

DWR Questions dated October 1, 2026

1. Site 2 - UT Hickory Creek channel change (site 2) is oriented at a right angle to the confluence with UT Hickory Creek (Site 1 channel change) – can this angle be altered so it is not perpendicular to the streambank?

Yes, the angle has been altered on the drawings to approximately 75-degrees (heading downstream) with the receiving channel flow. Additionally, impacts have been reduced by 30 lf of permanent impacts, and 15 lf of temporary impacts.

The revised sheets and impact summary table are included in this response.

2. Site 4 – There is a blue line channel shown to be connected to Hickory Creek near the downstream end of this site – the origin is shown to be near the proposed wall but doesn't connect back to the upstream portion of Hickory Creek. Is this a separate UT to Hickory Creek or a braided post-Helene part of Hickory Creek? I need clarification where the origin is and if it is a separate stream impact to Site 4.

The blue line channel is a braided portion of the Creek resulting from the storm and is not considered a JS or a portion of an UT.

3. Site 5 – Proposed 4' partially grouted rip rap base ditch in path of existing UT for 32 LF?

- a. I am confused as to why the streambed is proposed to be grouted, as is shown in detail 15-5, for the entire length of stream channel (32LF)? That doesn't seem appropriate.

Due to the steepness of the slope, shown on topo sheet 6 of 29, the road is on approximately 15 feet of fill above the toe of slope. The stream, which begins at the outfall of the “old” pipe will be picked up by the partially grouted v-ditch, which is being used for long-term channel stability on the fill slope. The stream will then continue to Hickory Creek. This approach avoids having a very deep pipe or installing multiple drainage structures to ‘step down’ the pipe system.

- b. Also, I don't think that the impact is fully shown on the plans, as it is for other sites with the same detail 15-5 proposed (footprint seems that it would be wider than existing UT width). Please clarify.

Where practicable and depending on hydraulic forces, the partially grouted rip-rap ditches will be narrowed such that the width is not much wider than the existing stream.

4. Site 6- Detail 15-3 shows rip rap keyed into the channel bed at culvert inlet and outlet, but a permanent impact is not shown on streambed (if you zoom way in) or listed on cover letter impact table (only labeled as bank stabilization)

Per our conversation, this impact is necessary to restore a Helene-related stability issue in the channel and is not being proposed as a permanent loss but would be considered permanent fill to stabilize the channel.

The application impact summary has been updated to reflect this. 29 If has been shifted from the Bank Stabilization Column to the Permanent Loss Column.

This does not change the overall permanent impact totals for the project, just the distinction between bank stabilization and loss of waters.

5. Site 7- Is there a feasible way to not pipe as much of this stream as is proposed? Need a detail for proposed rip rap at culvert outlet.

The area around Site 7 is steep on both sides. The length of pipe addresses safety concerns with the existing ditch depth (approximately 2-foot sheer drop, right off the edge of travel) on the westbound side. The pipe will also allow for a minimum 2-foot shoulder, while also minimizing the cut slope (dashed line) directly behind the pipe/shoulder. Plans will be updated to show only the bank stabilization detail.

6. Site 9 – The channel realignment results in a long, straightened reach of Hickory Creek. Is there an alternative available?

The grade of the stream slope is very steep in this location and results in more of a Type B stream. In addition, the stream is adjacent to the fill slope of the road. The road is approximately 40 feet higher than the stream. As shown on the plans, the stream washed out the fill and therefore this section of road during Hurricane Helene. While the plans depict a straight reach, it is expected that adjustments will be made during construction, including the use of large boulders to deflect the flow back and forth within the channel footprint.

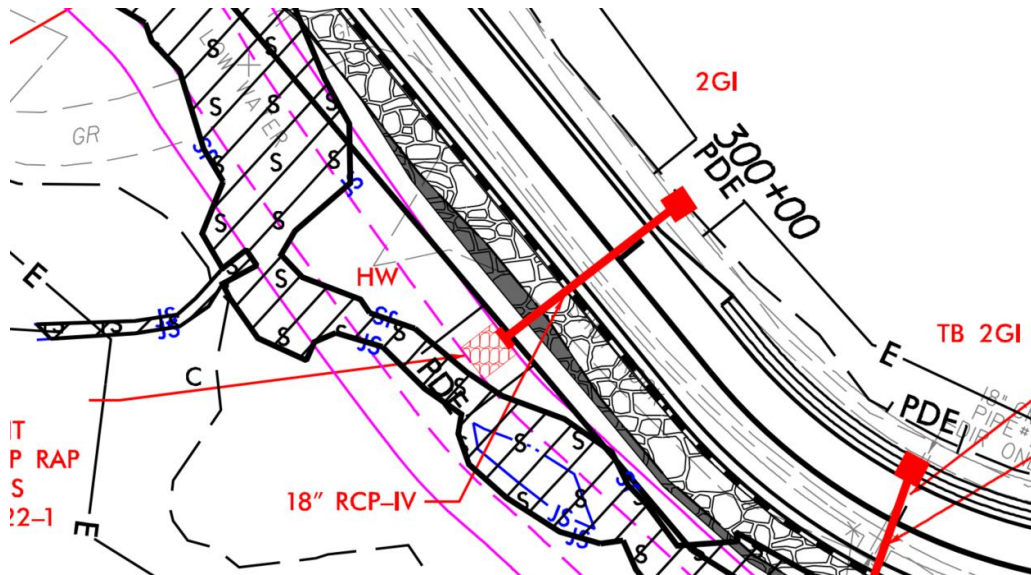
7. Site 10 – wetland fill – is the wetland shown on the plans the entire extent of the wetland? It appears to be an isolated wetland.

Hurricane Helene caused a slope failure/slide in this location. The slope will be cut back as indicated on the plans (dashed line) and a portion (200 ft) will be rock plated. The wetland is at the toe of the slope and is sourced by a spring seep.

8. Can the different parts of the wall below 74A be identified? There is different symbology shown on the plans and I am curious what they mean. Is the entire wall footprint above OHW mark?

The retaining walls are located at Site 17 (PD Sheets 17 and 19) and Site 19 (PD Sheet 21) and have been highlighted in yellow on the drawings.

Gray areas, as noted in the image below, found at the base of the Partially Grouted Rock are imbedded below the stream. The retaining wall footprints are above the OHW mark.



9. Site 12- end of channel realignment – don't see a defined channel that the new channel will connect to (downstream channel is really wide) – will channel be reworked here to a stable dimension?

The contractor and on-site stream relocation professional will need to determine the best location to tie the proposed stream back to the existing stream. The contractor will work in the dry to the extent practicable.

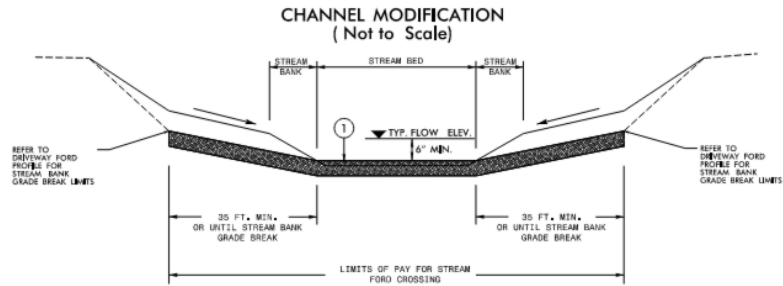
10. S17 - Why are some sections of Hickory Creek being moved closer to 74-A?

Post-Helene channel instability is due to continued channel migration, the channel splitting into a multi-braided channel, substantial aggradation, and over widening of the channel geometry. This continuing instability has caused roadway encroachment by the stream. Consequently, the proposed stream work was determined necessary to the resiliency of the roadway. Impacts to private property and the pre-Helene stream channel alignment were also considered when setting the channel alignment. To maintain smooth meanders, and work within these constraints, the channel alignment may move closer to the road than the existing post-Helene alignment for small sections.

- a. Will a detail be provided for the potential ford in Hickory Creek?

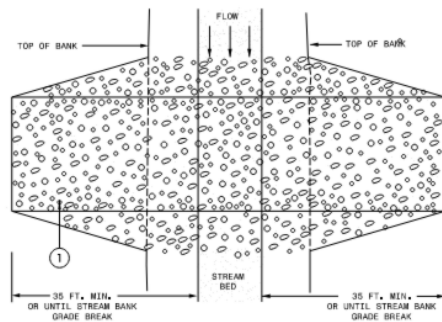
Due to impacting landowners' access to their property, NCDOT will construct/reconstruct rock fords to reestablish this access. The locations and designs of the fords will be provided in a future construction revision. Future maintenance of these fords will be the responsibility of the property owner.

FORD STREAM PROFILE

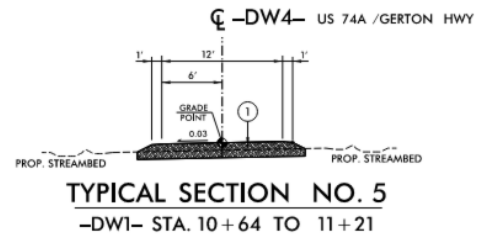


PAVEMENT SCHEDULE	
1	NATURAL MATERIAL

PLAN VIEW FORD STREAM CROSSING



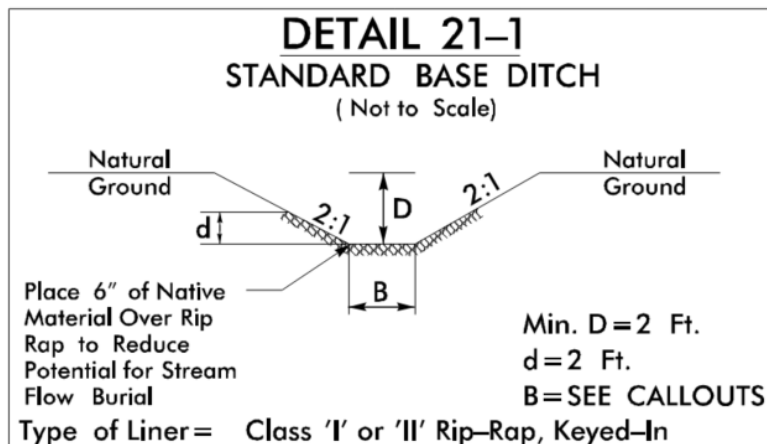
TYPICAL FORD STREAM SECTION



11. Site 20 & 21 – inlet base ditch detail has liner of rip rap with native material on top – this is great.

- The channel changes below, shown with detail Y, Z, B1, C1, D1, E1, do not specify native material on top – can this be specified so that the potential for stream flow burial is reduced?

“Native material” will be added on top of rip rap as noted where practicable.



12. Site 18- Why does the channel need to take a more direct route to Hickory Creek?
Can most of this not be left as is?

This vicinity of Hickory Creek (including these UT's) was obliterated by the deposition of upstream debris and adjacent slides. The stream has re-carved a path to Hickory Creek through this depositional material and remains unstable. This shorter path will reduce the distance the stream is in this high sediment depositional area and is also closer to the pre-storm location of this unnamed tributary.



13. For channel realignment / relocations, will this work be constructed off-line or using a pump-around?

Channel realignments/relocations will be constructed with both methods, minimizing disturbance of the stream flow where practicable. Some areas will require in-stream work due to steepness of channel or limited access.

14. Thank you for noting that contractor is to avoid removal of existing trees within the temporary easement area adjacent to the stream. When will a reforestation plan be submitted? Where will the reforestation occur- within the construction easement area and/or within the temporary easement area? Can that be shown with shading / hatching on the stream relocation plans?

Revised stream plans will include shading/hatching and a detail for reforestation. In general, the reforestation will occur within the easement areas. This revision and plan will be provided with construction revision plans.

USACE Questions dated October 2, 2026

Comments are in-line in the drawings. If there were no comments on the page, the page was deleted.

From Permit Drawings

- Sheet 4 of 29 - This angle should be softened so it's not a 90 degree turn. -

The angle has been altered on the drawings to approximately 75-degrees (heading downstream) with the receiving channel flow. Additionally, impacts have been reduced by 30 lf of permanent impacts, and 15 lf of temporary impacts.

The revised sheets and impact summary table are included in this response.

- Sheet 5 of 29 - Is this an impact an if so is it accounted for in the impact table?

The blue line channel is a braided portion of the Creek resulting from the storm and is not considered a JS or a portion of an UT.

- Sheet 13 of 29 - Why is this stream being relocated when it is so far from the road? –

In this location the road is approximately 62 feet higher than the stream, as shown on the topo Sheet 14, and the slope is extremely steep as shown in the picture. In addition to the near proximity, the channel is also in a bend. During Hurricane Helene this created a scour of the fill slope and subsequent road failure. Consequently, the stream channel will be reestablished further from the roadway, providing a more gradual slope on the embankment.

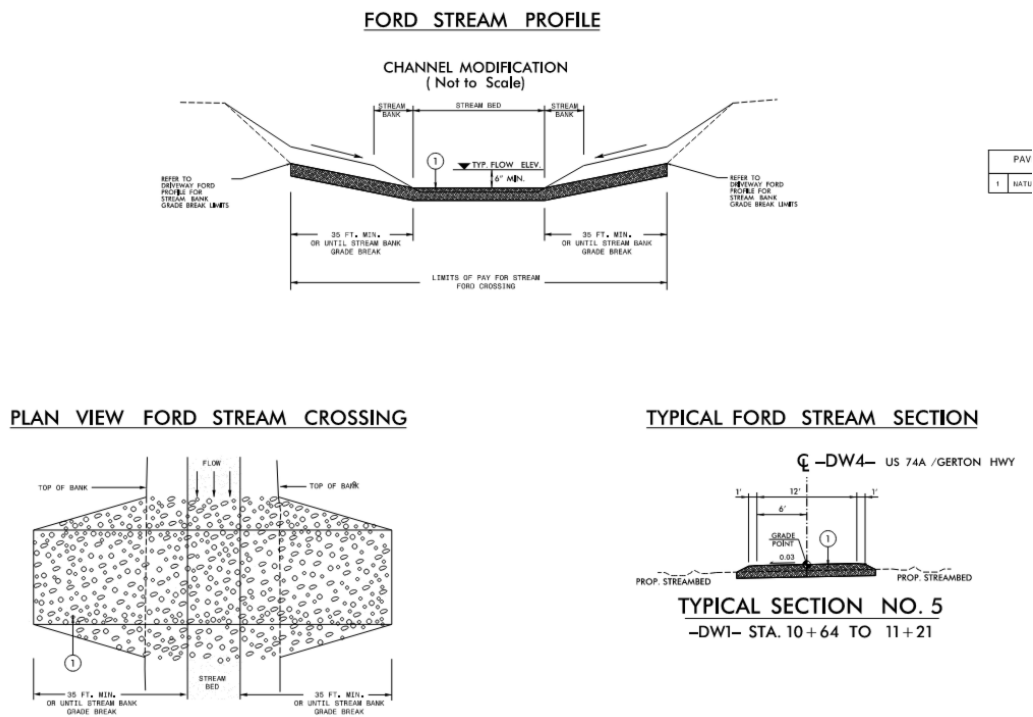


- Sheet 17 of 29 - Why are they relocating the stream when it's this far from the road? They are literally moving it closer to the road in places.

The proposed stream relocation returns the stream to its pre-Helene alignment with a single channel, instead of a multi-braided channel created by the storm. Further, as shown on the topographic sheet 18, this is another area where the channel is quite narrow with steep slopes. The channel has been relocated to not create greater impacts to the road.

- Sheet 19 of 29 - Will this access be maintained and why is the stream being moved closer to the road?

Due to impacting landowners' access to their property, NCDOT will construct/reconstruct rock fords to reestablish this access. The locations and designs of the fords will be provided in a future construction revision. Future maintenance of these fords will be the responsibility of the property owner.



The proposed channel more closely depicts the pre-Helene stream alignment, restoring the pre-storm hydraulic function and meanders wherever practicable.

- Sheet 21 of 29 - Where is this stream currently going? Will the flow pattern remain?

This UT drains through the existing culvert towards Hickory Creek. The downstream outlet of the pipe was not found in the field and may be buried by rock and debris.

The flow pattern will be maintained towards Hickory Creek via a proposed rip rap armored channel.

My biggest concern is Site 17 as this is the biggest relocation and it appears that many of the segments at this location do not occur in very close proximity to the road so it's hard for me to see why relocation is needed.

Post-Helene channel instability is due to continued channel migration, the channel splitting into a multi-braided channel, substantial aggradation, and over widening of the channel geometry. This continuing instability has caused roadway encroachment by the stream. Consequently, the proposed stream work was determined necessary to the resiliency of the roadway. Impacts to private property and the pre-Helene stream channel alignment were also considered when setting the channel alignment. To maintain smooth meanders, and work within these constraints, the channel alignment may move closer to the road than the existing post-Helene alignment for small sections.

There is even one segment being relocated closer to the road which is making me scratch my head some and I'd like to get some more info on the reasoning behind this design.

As noted previously, the proposed stream relocation returns the stream to its pre-Helene alignment with a single channel where it does not risk roadway embankment instability. This approach minimizes the required amount of cut into the southern slope while returning the channel to a relatively natural and stable alignment.

WRC Permitting Comments, October 2, 2026

1. Site 1. The need [to] relocate and armor the stream should be reevaluated since it was not impacted much by flooding. It may be possible to leave the last 100 feet or so undisturbed because the existing channel is beyond the fill for the shoulder widening. This would help avoid some riparian vegetation, which is a general effort the WRC would appreciate throughout the project to help conserve stream shading and reduce further stream warming in the Hickory Creek watershed. Rip rap lining of the channel should be avoided as well unless shear calculations indicate actual scour is expected. Related to this, the detail depicts rip rap only on the new stream banks but there is a note for native material over the rip rap. If the channel is relocated, native material should extend onto the streambed, as likely intended, and be approved by NCDOT staff.

This site and Site 2 were reevaluated and it was determined that the UT to Hickory Creek could be tied in sooner. The angle has been altered on the drawings to approximately 75-degrees (heading downstream) with the receiving channel flow. Additionally, impacts have been reduced by 30 lf of permanent impacts, and 15 lf of temporary impacts.

The revised sheets and impact summary table are included in this response.

2. Site 4 (stream site 5). The grading and clearing of the rhododendron and other stabilizing mature vegetation on the south side of the channel should be avoided (see photo 3). It appears that the channel would not be shifted much anyway, likely because the space needed here for construction will be relatively narrow due to wall construction.

We will add a note to retain existing vegetation to the extent practicable with the first construction revision.

3. Site 8 (stream site 6). The grading and clearing of mature vegetation on the south side of the channel should be avoided in the easement.

We will add a note to retain existing vegetation to the extent practicable with the upcoming construction revision.

4. Grading and clearing of mature riparian vegetation on the south side of the channel should be avoided in the easements at other sites as well, particularly sites 9, 12, and 17. At site 12 it will likely be impractical to fully move the channel, as proposed, anyway due to boulders and likely exposed bedrock (see photo 4). The stream relocation at Site 17 from about 271+00 to about 290+00 does not appear necessary

for road repairs. If the channel is realigned here as proposed, then it is particularly important that clearing be avoided where not necessary (which is primarily in the middle portion of the site where mature trees remain).

We will add a note to retain existing vegetation to the extent practicable with the upcoming construction revision.

5. Like at site 1, the need to armor the stream channel entirely should be reevaluated. Coir matting with a native bed only may suffice and would be better for stream habitat.

We will evaluate and change per comments to the extent practicable assuming this comment is in reference to sites 18 through 21.

In addition to considering the preceding comments, the NCWRC would appreciate the incorporation of the following conditions into the project to help conserve trout habitat in Hickory Creek:

1. PGR (partially grouted rock) should contain voids as specified by standards from the NCDOT hydraulic unit. This would better allow for eventual tree colonization.

Current details and specifications reflect there are voids.

2. Native material and large rock material should remain or be replaced along the face of knee/toe walls that will be in or close to streams.

Current details and specifications to be issued with construction revision will reflect this.

3. Culvert clean-outs and channel excavation, where necessary, should not create perched outlet conditions.

Avoiding perched pipe outlets are included in the Notes shown on the plans.

4. Riprap should only extend vertically to or near the ordinary high level and coir matting should be used above that elevation. Rip rap should be avoided on streambeds except where bed scour is a concern. Rip rap placed on the streambed should be embedded or “keyed-in” below grade and topped with native material to prevent stream flow burial.

Notes and Details regarding the use of rip rap and coir fiber matting will be included in the plans.

5. The streambeds should be restored upstream and downstream of new culvert installations with well-compacted native material or native material/rip rap mix (as directed by environmental staff) to one foot above the culvert inverts.

Notes and Details regarding the use of rip rap and native material will be included in the plans.

6. Erosion control matting with nylon mesh should not be used along streams since it entangles and kills wildlife. Nylon mesh matting is prohibited from use in riparian areas by WQ conditions. Coir matting should be used where erosion control matting is needed along streams.

Erosion Control Plans & Details will be updated to include coir fiber matting only in riparian areas.

7. Streambanks on channel changes should be matted, seeded, and planted with native trees.

This will be included in the reforestation plan and included in the stream design.

8. Applicable measures from the current NCDOT Erosion and Sediment Control Design and Construction Manual should be adhered to (North Carolina Department of Transportation Erosion Control Manual). Design Standards in Sensitive Waters should be incorporated into design and construction to help ensure protection of trout spawning and good quality habitats. Where basins are not practical, comparable 25-year performance should be accommodated with other measures (see part (d) of 15A NCAC 04B .0124).

Erosion Control Plans adhere to the manuals and are designed to standards for sensitive waters and a 25-yr storm performance.

9. Sandbags, rock berms, cofferdams, or other diversion structures should be used to isolate flowing water from in-channel construction wherever practical. Channel changes should be excavated in the dry to the extent possible by first excavating material outside of direct stream flow.

Excavation in the dry shall be implemented where practicable.

10. Channel changes should be directed by the NCDOT engineer or delegated environmental staff.

Stream channel changes will be at the direction of a stream restoration specialist and coordinated on-site with the contractor.

11. Like a reforestation plan, a field constructability and clearing review and flagging of revised clearing limits should be implemented to ensure the contractors and NCDOT representatives have a verified plan for actual grading and clearing needs. I would be glad to assist with that effort.

The Contractor and Division will coordinate a pre-construction meeting with appropriate parties prior to the stream construction.

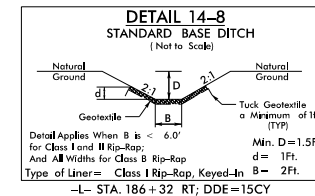
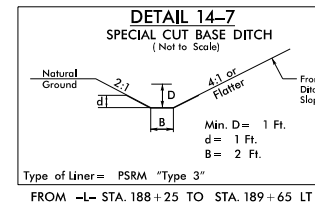
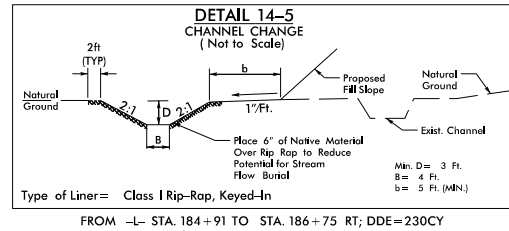
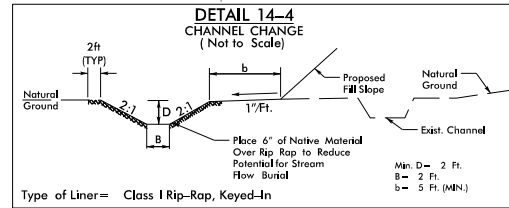
REVISIONS

6/2/99

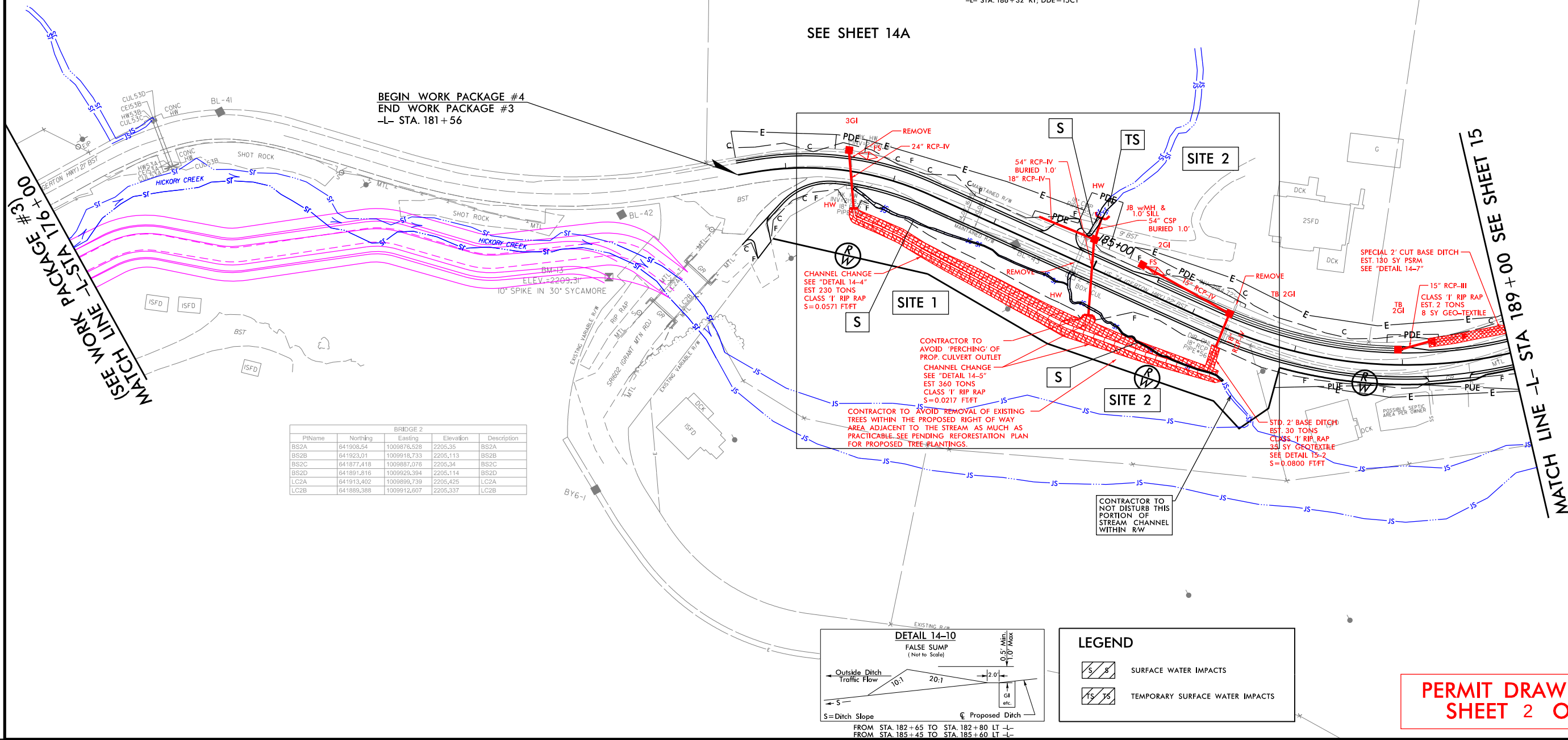
Site 2:
Adjusting for a better angle into UT, and
reducing permanent impact by 30 lf and
temporary by 15 lf.

SINGLE BARREL CONC BOX CULVERT 3' W X 3' H				
POINT	NORTH	EAST	ELEVATION	DESC
CEI53A	642224.763	1009548.484	2225.517	CEI53A
CEI53B	642269.743	1009554.571	2235.031	CEI53B
CUL53A	642225.025	1009546.809	2222.536	CUL53A
CUL53B	642224.544	1009549.976	2222.516	CUL53B
CUL53C	642269.898	1009553.076	2232.018	CUL53C
CUL53D	642269.685	1009556.046	2232.014	CUL53D
HWS3A	642224.693	1009548.449	2226.818	HWS3A
HWS3B	642269.925	1009554.498	2236.621	HWS3B

BRIDGE 2				
PIName	Northing	Easting	Elevation	Description
BS2A	641908.54	1009876.528	2205.35	BS2A
BS2B	641923.01	1009918.733	2205.113	BS2B
BS2C	641877.418	1009887.076	2205.34	BS2C
BS2D	641891.816	1009926.394	2205.114	BS2D
LC2A	641913.402	1009899.739	2205.425	LC2A
LC2B	641889.368	1009912.607	2205.337	LC2B



SEE SHEET 14A



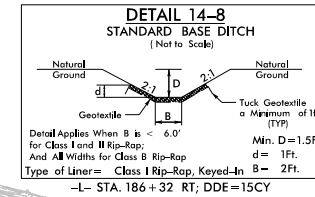
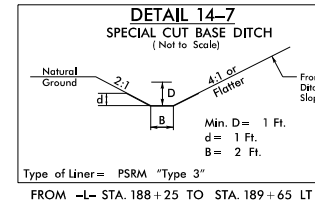
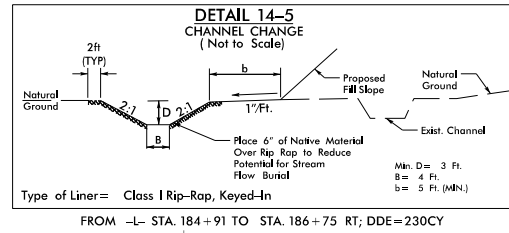
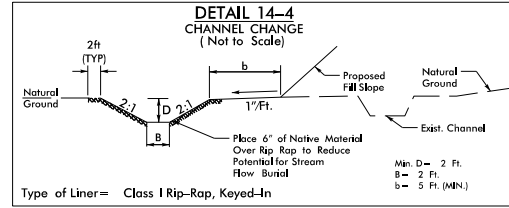
PERMIT DRAWING
SHEET 2 OF 29

6/2/99

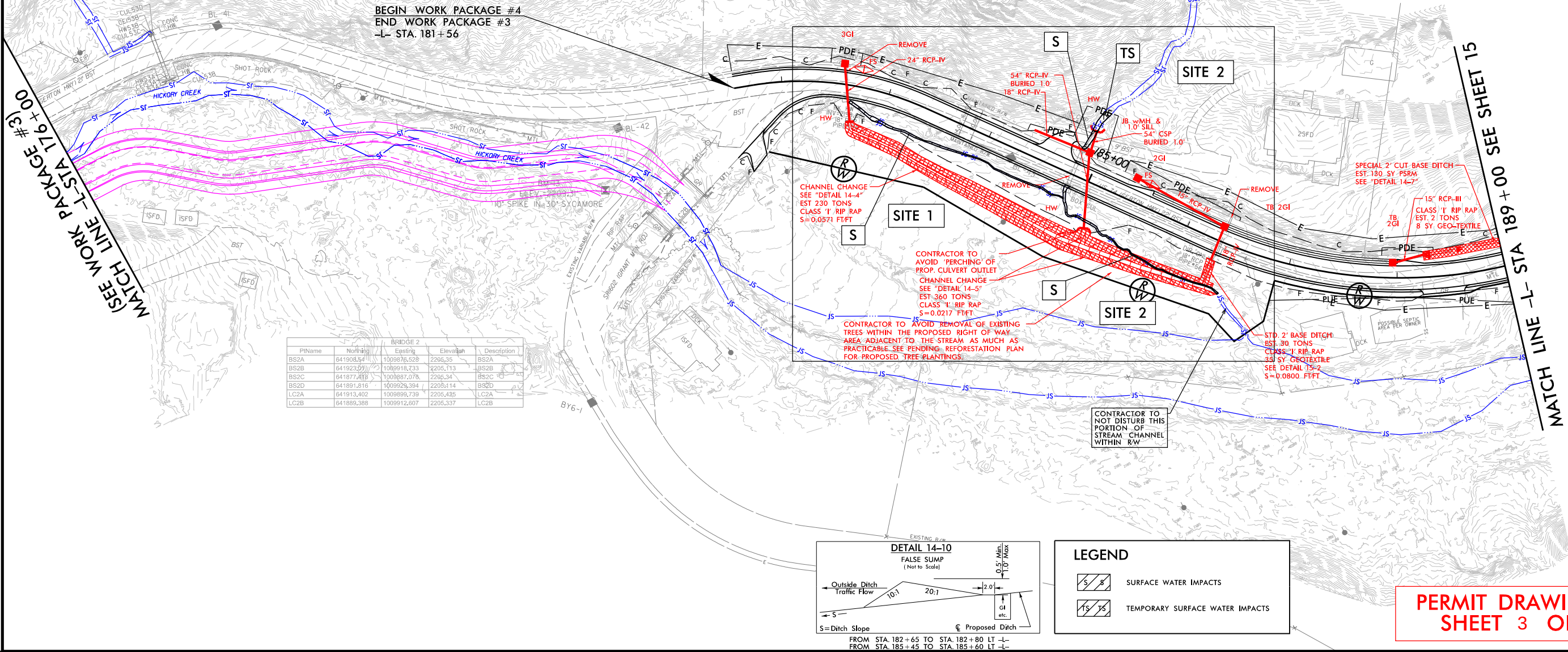
Site 2:
Adjusting for a better angle into UT, and
reducing permanent impact by 30 lf and
temporary by 15 lf.

SINGLE BARREL CONC BOX CULVERT 8' W X 8' H				
POINT	NORTH	EAST	ELEVATION	DESD
CUL53A	642224.763	1009546.384	2225.517	CE53A
CUL53B	642226.743	1009546.573	2228.031	CE53B
CUL53C	642228.025	1009546.009	2225.536	CUL53A
CUL53D	642229.254	1009546.076	2225.516	CUL53B
CUL53E	642230.989	1009546.076	2225.018	CUL53C
CUL53F	642232.086	1009546.046	2225.014	CUL53D
CUL53G	642234.593	1009546.449	2226.816	HW53A
HW53B	642235.925	1009546.496	2230.621	HW53B

BRIDGE 2				
PIName	Northing	Easting	Elevation	Description
BS2A	641908.54	1009876.528	2205.35	BS2A
BS2B	641923.07	1009918.733	2205.113	BS2B
BS2C	641877.418	1009887.076	2205.34	BS2C
BS2D	641891.816	1009926.394	2205.114	BS2D
LC2A	641913.402	1009899.739	2205.435	LC2A
LC2B	641889.368	1009912.607	2205.337	LC2B

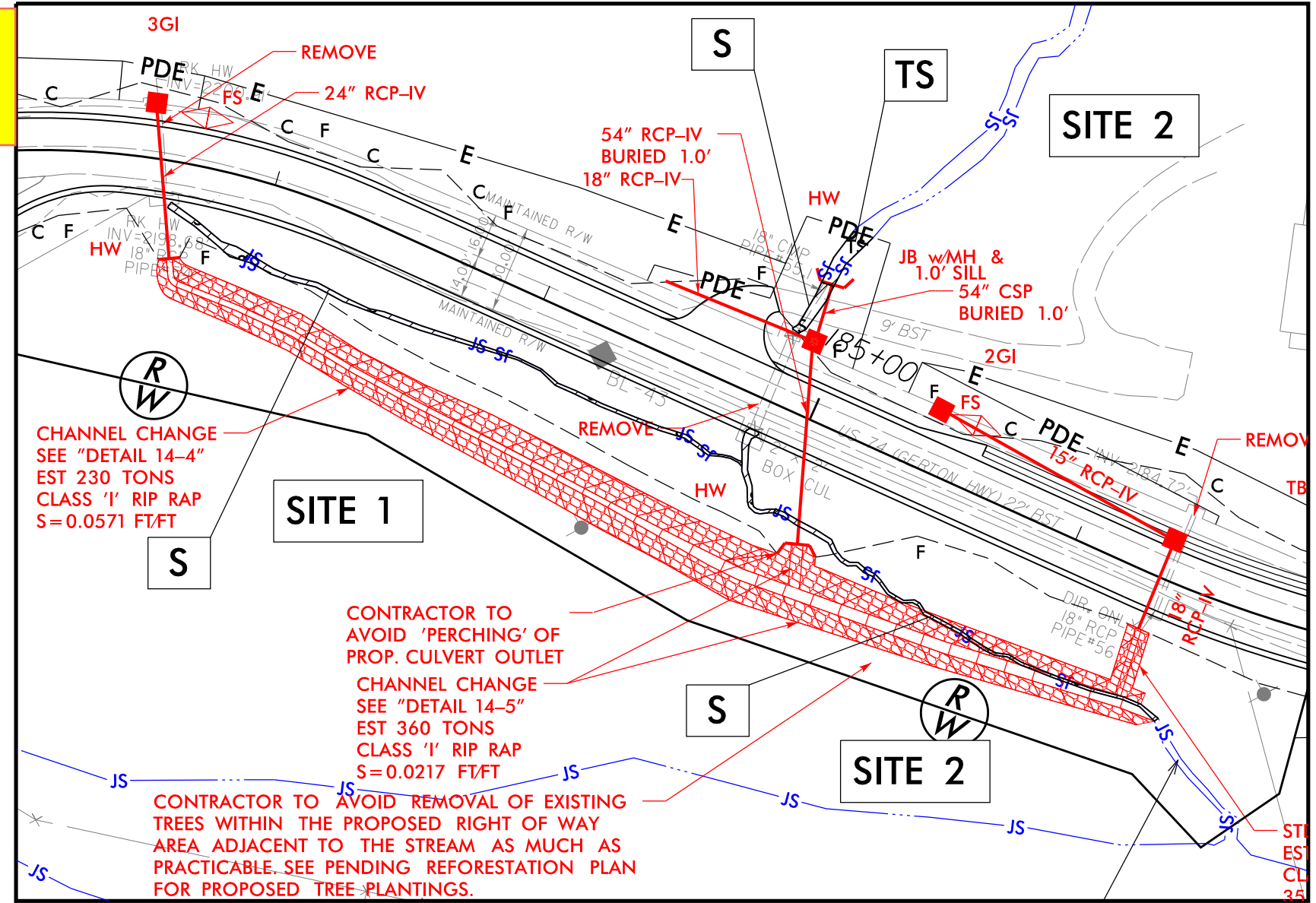
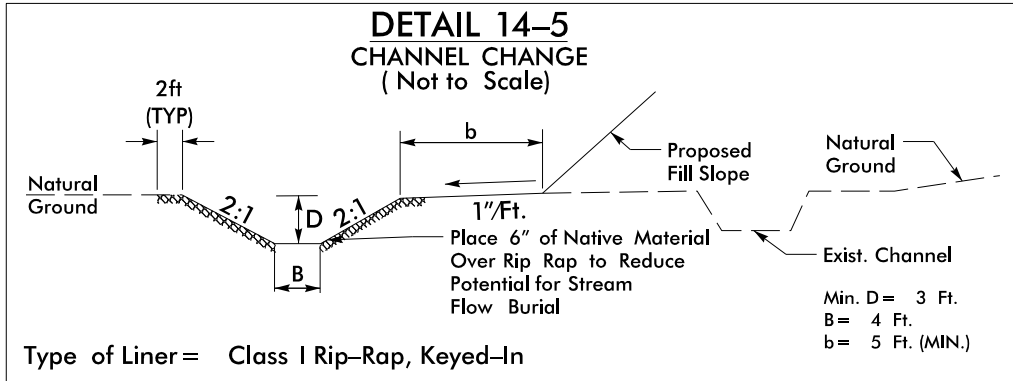
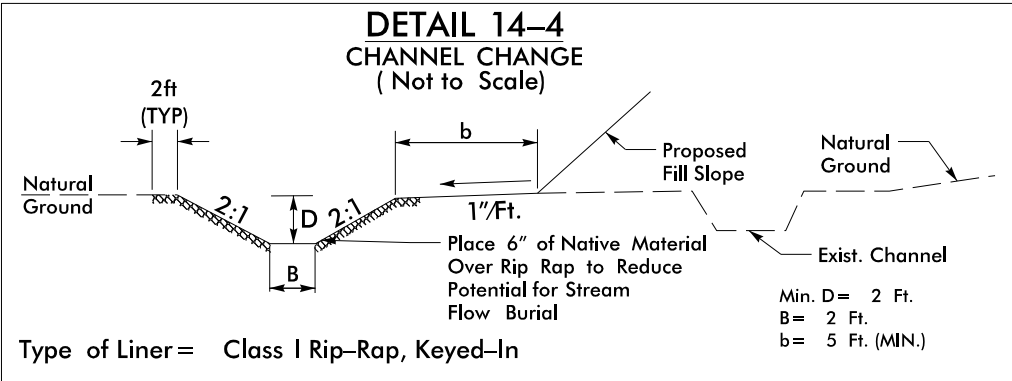


SEE SHEET 14A



PERMIT DRAWING
SHEET 3 OF 29

Site 2:
Adjusting for a better angle into UT, and
reducing permanent impact by 30 lf and
temporary by 15 lf.

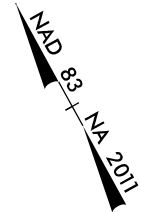


LEGEND

SURFACE WATER IMPACTS

TEMPORARY SURFACE WATER IMPACTS

PROJECT REFERENCE NO. 18314.1045039 (WP4)		SHEET NO. 14A	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			
HDR Engineering, Inc. of the Carolinas 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116			
25 12.5 0 25 50 GRAPHIC SCALE			



Revised Impact
Summary Table to
reflect Site 2 changes.

WETLAND AND SURFACE WATER IMPACTS SUMMARY												
			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-L- 182+65 - 184+85	Channel Change						< 0.01		217		
2	-L- 184+91	54" RCP						< 0.01	< 0.01	56	21	
2	-L- 185+01 - 186+80	Channel Change						< 0.01		153		
3	-L- 189+53 - 189+76	Bank Stabilization						< 0.01		50		
4	-L- 190+86 - 195+68	Hickory Creek Reestablishing						0.13	0.02	450	47	
5	-L- 196+26	18" RCP						< 0.01	< 0.01	32	39	
6	-L- 197+99 - 198+00	Bank Stabilization						< 0.01	< 0.01	29	18	
7	-L- 202+22 - 204+23	30" CSP/RCP-IV and 36" RCP-IV						0.01	< 0.01	160	20	
8	-L- 207+31 - 212+24	Hickory Creek Relocation						0.11		265		
8	-L- 207+31 - 212+24	Hickory Creek Reestablishing						0.10	0.03	213	48	
9	-L- 216+19 - 218+25	Hickory Creek Reestablishing						0.07	< 0.01	169	14	
10	-L- 217+40 - 218+12	Cut Slope			0.02							
11	-L- 218+00 - 221+99	Bank Stabilization						0.03		94		
11	-L- 218+00 - 221+99	Partially Grouted Rip Rap							0.12		327	
12	-L- 221+99 - 226+49	Hickory Creek Relocation						0.12		282		
12	-L- 221+99 - 226+49	Hickory Creek Reestablishing						0.09		139		
13	-L- 226+49 - 227+90	Bank Stabilization						< 0.01		25		
13	-L- 226+49 - 227+90	Partially Grouted Rip Rap							0.11		195	
14	-L- 227+90 - 232+32	Hickory Creek Relocation						0.19		325		
14	-L- 227+90 - 232+32	Hickory Creek Reestablishing						0.10	0.04	178	72	
15	-L- 233+98 - 240+54	Hickory Creek Relocation						0.10		240		
15	-L- 233+98 - 240+54	Hickory Creek Reestablishing						0.15	0.04	291	152	
15	-L- 233+98 - 240+54	Bank Stabilization						< 0.01		20		
16	-L- 255+85 - 258+72	Hickory Creek Reestablishing						0.13	0.02	227	53	
17	-L- 263+44 - 308+38	Hickory Creek Relocation						1.04		1634		
17	-L- 263+44 - 308+38	Hickory Creek Reestablishing						1.66	0.02	2831	52	
18	-L- 281+76 - 285+49	Standard 2' Base Ditch/Channel Change						0.04		449		
19	-L- 280+76 - 281+79	30" RCP-IV						< 0.01	< 0.01	124	20	
20	-L- 281+84 - 281+89	54" RCP-IV						< 0.01	< 0.01	13	12	
21	-L- 283+21 - 283+17	48" RCP						< 0.01	< 0.01	25	9	
22	-L- 314+89 - 314+92	Pipe cleanout/Dewatering							< 0.01		25	
TOTALS*:					0.02			4.12	0.41	8691	1124	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
OCTOBER 2026
HENDERSON COUNTY
18314.1045039
GERTON HWY - US 74

SHEET29OF29

6/2/99

Walls highlighted.

LEGEND

S

S

TS

TS

SURFACE WATER IMPACTS

TEMPORARY SURFACE WATER IMPACTS

PROJECT REFERENCE NO.18314.1045039 (WP4)

SHEET NO.20

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

HDR

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St. Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

5025050100

GRAPHIC SCALE

LEGEND

SLOPE EMBANKMENT

PGR

STABILIZED FILL

MATCH LINE -L- STA 262+00 SEE SHEET 19

MATCH LINE -L- STA 275+00 SEE SHEET 21

SITE 17

DETAIL 20-1

PARTIALLY GROUTED RIP RAP BASE DITCH

(Not to Scale)

Type of Liner= Class 'III' Partially Grouted Rip Rap

STA. 264+35 RT, DDE=10CY, 265+35 RT, DDE=10CY, 267+13 RT, DDE=10CY, 268+94 RT, DDE=10CY -L-

DETAIL 20-2

RIP RAP AT EMBANKMENT

(Not to Scale)

Type of Liner= CL 'III' Rip-Rap, Keyed-In

STA. 264+59 RT, 265+38 RT, 267+13 RT, 268+94 RT -L-

(P)

4' PARTIALLY GROUTED RIP RAP BASE DITCH
EST. 100 TONS CLASS 'III' RIP RAP
80 SY GEOTEXTILE, 10 CY CONCRETE
S=0.6146 FT/FT, SEE DETAIL 20-1

(Q)

RIP RAP AT EMBANKMENT
CLASS 'III' RIP RAP
EST. 50 TONS
SEE DETAIL 20-2

(R)

4' PARTIALLY GROUTED RIP RAP BASE DITCH
EST. 90 TONS CLASS 'III' RIP RAP
70 SY GEOTEXTILE, 10 CY CONCRETE
S=0.6165 FT/FT, SEE DETAIL 20-1

(S)

RIP RAP AT EMBANKMENT
CLASS 'III' RIP RAP
EST. 55 TONS
SEE DETAIL 20-2

(T)

4' PARTIALLY GROUTED RIP RAP BASE DITCH
EST. 50 TONS CLASS 'III' RIP RAP
40 SY GEOTEXTILE, 5 CY CONCRETE
S=0.8125 FT/FT, SEE DETAIL 20-1

(U)

RIP RAP AT EMBANKMENT
CLASS 'III' RIP RAP
EST. 45 TONS
SEE DETAIL 20-2

(V)

4' PARTIALLY GROUTED RIP RAP BASE DITCH
EST. 65 TONS CLASS 'III' RIP RAP
50 SY GEOTEXTILE, 10 CY CONCRETE
S=0.7514 FT/FT, SEE DETAIL 20-1

(W)

RIP RAP AT EMBANKMENT
CLASS 'III' RIP RAP
EST. 40 TONS
SEE DETAIL 20-2

DETAIL 20-3

FALSE SUMP

(Not to Scale)

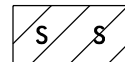
S=Ditch Slope

C=Proposed Ditch

FROM STA. 265+45 TO STA. 265+60 LT -L-
FROM STA. 267+15 TO STA. 267+30 LT -L-
FROM STA. 269+00 TO STA. 269+15 LT -L-
FROM STA. 272+80 TO STA. 272+95 LT -L-

PERMIT DRAWING
SHEET 17 OF 29

LEGEND

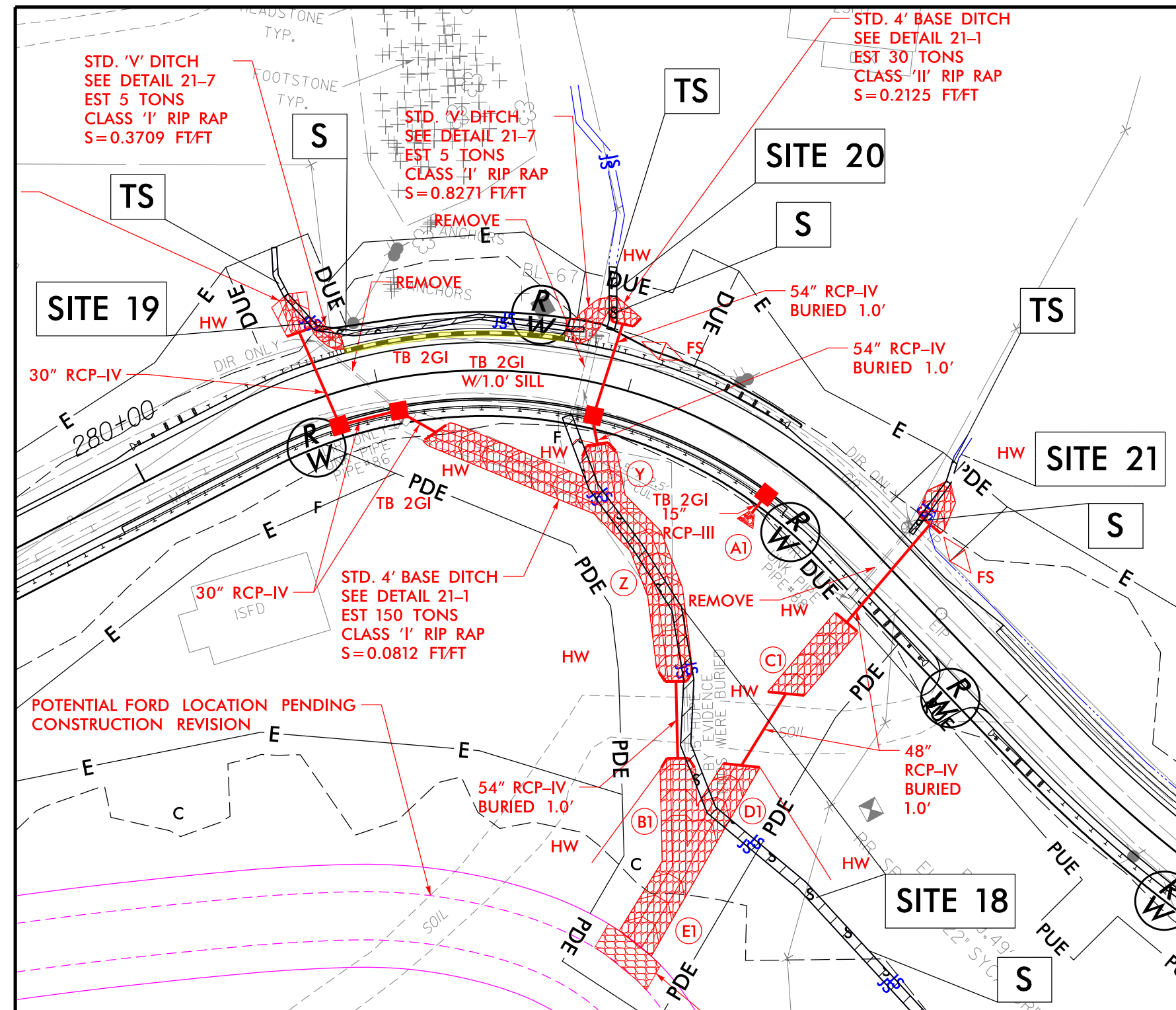
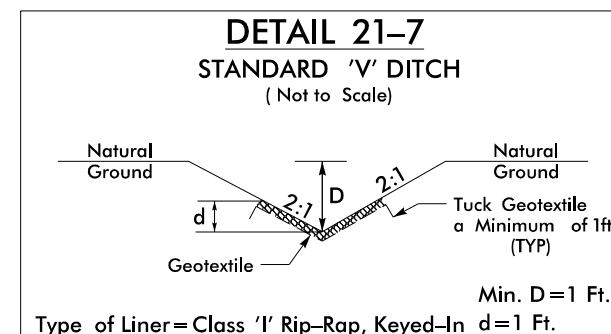
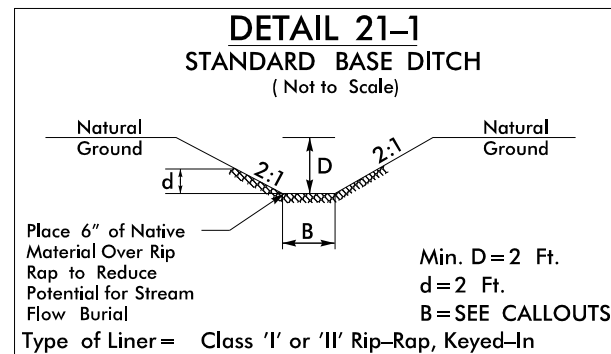


SURFACE WATER IMPACTS



TEMPORARY SURFACE WATER IMPACTS

Walls highlighted.

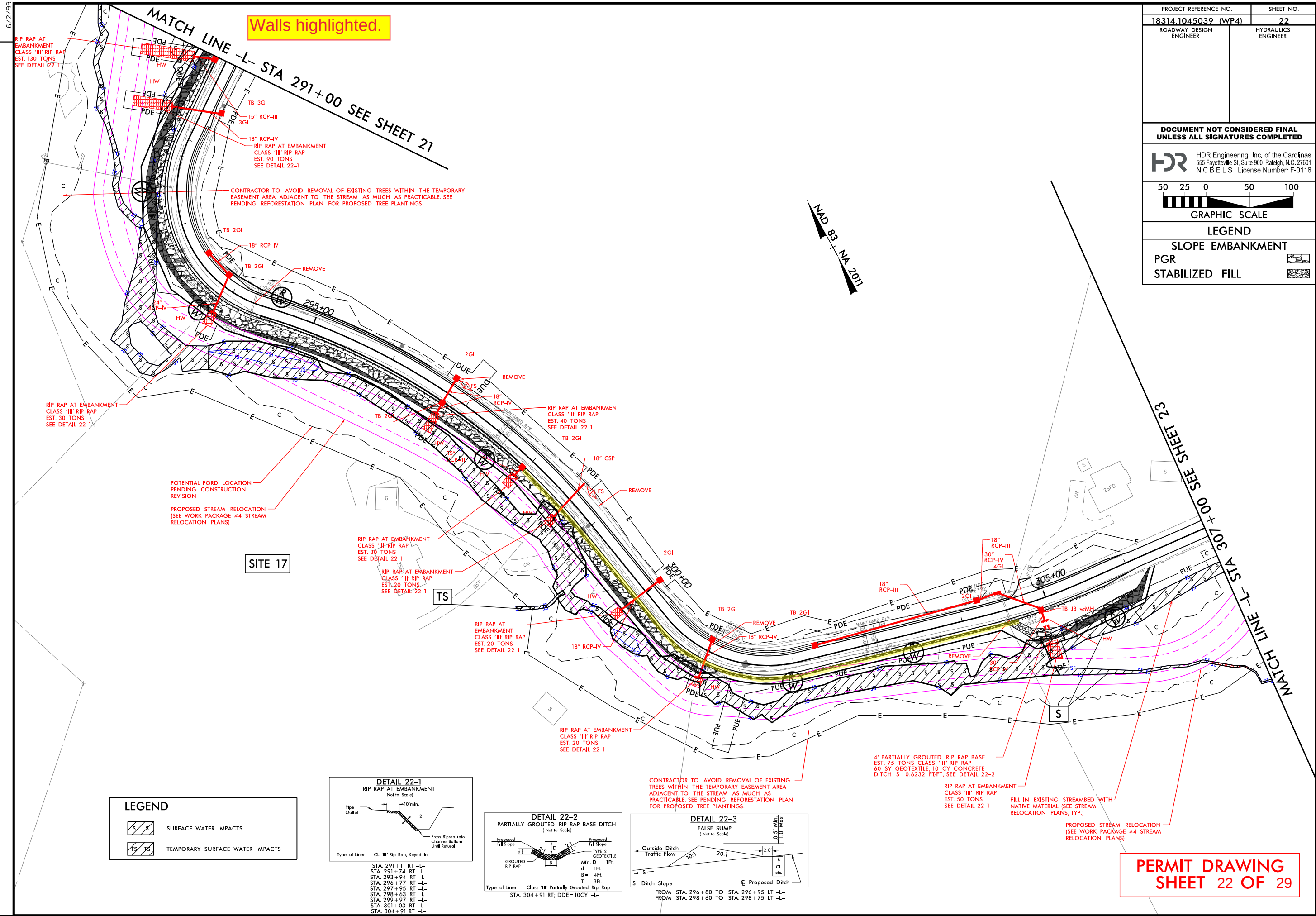


PERMIT DRAWING
SHEET 21 OF 29

PROJECT REFERENCE NO.		SHEET NO.	
18314.1045039 (WP4)		21A	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			
		HDR Engineering, Inc. of the Carolinas 555 Fayetteville St, Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116	
25 0 25 50  GRAPHIC SCALE			

PLOT DRIVER: NCDOT_permit_s.NOCN.WP#4.tbl
PENTABLE: NCDOT_permit_s.NOCN.WP#4.tbl
USER: DAMORRISON
DATE: 6/23/2026
TIME: 7:50:45 AM
FILE: \

REVISIONS



PERMIT DRAWING
SHEET 22 OF 29

Updated Impact Descriptions/ Mitigation Justification

Permit Site	Stream Name	Status/ Class	Stream Re-Establishment	Perm Fill (loss)	Bank Stabil-ization	Temporary Impact	ACOE Mitigation Required	DWR Mitigation Required	Proposed Mitigation Ratio	Impact Description
1	UT Hickory Creek Intermittent	Intermittent	--	217 lf <0.01 ac	--	--	217 (217)	0	1:1	Stream realignment due to fill slope. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location due to the fill slope. Stream jurisdiction starts at the outlet of the existing 18” CMP. The relocation impacts the entire length of the stream at site 1. The stream will be replaced with a base channel and rip rap lined banks for stability. UT to Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the stream and the road and establish a buffer from the roadway. NCDOT proposes a reduction in mitigation ratios for this intermittent system, as stabilization and increased buffer will result in uplift from the current stream condition.
2	UT Hickory Creek	Intermittent	--	239 lf 0.01 209 lf 0.01ac	--	36 lf <0.01ac 15 lf <0.01 ac	239 (239) 209 lf (209)	0	1:1	The existing drainage structures require replacement, impacts due to the roadway fill slope, and channel stability result in relocation of the stream. The existing 18” CMP is undersized and will be replaced with a 54” CMP and the existing box culvert will be replaced with a 54” RCP. The stream realignment is due to fill slope changes from the impacts from Hurricane Helene and stream stability. The stream will be replaced with a base channel and rip rap banks for stability. The temporary impacts are associated with construction methods, access, and dewatering. This stream system is located in one of the wider areas of the Hickory Creek valley and was a depositional area/ debris field after the storm. The area was previously a campground and the stream has evidence of straightening between the road and the campground. Moving the stream away from US 74A will provide a long-term separation from the stream and the road and establish a buffer from the roadway. Additionally, the stream design will provide a more natural profile than what exists today. Due to these factors, NCDOT proposes a reduced mitigation ratio for this system.
3	Hickory Creek	Perennial	--	--	50 lf <0.01ac	--	--	--	--	2’ base ditch/permanent bank stabilization and PDE. Impacts along the bank of Hickory Creek are necessary to stabilize and reduce water velocity from the outlet of the 24” RCP-IV to where it joins Hickory Creek.
4	Hickory Creek	Perennial	--	450 lf 0.13 ac	--	47 lf 0.02 ac	450 (113)	450	0.25:1	Stream realignment. Damage to the roadway structure from Hurricane Helene and the roadway repairs necessary require permanent reestablishment of the channel at this location. The length of stream reestablishment is 450 linear feet. Temporary stream impacts are due to tying in the reestablished stream to the existing and construction method needs. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
5	UT Hickory Creek	Intermittent	--	32 lf <0.01 ac	--	--	32 (8)	0	0.25:1	Replace existing drainage structure (18” RCP). The existing 18” RCP requires replacement with a new 18” RCP-IV and the fill slope will have a 4’ Class III grouted rip rap base ditch resulting in permanent stream impact. The jurisdiction of this intermittent system begins at the outlet of the 18” pipe. The stream exits the pipe and flows down the damaged/ unstable slope and to a boulder field to Hickory Creek. This work will stabilize the slope and the stream channel. Due to the stability created by this work, NCDOT proposes a reduced mitigation ratio for this system.

Updated Impact Descriptions/ Mitigation Justification

Permit Site	Stream Name	Status/ Class	Stream Re-Establishment to Pre-Helene Location	Perm Fill (loss)	Bank Stabil-ization	Temporary Impact	ACOE Mitigation Required	DWR Mitigation Required	Proposed Mitigation Ratio	Impact Description
6	UT Hickory Creek	Perennial	--	29 lf <0.01 ac	29 lf <0.01 ac	18 lf <0.01 ac	-0-	0--	--	Debris removal from existing pipe and permanent bank stabilization. Bank stabilization is necessary to stabilize the inlet and reduce water velocity at the outlet of the 3’ x 3’ box culvert. Temporary impacts upstream and downstream of bridge are shown for debris removal, construction methods, and access.
7	UT Hickory Creek	Intermittent	--	160 lf 0.01 ac	--	20 lf <0.01 ac	160 (160)	0	1:1	Stream piping due to roadway fill slope. The stream will be conveyed through a 30” CSP/RCP-IV and 36” RCP-IV due to the fill slope in this area resulting in 153 linear feet of permanent impact. Temporary impacts upstream and downstream of the pipe are shown for construction methods and access. Based on pre and post storm imagery, it is likely this stream did not previously use the roadside ditch as it does today. It is likely an upstream pipe crossing became clogged during the storm, and the water diverted down the roadside ditch. This system then exits the pipe and cascades ~20 feet down an unstable slope to Hickory Creek. Due to the stability created by this work NCDOT proposes a reduced mitigation ratio for this system.
8	Hickory Creek	Perennial	213 lf 0.10 ac	265 lf 0.11 ac	--	48 lf 0.03 ac	265 (66)	265	0.25:1	Stream realignment. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location. The stream relocation is 265 linear feet and the portion of the stream that will be reestablished to pre-Helene alignment is 213 linear feet. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
9	Hickory Creek	Perennial	169 lf 0.07 ac	--	--	14 lf <0.01 ac	0	0	--	Stream realignment. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location. The section of stream that will be reestablished to pre-Helene alignment is 169 linear feet. Temporary stream impacts are due to tying in the reestablished stream to the existing and construction method needs. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
10	Site 10 is a wetland impact only. See wetland table.									
11	Hickory Creek	Perennial	--	--	94 lf 0.03 ac	327 lf 0.12 ac	--	--	--	Bank stabilization and PGR/easement impacts. Permanent bank stabilization is necessary along the banks of Hickory Creek at four locations down gradient of the pipe outlets along the roadway to stabilize and reduce water velocity. Temporary impacts are shown for installation of the partially grouted rip rap (PGR) adjacent to Hickory Creek and areas within the easement for construction methods and access.

Updated Impact Descriptions/ Mitigation Justification

Permit Site	Stream Name	Status/ Class	Stream Re-Establishment to Pre-Helene Location	Perm Fill (loss)	Bank Stabil-ization	Temporary Impact	ACOE Mitigation Required	DWR Mitigation Required	Proposed Mitigation Ratio	Impact Description
12	Hickory Creek	Perennial	139 lf 0.09 ac	282 lf 0.12 ac	--	--	282 (71)	282	0.25:1	Stream realignment. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location. The stream relocation is 282 linear feet and the portion of the stream that will be reestablished to pre-Helene alignment is 139 linear feet. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
13	Hickory Creek	Perennial	--	--	25 lf <0.01	195 lf 0.11 ac	--	--	--	Bank stabilization and PGR/easement impacts. Permanent bank stabilization is necessary along the banks of Hickory Creek at two locations down gradient of the pipe outlets along the roadway to stabilize and reduce water velocity. Temporary impacts are shown for installation of the partially grouted rip rap (PGR) adjacent to Hickory Creek and areas within the easement for construction methods and access. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
14	Hickory Creek	Perennial	178 lf 0.10 ac	325 lf 0.19 ac	--	72 lf 0.04 ac	325 (81)	325	0.25:1	Stream realignment. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location. The stream relocation is 325 linear feet and the portion of the stream that will be reestablished to pre-Helene alignment is 178 linear feet. Temporary stream impacts are due to tying in the reestablished stream to the existing, construction methods, and access. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.

Updated Impact Descriptions/ Mitigation Justification

Permit Site	Stream Name	Status/ Class	Stream Re-Establishment to Pre-Helene Location	Perm Fill (loss)	Bank Stabil-ization	Temporary Impact	ACOE Mitigation Required	DWR Mitigation Required	Proposed Mitigation Ratio	Impact Description
15	Hickory Creek	Perennial	291 lf 0.15 ac	240 lf 0.10 ac	20 lf <0.01 ac	152 lf 0.04 ac	240 (60)	240	0.25:1	Stream realignment and permanent bank stabilization. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location. The stream relocation is 240 linear feet and the portion of the stream that will be reestablished to pre-Helene alignment is 291 linear feet. Permanent bank stabilization is necessary to stabilize and reduce water velocity from the pipe outlet located at Sta. 240+05. Temporary impacts upstream and downstream of the realignment are shown for construction methods and access. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
16	Hickory Creek	Perennial	227 lf 0.13 ac	--	--	53 lf 0.02 ac	0	0	--	Stream realignment. Damage to the roadway structure from Hurricane Helene requires permanent realignment of the channel at this location. The stream that will be reestablished to pre-Helene alignment is 227 linear feet.
17	Hickory Creek	Perennial	2,831 lf	1,634 lf	--	52 lf 0.02 ac	1,634 (409)	1,634	0.25:1	Stream realignment. Damage to the roadway structure and debris jams from Hurricane Helene requires permanent realignment of the channel at this location. The stream relocation is 1,634 linear feet and the portion of the stream that will be reestablished to pre-Helene alignment is 2,831linear feet. This stretch of Hickory Creek runs at the toe of the existing roadway slope of US 74A. Moving the stream away from US 74A will provide a long-term separation from the river and the road and establish a buffer from the roadway. This will allow the stream to experience a typical flood event and not jeopardize the integrity of the US 74A roadway fill slope. NCDOT will minimize tree clearing within the relocated area to provide as much canopy and stabilization benefits as practicable. Due to the above, NCDOT proposes a reduction in mitigation ratios for this system, as stabilization and increased buffer will result in uplift from the current stream condition.
18	UT Hickory Creek	Perennial	--	449 lf 0.04 ac	--	--	449 (449)	449	1:1	Channel realignment. Damage to the roadway structure, debris piles from Hurricane Helene, and relocation of Hickory Creek results in the need for permanent realignment of the channel. The impact of realigning the stream is 449 linear feet as the new channel will take a more direct route to tie to Hickory Creek.
19	UT Hickory Creek	Intermittent	--	124 lf <0.01 ac	--	20 lf <0.01 ac	124 (124)	0	1:1	Stream piping due to fill slope and retaining wall. The stream will be conveyed through a 30” RCP-IV due to the fill slope and retaining wall construction resulting in 124 lf of permanent impact. Temporary impacts upstream of the pipe are shown for construction methods and access.
20	UT Hickory Creek	Perennial	--	13 lf <0.01 ac	--	12 lf <0.01 ac	13 (13)	0	1:1	Retaining wall and replacement of existing culvert. The existing 3.5 x 2.5 box culvert is being replaced with a 54” RCP-IV due to damage and the retaining wall in this area resulting in 13 lf of permanent impact. Temporary impacts upstream of the pipe are shown for construction methods and access.

Updated Impact Descriptions/ Mitigation Justification

Permit Site	Stream Name	Status/ Class	Stream Re-Establishment to Pre-Helene Location	Perm Fill (loss)	Bank Stabil-ization	Temporary Impact	ACOE Mitigation Required	DWR Mitigation Required	Proposed Mitigation Ratio	Impact Description
21	UT Hickory Creek	Intermittent	--	25 lf <0.01 ac	--	9 lf <0.01 ac	25 (13)	0	0.5:1	Removal of existing pipe and installation of new 48” RCP-IV. Permanent impacts are a result of realigning and stabilization of the existing channel inlet at the pipe removal/replacement. Temporary impacts to the stream are required for equipment to access the pipe and for temporary dewatering (pump around). This vicinity of Hickory Creek (including these UT’s) was obliterated by the deposition of upstream debris and adjacent slides. The streams shown have re-carved a path to Hickory Creek through this area. Due to the stability and restoration of a more natural stream profile this project will provide, NCDOT proposes a reduced mitigation ratio for this system.
22	UT Hickory Creek	Intermittent	--	--	--	25 lf <0.01ac	--	--	--	Removal of debris from existing 36” CMP and access. Temporary impacts to the stream are required for debris removal and access the pipe.
Totals			4,048 lf	4,455 lf Site 2: +29 4,484 lf 4.08 ac	218 lf Site 2: -29 189 lf 0.04 ac	1,124 lf 0.41 ac	4,455 lf 2,009 lf (with ratio)	3,645 lf		
				8,721 lf 4.12 ac Site 6: -30 8,691						

Wetlands in the Project Area

Permit Site	Excavation in Wetlands (loss)	Temporary Impacts in Wetlands	ACOE Mitigation Required	Impact Description/ Avoidance and Minimization
10	0.02 ac	--	*	Excavation for cut slope. This work will result in 0.02 acre of permanent excavation in wetlands due to the installation of rock plating on the roadway cut slope due to landslide damage from the storm. *Due to the small amount of wetland impacts at this location, NCDOT does not propose mitigation for this activity.