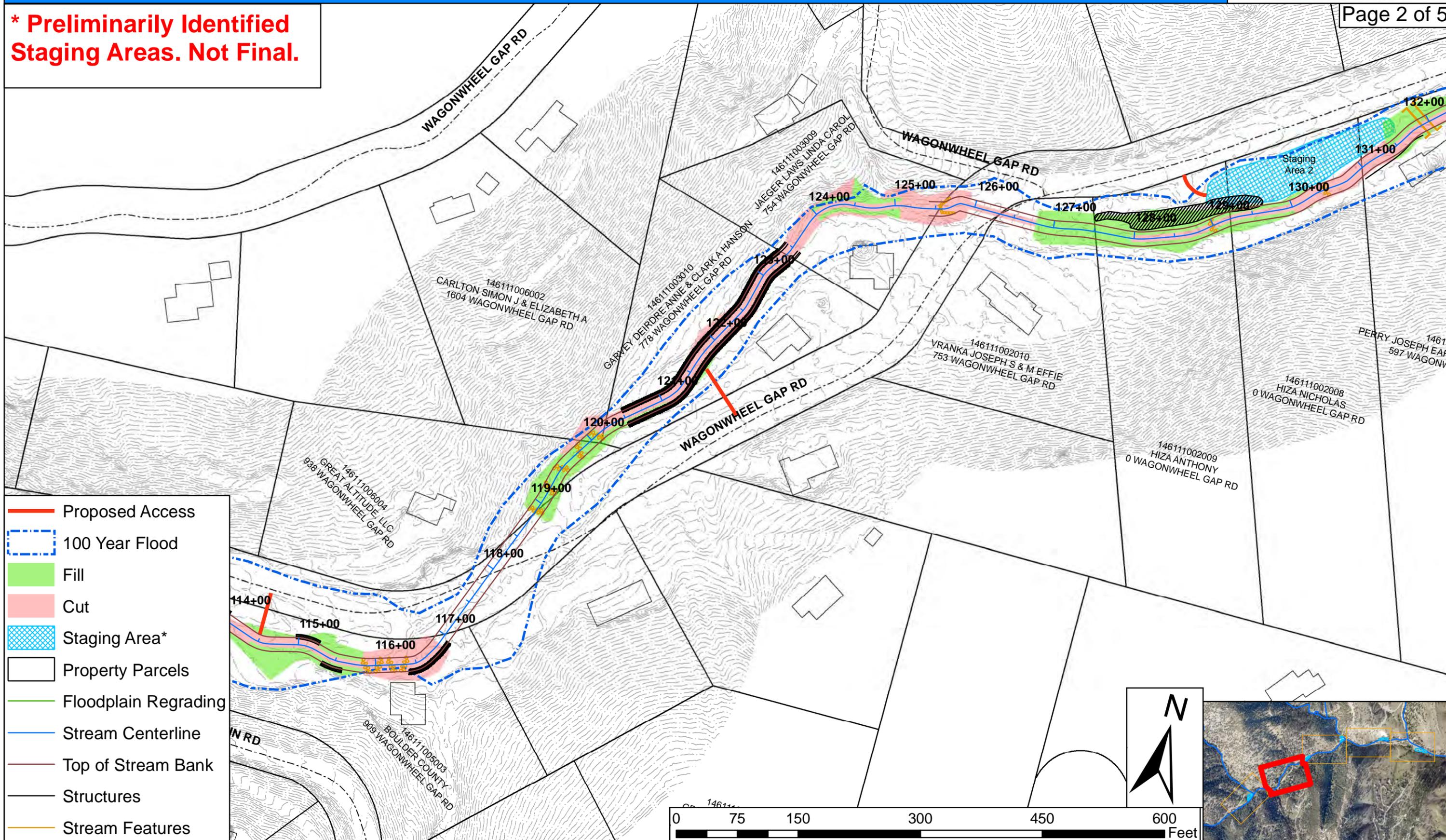
Fourmile Canyon Creek - Material Staging* & Cut Fill

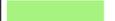
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Staging Areas. Not Final.

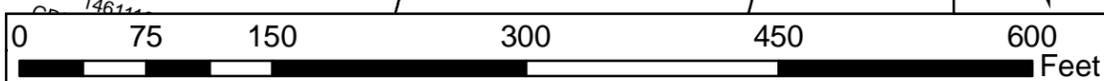


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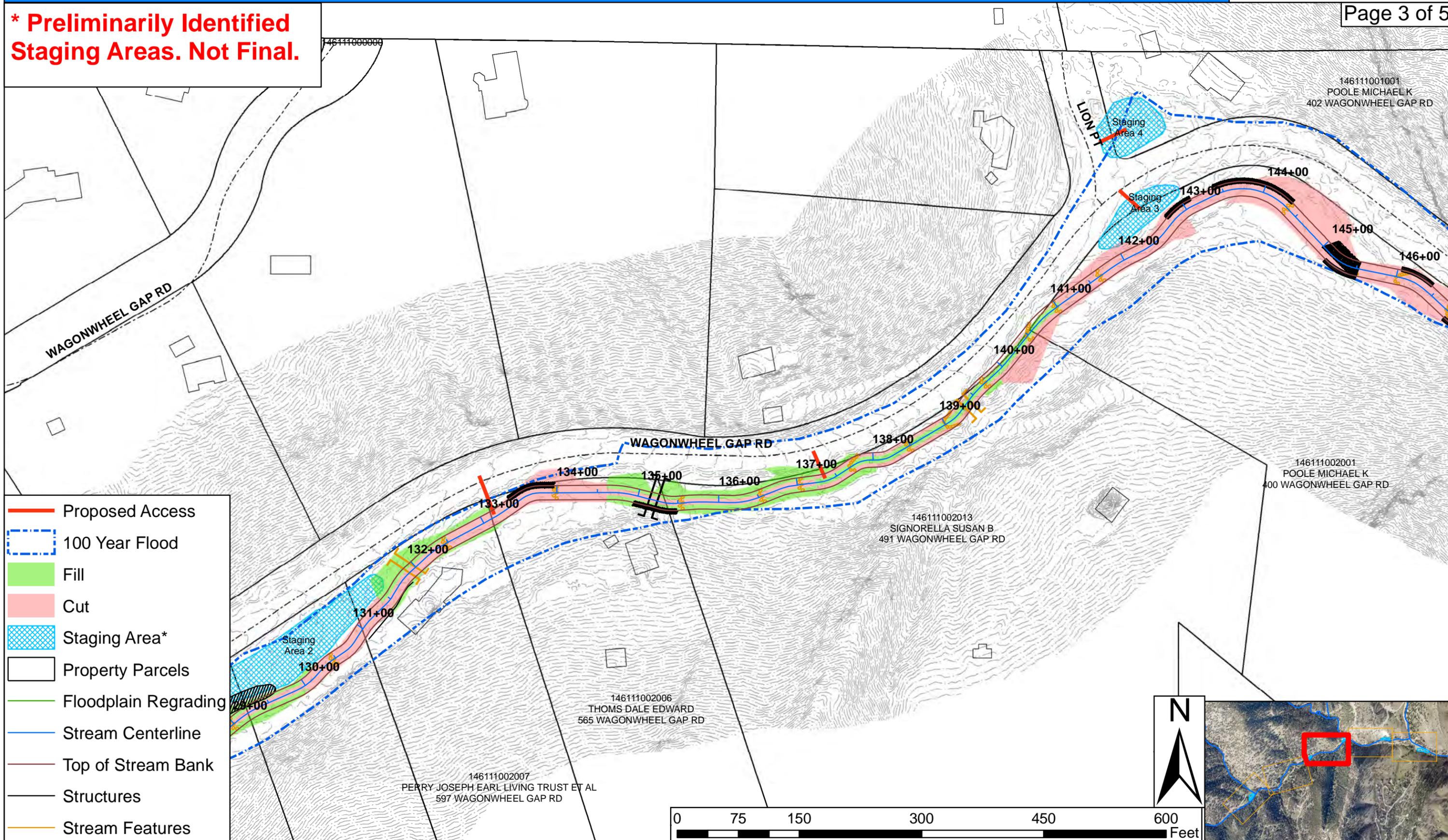


-  Proposed Access
-  100 Year Flood
-  Fill
-  Cut
-  Staging Area*
-  Property Parcels
-  Floodplain Regrading
-  Stream Centerline
-  Top of Stream Bank
-  Structures
-  Stream Features

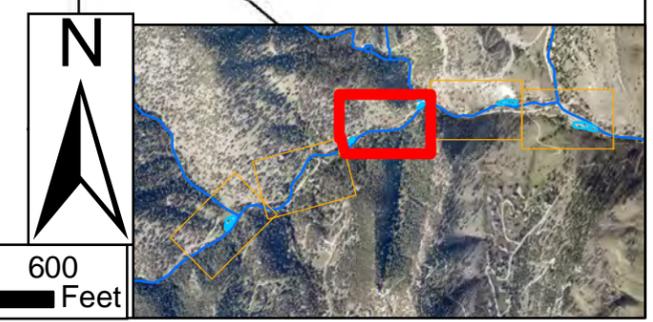
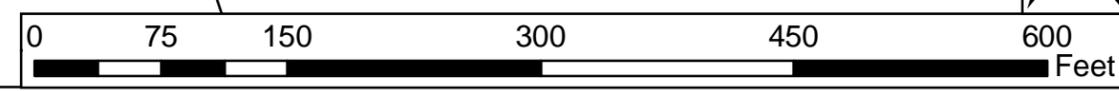


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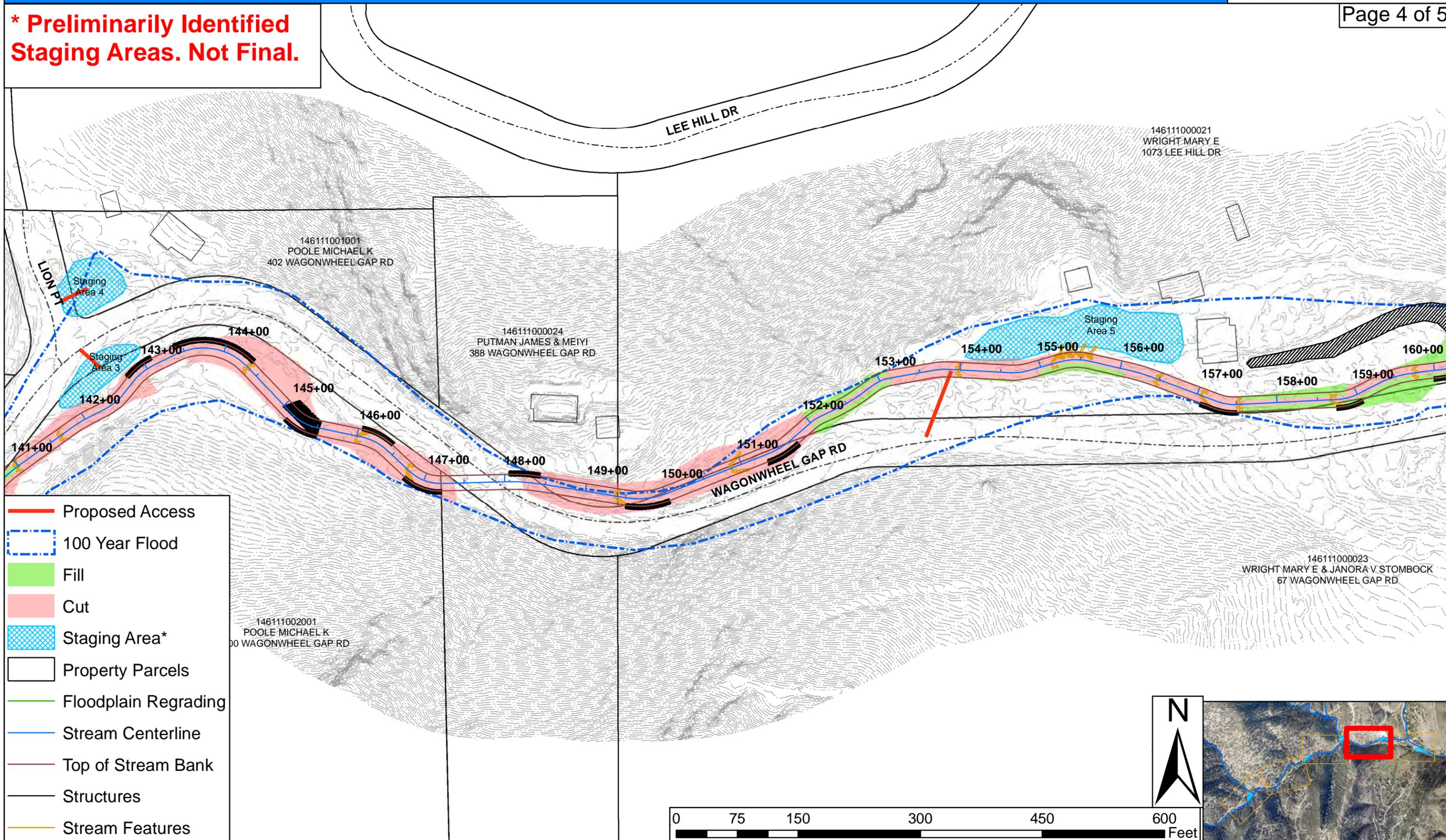


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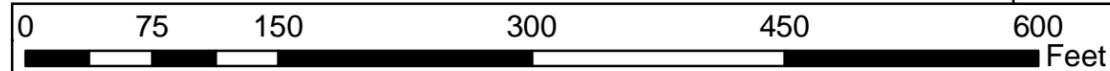


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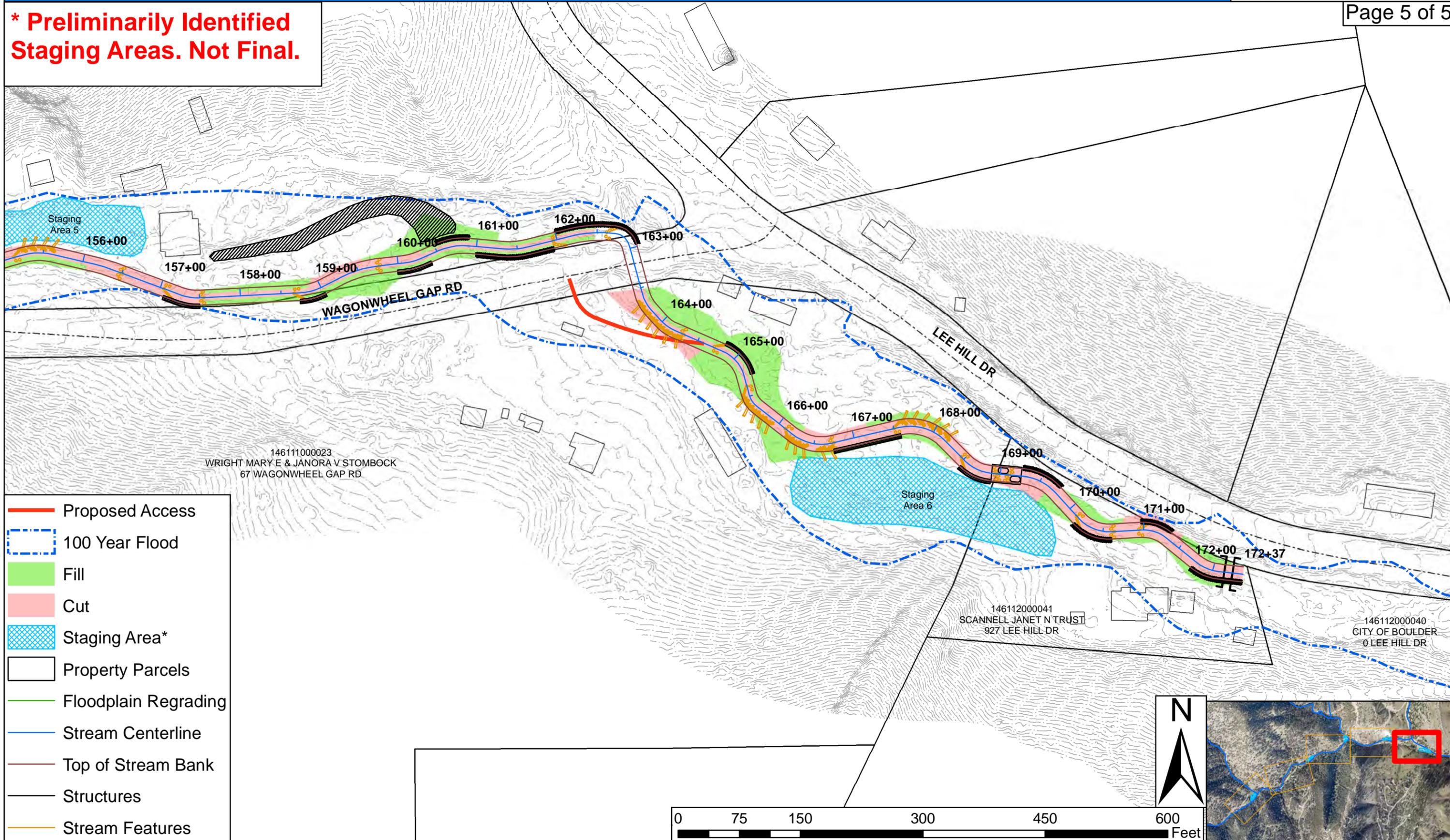


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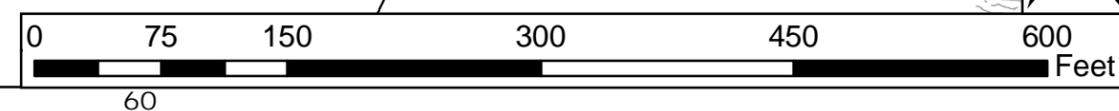


Fourmile Canyon Creek - Material Staging* & Cut Fill

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MEMORANDUM

TO: Clarissa Hageman, Boulder County Department of Transportation

FROM: Lucas Babbitt, PE, CFM, Michael Baker International, Inc.

DATE: September 30, 2016

SUBJECT: Fourmile Canyon Creek Stream Restoration
Draft Erosion Control Memorandum

INTRODUCTION

Under contract with Boulder County, Michael Baker International (Baker) has been tasked with preparing engineering design and construction plans and specifications (completed to the 30% design level) for stream restoration on Fourmile Canyon Creek, a tributary to Boulder Creek. Fourmile Canyon Creek experienced significant flood-related damages as a result of the September 2013 flood event. Baker has completed the 30% stream restoration design for Fourmile Canyon Creek, documenting the conditions of Fourmile Canyon Creek and providing details of the restoration design in a Design Memorandum and Construction Plans and Specifications. The purpose of this technical memorandum is to identify temporary erosion control measures that are associated with the construction phase of the stream restoration project. An erosion control plan is not part of this memo.

TEMPORARY EROSION CONTROL MEASURES

The following are the temporary erosion control measures that are associated with construction. Note that disturbances of one-acre or more will require a CDPHE Stormwater Construction Permit. General Erosion Control BMPs shall be implemented to prevent the erosion of soil, and as necessary, Sediment Control BMPs shall be required to remove sediment from runoff. Measures include:

- Prepare a site-specific erosion control plan outlining erosion and sediment control BMPs.
- Minimize the amount of disturbed soil. Keep construction activities limited to areas only necessary to complete the required activity.
- Unless construction plans specify and requisite permits have been obtained, avoid all construction activities in wetlands and riparian areas.
- Remove and stockpile topsoil prior to grading and shaping. To the extent possible, return topsoil to the pre-disturbance location.
- Schedule excavation and soil removal such that the smallest possible area will be unprotected from erosion for the shortest time practical.

- Avoid construction work in flowing or standing water. Provide temporary facilities to divert flowing water around work areas. Provide dewatering measures to remove water from work areas. If unavoidable, minimize the extent and time that work is performed in water. Diversion and dewatering includes the flowing creek, and any additional flowpaths, such as stormwater runoff, seeps, and springs.
- Provide sediment barriers (silt fence) along the slopes of disturbed (cut or fill) soil.
- Protect the perimeter of water bodies from runoff from excavated materials or other stockpiled construction materials placed near the water body.
- Seed disturbed areas that will be unprotected for extended periods of time.
- Preserve native vegetation to the maximum extent possible in work areas. Undisturbed buffer strips of natural vegetation should be left on streambanks where possible.
- Install sediment basins to settle and filter sediment from disturbed, eroding, or stockpiled areas to eliminate or reduce the amount of sediment entering a water body.
- Operate equipment in a manner that prevents inadvertent dumping or spilling of excavated or transported material.

DRAFT



Land Use

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

Building Safety & Inspection Services Team

MEMO

TO: Christian Martin, Staff Planner - Flood Recovery
FROM: Ron Flax, Chief Building Official
DATE: November 2, 2016

RE: Referral Response, Docket LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration)

LISU application to undertake a stream restoration project on Fourmile Canyon Creek involving 10,848 cubic yards of earthwork.

Thank you for the referral. We have no conflicts with the proposal, but have the following information for the applicants:

1. **Grading Permit.** A grading permit and plan review and inspections approvals are required.

Please refer to the county's adopted 2015 editions of the International Codes and code amendments, including the most applicable portion, Appendix J (grading) of the International Building Code ("IBC"), which can be found via the internet under the link:

2015 Building Code Adoption & Amendments, at the following URL:
<http://www.bouldercounty.org/dept/landuse/pages/default.aspx>

2. **Engineering Observations.** Observation reports from the design engineer or another qualified engineer stating that the grading work has been accomplished in substantial conformance with the approved grading plans will be required to be submitted to Building Safety & Inspection Services for review and approval prior to final approval of the work covered by the grading permit.
3. **Plan Review.** The items listed above are a general summary of some of the county's building code requirements. A more detailed plan review will be performed at the time of grading permit application, when full details are available for review, to assure that all applicable minimum requirements are to be met. Our Building Safety publications can be found at:

<http://www.bouldercounty.org/property/build/pages/bldingdf.aspx>

If the applicants should have questions or need additional information, we'd be happy to work with them toward solutions that meet minimum building code requirements. Please call (720) 564-2640 or contact us via e-mail at building_official@bouldercounty.org



Transportation Department

2525 13th Street, Suite 203 • Boulder, Colorado 80304 • Tel: 303.441.3900 • Fax: 303.441.4594
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

October 24, 2016

TO: Christian Martin, Planner II, Land Use

FROM: Harry Katz, Floodplain Permitting Specialist, Transportation

SUBJECT: Docket LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration)

Request: LISU application to undertake a stream restoration project on Fourmile Canyon Creek involving 10,848 cubic yards of earthworks.

Location: Parcels 146111000021, 146111000023, 146111000024, 146111002001, 146111002006, 146111002007, 146111002008, 146111002009, 146111002010, 146111002013, 146111003010, 146111005003, 146111006002, 146111006004, 146111008005, 146111008006, 146111008007, 146111008008, 146112000040, 146112000041, located at Fourmile Canyon Creek along Lee Hill Drive, Wagonwheel Drive and Pinto Drive, in Sections 11 and 12, T1N, R71W.

The Transportation Department – Floodplain Management Program has reviewed the above referenced docket and has the following comments:

1. The proposed development is located within the Floodplain Overlay District. In accordance with Article 4-400 of the Boulder County Land Use Code, a Floodplain Development Permit (FDP) is required for this project.
2. The FDP application will require certification of the design by a Colorado Registered Professional Engineer.
3. The FDP application will require an approved Conditional Letter of Map Revision (CLOMR) from FEMA.
 - a. CLOMR submittal will need to be revised if properties withdraw from buyout program.
 - b. A Letter of Map Revision (LOMR) is required after project completion. This must include a floodway delineation for a target 0.50 ft rise in water surface elevation.

Additional Information:

1. The proposed development will need to meet all local, state, and federal regulations.
2. Demonstration of coverage under a USACE Nationwide or Individual 404 permit is required prior to FDP issuance.
3. Please contact Harry Katz (Floodplain Permitting Specialist; Transportation Department) at hkatz@bouldercounty.org or 720-564-2865 to discuss FDP including hydraulic analysis requirements.



Parks and Open Space

5201 St. Vrain Road • Longmont, Colorado 80503
303.678.6200 • Fax: 303.678.6177 • www.bouldercounty.org

TO: Jennifer Severson, Land Use Department
FROM: Ron West, Natural Resource Planner
DATE: November 6, 2016
SUBJECT: Docket LU-16-0030, BOCO Fourmile Canyon Creek

Site Conditions

I have reviewed the submitted materials, and have visited the location many times in the past. The project area totals about 1.4 miles of Fourmile Canyon Creek. The 2013 flood, and others, have heavily disturbed this reach, as described in the application.

County Comprehensive Plan Designations

The parcel has the following designations in the Boulder County Comprehensive Plan, and from other resource inventories.

- Prebles Meadow Jumping Mouse (PMJM) Habitat – Foothills Perennial Stream
- Riparian Area
- Archeological Sensitive Area
- 100-year Floodplain

Discussion

This project would restore a heavily flood-impacted stream reach. Compared to other stream projects, relatively long sections of creek realignment are included. However, none of the above-listed resources should be significantly impacted, and some would be improved in the long-term. The following discussion is divided into: 1) general comments relevant to all stream projects; and 2) questions and comments specific to the proposal. General comments are further divided into: A) planning and construction; B) revegetation; and C) permits.

General Comments

Planning and Construction --

How would areas of existing vegetation – areas that are not to be disturbed – be delineated in the field, so that heavy machinery is prevented from entering the areas? This is often accomplished with orange construction fencing, rather than silt fencing. It is less expensive, easier to install, and reusable. If individual trees are to be protected, what field technique would be used? Young cottonwood seedlings that have naturally sprouted since the flood should be avoided. If not possible, transplanting such seedlings back into the site is highly encouraged. Regarding tree/root wad wood, where would the trees come from?

Soil riprap (instead of rock-only riprap) should be used in all cases. Fines need to be included

within the riprap to allow for natural germination and establishment of plants in the long term. Some fines near the water line would unavoidably be washed away in high water events, but without fines, riprap would remain barren for decades. Existing, previously-placed riprap should be mitigated by adding fines.

As called for in the county's 2016 Storm Drainage Criteria Manual, biodegradable hydraulic fluids must be used in all heavy machinery.

Steam cleaning of all equipment is mandatory, before it enters the site, to remove both noxious weed seeds and aquatic nuisance species.

A "spill kit" must be on-site during all work with heavy machinery -- emergency pollutant isolation and clean-up materials, with procedures.

Some large, downed woody material should remain on-site, particularly if already embedded in stream deposits. Such material plays an ecologically important role in a natural riparian community. Additionally, some standing dead trees (snags) should remain on-site, and not all removed simply because they are dead. Cavity nesting species depend on these.

Staging areas and stream access corridors must be approved by the county prior to issuance of the grading permit. These cannot be left to the discretion of the contractor. Fueling areas must be located in upland sites, as far away from the stream edge as possible, and preferably in areas without porous stream deposits such as sand or cobble. Both staging and fueling areas should be at least 50 feet from the creek, and preferably 100 feet. Appropriate BMPs for fueling areas must be utilized. County road ROWs can be used if approved by the Transportation Department.

Revegetation --

A complete list of graminoids, forbs, shrubs and trees must be approved by the county before grading permit is issued (see below for this project). All species must include scientific names of plants. Rather than simply grasses, the use of plantings – containers and/or cuttings – is strongly encouraged.

Tree/shrub cuttings and container plantings should be monitored for three years. Who is responsible for monitoring, and what is the protocol if plantings die? Will temporary irrigation be used?

Staff strongly encourages beaver protection for tree plantings and vole/small mammal protection for shrub plantings. This is often accomplished using mesh collars.

If straw mulch or straw bale barriers are used, all straw must be certified weed-free.

Would topsoil be imported, or would seeding occur on existing fines? If topsoil is to be imported, where will it come from and how will the introduction of weed seeds be prevented? How deep would the amended topsoil layer be?

Hydroseeding should not be used; it is often unsuccessful in our climate. Seeding could be either broadcast or drilled. Hydromulching, after seeding, is fine.

Permits –

Final US Fish & Wildlife Service clearance has been obtained for Prebles Meadow Jumping Mouse; a copy of the letter should be submitted for Land Use files.

A state Stormwater Management Plan is necessary.

Comments Specific to the Proposal

Page 2 of the Narrative states that, "...a focused invasive species removal is not proposed." The Revegetation Plan must address noxious weed control, as part of the 3-year monitoring effort.

Drawing, Sheet 2B – The Log J-hook Vane detail notes that "hardwood" is to be used, whereas hardwood is not called out for any other structures that include logs. Is this correct, and if so what type of hardwood would be used and from where secured? Most stream projects are using ponderosa pine, a softwood. Some of the other details call for "brush;" what is this and where does it come from?

Drawings, Sheet 3 -- The area between Stations 100 and 102 calls for "grade floodplain to bankfull elevation." This aspect of the project should be coordinated with the Parks & Open Space Department. If the buy-out is closed on this property, POS is interested in the possibility of expanding parking at the destroyed Anne U. White Trailhead.

Drawings, Sheet 11, Revegetation – The following species are not native to Boulder County and cannot be included in the Revegetation Plan: *Festuca idahoensis*, *Pseudoroegneria spicata*, *Achillea millefolium*, and *Penstemon strictus*. *Elymus lanceolatus* (thickspike/streambank wheatgrass) could be used instead of *P. spicata*; the latter is a Western Slope species. The yarrow must be *A. lanulosa*; *A. millefolium* is European. *F. saximontana* could be used instead of *F. idahoensis*; the latter is a subalpine species. One of several native penstemons could be used instead of *P. spicata*.

The first Note is confusing: "Seeding will only be performed between September 1 and when the ground is frozen, and when the ground is thawed and June 1...." Note 4: From *where* will the willow cuttings be harvested?

Recommendations

- The items discussed above should be considered and questions resolved.



Transportation Department

2525 13th Street, Suite 203 • Boulder, Colorado 80304 • Tel: 303.441.3900 • Fax: 303.441.4594
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

October 31, 2016

TO: Christian Martin, Planner II, Land Use Department
FROM: Chad Schroeder, Development Review Planner
SUBJECT: Docket #LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration)

The Transportation Department has reviewed the above referenced docket and has the following comments about the proposed development:

1. Access locations for the project shall be shown on plans for building permits along with the permission letters/easements from the respective property owners.
2. The stream restoration project will occur concurrently with the Boulder County permanent road reconstruction project. The projects shall be coordinated between the two project contractors.
3. The applicant must submit a traffic control plan completed by a Traffic Control Supervisor to the Transportation Department for review and approval at the time of building application. The traffic control plan must include:
 - a. Flaggers and/or other traffic control measures must be used at the intersections of the access points on Wagonwheel Gap Road during hauling operations.
 - b. Locations and types of warning signs along the roads shall be shown.
4. The applicant must a transportation management plan to the Transportation Department for review and approval. The plan shall outline how progress and other information, such as commute interruptions, will be communicated to the public. The applicant shall coordinate with the Transportation Department's Public Information Officer, Andrew Barth (303-441-1032).
5. The applicant must also ensure that vehicle tracking and a sweeping plan are included in the erosion and sediment plan.
6. Hours of hauling shall be from 8:00 AM to 4:30 PM to limit impacts on regular vehicular traffic, especially during peak commuter periods.
7. A qualified Professional Engineer registered in the State of Colorado needs to provide stamped engineered plans at the time of building permit application.
8. Final grade cuts and fills shall not be steeper than a 1-½ to 1 slope. Grades steeper than a 1-½ to 1 slope will need to be supported by a retaining wall.
9. Construction staging should be located in areas outside of the 100-year floodplain as best as possible, or as far away from Fourmile Canyon Creek as possible.
10. Workers' vehicles can be parked in designated approved areas that are outside of the road traveled way. Parking plans shall be shown on plans for building application for approval.
11. The applicant must obtain all necessary permits before commencing operations, including without limitation: United States Army Corps of Engineers Permits, a stormwater permit from the State of Colorado (for over 1 acre of disturbance), and Oversize/Overweight permits from the Transportation Department if applicable.
12. Appropriate erosion control measures shall be installed downslope and parallel to contours for all disturbed areas including staging areas. The location of erosion control shall be shown on site plans submitted for building permit approval. Stockpiled fill piles over 30 days shall be properly covered and/or stabilized with temporary vegetation.

This concludes our comments at this time.



Land Use

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

MEMO TO: Agencies and Adjacent Property Owners
FROM: Christian Martin, CFM, Planner II – Flood Recovery
DATE: October 18, 2016
RE: Docket LU-16-0030

Docket LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration)

Request: LISU application to undertake a stream restoration project on Fourmile Canyon Creek involving 10,848 cubic yards of earthworks.
Location: Parcels 146111000021, 146111000023, 146111000024, 146111002001, 146111002006, 146111002007, 146111002008, 146111002009, 146111002010, 146111002013, 146111003010, 146111005003, 146111006002, 146111006004, 146111008005, 146111008006, 146111008007, 146111008008, 146112000040, 146112000041, located at Fourmile Canyon Creek along Lee Hill Drive, Wagonwheel Drive and Pinto Drive, in Sections 11 and 12, T1N, R71W.
Zoning: Forestry (F) and Rural Residential (RR) Zoning Districts
Applicant: George Gerstle, Boulder County Department of Transportation
Agent: Clarissa Hageman, Boulder County Department of Transportation

Limited Impact Special Review is required of proposed uses that may have greater impacts on services, neighborhoods, or the environment than those allowed by right under the Boulder County Land Use Code. This process will review conformance of the proposed use with the Boulder County Comprehensive Plan and the Land Use Code.

This process includes a public hearing before the Board of County Commissioners. Adjacent property owners and holders of liens, mortgages, easements or other rights in the subject property are notified of this hearing. The Land Use staff and County Commissioners value comments from individuals and referral agencies. Please check the appropriate response below or send a letter. Late responses will be reviewed as the process permits; all comments will be made part of the public record and given to the applicant. Only a portion of the submitted documents may have been enclosed; you are welcome to review the entire file at the Land Use Department. If you have any questions regarding this application, please contact me at (303) 441-3930 or cpmartin@bouldercounty.org.

Please return responses to the above address by **November 2, 2016.**

We have reviewed the proposal and have no conflicts.

Letter is enclosed.

Signed  PRINTED Name Jessica Fasick

Agency or Address Land Use Historic Review



Land Use

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856

Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

TO: Christian Martin, Land Use Department
FROM: Jessica Fasick, Historic Review, Land Use Department
DATE: October 20, 2016
SUBJECT: Docket LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration)

The Fourmile Canyon Creek corridor has been identified as an Archaeologically Sensitive Area and therefore subject to Historic Review. In addition, at least four of the properties have structures that are over 50 years of age. The project narrative of docket LU-16-0030 states that “in June 2016, the State Historical Preservation Office (SHPO) concurred that the project will have no adverse effects on cultural resources.” Land Use Preservation Staff requests that a condition be included in the approval of docket LU-16-0030 that the applicant provides Land Use with proof of consultation with the SHPO and any cultural resource inventories or background documentation (including site forms) before the issuance of a permit for construction.



Public Health

Environmental Health Division

November 10, 2016

TO: Staff Planner, Land Use Department
FROM: Jessica Epstein, Environmental Health Specialist
SUBJECT: LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration) project
OWNER: Boulder County

PROPERTY ADDRESS: Parcels 146111000021, 146111000023, 146111000024, 146111002001, 146111002006, 146111002007, 146111002008, 146111002009, 146111002010, 146111002013, 146111003010, 146111000003, 146111006002, 146111006004, 146111008005, 146111008006, 146111008007, 146111008008, 146111000040, 146111000041

SEC-TOWN-RANGE: 11 and 12, 1N, 71

The Boulder County Public Health Department – Environmental Health division has reviewed the submittals for the above referenced docket and has the following comments.

Avoid Damage to OWTS:

1. Before beginning construction, the contractor must determine the location of all the existing approved OWTS components in the project area. The documents are scanned into septicmart.org. If there are unapproved OWTS, there may not be any information online. In this case, the owner should help with the general location of the system.
2. Heavy equipment should be restricted from the surface of the absorption field during stream restoration to avoid soil compaction, which could cause premature absorption field malfunction. Caution should be used in conducting trenching and excavation activities so that sewer lines and other OWTS components are not damaged.

This concludes comments from the Boulder County Public Health – Environmental Health division at this time. For additional information on the OWTS application process and regulations, refer to the following website: www.SepticSmart.org. If you have additional questions about OWTS, please do not hesitate to contact Jessica Epstein at (303) 441-1138.

Cc: OWTS file, owner, Land Use Department



Land Use

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Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

MEMO TO: Agencies and Adjacent Property Owners
FROM: Christian Martin, CFM, Planner II – Flood Recovery
DATE: October 18, 2016
RE: Docket LU-16-0030

Docket LU-16-0030: Boulder County (Fourmile Canyon Creek Restoration)

Request: LISU application to undertake a stream restoration project on Fourmile Canyon Creek involving 10,848 cubic yards of earthworks.
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Applicant: George Gerstle, Boulder County Department of Transportation
Agent: Clarissa Hageman, Boulder County Department of Transportation

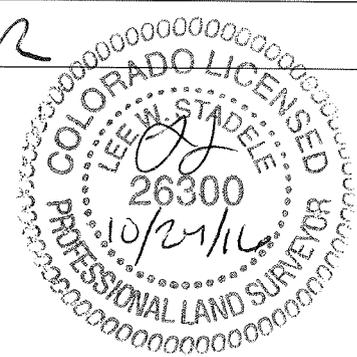
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Please return responses to the above address by **November 2, 2016.**

We have reviewed the proposal and have no conflicts.
 Letter is enclosed.

Signed  PRINTED Name LEE STADELE
Agency or Address BOLD SURVEYOR





Land Use

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

MEMO TO: Agencies and Adjacent Property Owners
FROM: Christian Martin, CFM, Planner II – Flood Recovery
DATE: October 18, 2016
RE: Docket LU-16-0030

RECEIVED
OCT 21 2016
SOURCES ENGINEER COLO.

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Please return responses to the above address by **November 2, 2016.**

We have reviewed the proposal and have no conflicts.
 Letter is enclosed.

Signed *Jacob Brucker* PRINTED Name Jacob Brucker, P.E.

Agency or Address Division of Water Resources



COLORADO
Division of Water Resources
Department of Natural Resources

1313 Sherman Street, Room 821
Denver, CO 80203

October 28, 2016

Christian Martin
Boulder County Land Use Department
Transmission via email: cpmartin@bouldercounty.org

Re: Stream Restoration Projects
Dockets LU-16-0028, 0029, 0030, and 0031
Water Division 1, Water Districts 4, 5, and 6

Dear Mr. Martin:

The submitted applications do not qualify as “subdivisions” as defined in § 30-28-101(10)(a), C.R.S. Therefore, pursuant to the State Engineer’s March 4, 2005 and March 11, 2011 memorandums to county planning directors, this office will only perform a cursory review of the referral information and provide comments.

The submittals concern four Limited Impact Special Review projects to restore and stabilize reaches of 1) Left Hand Creek; 2) the Little Thompson River; 3) Fourmile Canyon Creek; and 4) St. Vrain Creek. The projects involve bank stabilization, floodplain stabilization, realignment and reconstruction of portions of the stream channels, installation of pools and riffles, increasing riparian habitat, and removal of unstable debris.

Plantings proposed for revegetation include a number of wetland plants. The State Engineer’s Office has not opposed the replacement of wetlands so long as the following conditions are met:

1. The wetland mitigation areas are replaced on a one-to-one basis.
2. The new wetlands must not be located in such a way that they will result in injury to water rights that were not historically impacted by the original wetlands.
3. The wetlands cannot be constructed in such a manner that they will result in the exposure of ground water. (The State Engineer’s Office has not opposed the removal of overburden in such a manner that it results in the subirrigation of the wetlands.)
4. If water is required to grow the wetlands plants, the water that is applied must either be decreed for irrigation purposes or, if no water right exists, water can only be used for irrigation purposes if diverted under free river conditions.
5. If the new wetlands result in injury to water rights that historically were not impacted by the original wetlands, the applicant must provide augmentation water to mitigate for any possible injury to vested water rights.

Although it appears that the proposed projects, when completed, will not adversely impact water resources or vested water rights, the anticipated construction activity may adversely affect diversion structures and the quantity or quality of water in the stream system. We therefore recommend that the applicants consult with the appropriate Water Commissioner prior to commencing construction activities.

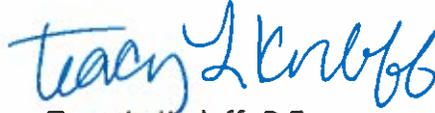
- Left Hand Creek (District 5) - Shera Sumerford, (303) 775-0840, shera.sumerford@state.co.us
- Little Thompson River (District 4) - Jean Lever, (970) 290-7397, jean.lever@state.co.us



- Fourmile Canyon Creek (District 6) - Bob Carlson, (303) 947-3522, bob.carlson@state.co.us
- St. Vrain Creek (District 5) - Shera Sumerford, (303) 775-0840, shera.sumerford@state.co.us

Should you or the applicants have any questions or concerns regarding this matter, please contact Sarah Brucker of this office.

Sincerely,



Tracy L. Kosloff, P.E.
Water Resource Engineer

Cc: Jean Lever, Water Commissioner, Water District 4
Shera Sumerford, Water Commissioner, Water District 5
Bob Carlson, Water Commissioner, Water District 6

TLK/srb: Stream Restorations 0028 to 0031 (Boulder)



LU-16-0030
APO COMMENTS

Severson, Jennifer

From: Simon Carlton <simoncarlton1@gmail.com>
Sent: Thursday, October 20, 2016 7:50 PM
To: #LandUsePlanner
Cc: Martin, Cory; Sanfacon, Garry
Subject: Re: Docket #: LU-16-0030 and Parcel #146111006002

Categories: URGENT

My wife and I own and reside at 1604 Wagonwheel Gap Road, CO 80302 also identified as Lot 32 Bow Mountain 2 and Parcel #146111006002. County Docket #:LU-16-0030 addresses Fourmile Canyon Creek Restoration adjacent to our land. However, there is an ongoing question as to whether the creek alignment - prior to September 2013 or since - actually touches our lot.

Previous requests to County employees to clarify this issue have not produced a definitive resolution so, while not wanting to adversely impact the progress of Creek or Roadway restoration, I respectfully request that the evidence provided to Commissioners (and made available to the Public in advance of the hearing on 11/29/2016) includes a detailed overlay of the proposed Creek re-alignment map showing official plat boundaries of adjacent and impacted land parcels.

Regards,

Simon Carlton
7205651993

Sent from my iPad