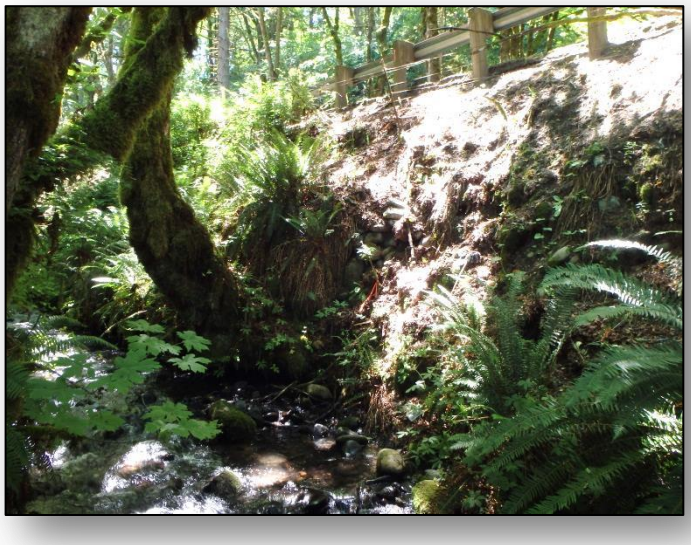
NE Manley Road & Culvert Project

Clark County, WA

DRAFT

Roadway and Stream Alternatives Analysis for
STA 26+00 to 31+00



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November 9, 2017

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Executive Summary

Downstream from the middle culvert on the NE Manley Road project, the existing stream is directly up against the road embankment for a few hundred feet. The road embankment near the stream is oversteepened (in some places at a 1:1 slope) at several locations and has signs of sloughing and slope instability. In order to provide a stable roadway embankment for the new reconstructed and widened roadway, this issue needs to be addressed. This study presents 5 different alternatives for addressing this issue.

The 5 options are:

- Option 1 – Shift Roadway 30 feet west
- Option 2 – Shift Roadway 15 feet west
- Option 3 –Maintain Road Alignment, Add Retaining Wall
- Option 4a – Maintain Road Alignment, Shift Stream 30 feet east
- Option 4b – Maintain Road Alignment, Shift Stream 60 feet east

Of the 5 options studied, the preferred alternate is either 4a or 4b. We recommend that discussions with the property owner to the east occur to determine their preferences before selecting the final alternative.

Endorsement

Background

NE Manley Road & Culvert Repair Project is located northwest of the City of Battle Ground in Clark County, WA. It includes the length of NE Manley Road from its intersection with NE 82nd Avenue (at the north end) to its intersection with NE 244th St (at the south end of the project). The project includes realignment of the roadway, addition of guardrails, and replacement of three culverts where Daybreak Creek crosses NE Manley Road.

Downstream from the middle culvert on the NE Manley Road project, the existing stream is directly up against the road embankment for a few hundred feet. The road embankment near the stream is oversteepened (in some places at a 1:1 slope) at several locations and has signs of sloughing and slope instability. In order to provide a stable roadway embankment for the new reconstructed and slightly widened roadway, this slope issue needs to be mitigated. This study presents five different alternatives for addressing this issue. The study considers the roadway section from approximately STA 26+00 (includes the middle culvert) to STA 31+00. The options are summarized as follows:

Option 1: Leave the stream in the current location, shift the roadway far to the west (approximately 30 feet) to allow a stable 2:1 slope from the roadway down to the stream with scour protection along the toe of the slope

Option 2: Leave the stream in the current location, shift the roadway to the west (approximately 15 feet) and install a retaining wall along the east side of the roadway with scour protection at the toe of the slope.

Option 3: Leave the stream in the current location and the roadway in the current location. Install a large retaining wall along the east of the roadway with scour protection along the toe of the slope.

Option 4a: Leave the roadway in the current location and shift the stream approximately 30 feet to the east. Construct a new 2:1 slope down from the roadway that would fill in the existing streambed.

Option 4b: Leave the roadway in the current location and shift the stream approximately 60 feet to the east. Construct a new 2:1 slope down from the roadway that would fill in the existing streambed.

Discussion

The following sections describe in more detail each of the five options. Appendix A includes a comparison matrix for all of the options, Appendix B includes preliminary drawings for each option, Appendix C includes preliminary costs for each option, and Appendix D contains a Photo Log of the project site.

OPTION 1 – SHIFT ROAD 30 FEET WEST

Road Alignment

This alignment requires a slight reverse curve around station 27+00, and then a tighter curve to get back to the original alignment. Roadway geometrics would be refined if this alternate were selected, and all curves and superelevations would meet the design speed criteria of 35 mph.

Roadway Embankment

Two roadway embankments would be modified. First, the east embankment starting around STA 27+00 would be excavated down to the stream at a 2:1 slope so it would be stable. The slope grading would continue until approximately STA 30+00. On the west side, from STA 28+00 to STA 31+00, new embankment fill would be required. The new embankment fill would be sloped at 2:1 down from the roadway.

Stream Reconstruction

The only stream reconstruction to occur in this option would be that associated with the middle culvert replacement along with scour protection at the toe of the slope, which would be at the west side of the stream. This would entail excavation (during the IWWW) for a rock toe that would be deep enough and large enough to resist lateral movement of the stream.

Retaining Walls

This option requires a substantial retaining wall approximately 200 feet long with a supported height of wall up to approximately 19 feet at the highest. The wall would be cut into the side of a steep hillside, and would require tiebacks into the backslope. Facing materials would either be pressure treated wood planking or precast concrete.

Environmental Impact

Other than the culvert replacement, impact to the stream would be limited to the toe protection along the left or west bank of the stream as described above. This option also would require removal of the trees along the east side of the roadway where the slope is being reduced and also along the west side of the roadway where new embankment is added. Total square footage of vegetation removal including the large trees would be approximately

0.5 acres.

Stormwater

The plan for collection, treatment, and detention of stormwater in this option is to use curbs along the edges of the roadway with catch basins. These would be collected and conveyed down and across the north culvert to a new stormwater facility on the west side of the road just north of the creek.

ROW Impact

In addition to the temporary and permanent easements required for the middle culvert replacement, an additional 40 foot wide by approximately 500 foot of ROW acquisition will be required along the west side of the roadway to accommodate the slopes for the new embankment.

OPTION 2 – SHIFT ROAD 15 FEET WEST

Road Alignment

This alignment starts around station 27 +00 and has a wider curve than existing before transitioning back to the original alignment. Roadway geometrics would be refined if this alternate were selected, and all curves and superelevations would meet the design speed criteria of 35 mph.

Roadway Embankment

Two roadway embankments would be modified. First, the east embankment starting around STA 27+00 would be excavated to a 2:1 slope up from the stream, and then a 7 to 8 foot high retaining wall constructed to support the roadway. The retaining wall would be approximately 150 feet long and then slope grading would continue until approximately STA 30+00. On the west side, from STA 28+00 to STA 31+00, new embankment fill would be required. The new embankment fill would be sloped at 2:1 down from the roadway.

Stream Reconstruction

The only stream reconstruction to occur in this option would be that associated with the middle culvert replacement along with scour protection at the toe of the slope, which would be at the west side of the stream. This would entail excavation (during the IWWW) for a rock toe that would be deep enough and large enough to resist lateral movement of the stream.

Retaining Walls

This option requires a retaining wall approximately 100 feet long with a supported height of

wall up to approximately 10 feet at the highest. The wall would be cut into the side of a steep hillside, pending final design, tiebacks may not be required for the wall for this option. Facing materials would either be pressure treated wood planking or precast concrete. It also requires a retaining wall approximately 150 feet long on the east side of the roadway. The retaining wall is assumed to be a type of gabion basket or an MSE wall.

Environmental Impact

Other than the culvert replacement, impact to the stream would be limited to the toe protection along the left or west bank of the stream as described above. This option also would require removal of the trees along the east side of the roadway where the slope is being reduced and also along the west side of the roadway where new embankment is added. Total square footage of vegetation removal including the large trees would be approximately 0.4 acres.

Stormwater

The plan for collection, treatment and detention of stormwater in this option is to use curbs along the edges of the roadway with catch basins. These would be collected and conveyed down and across the north culvert to a new stormwater facility on the west side of the road just north of the creek.

ROW Impact

In addition to the temporary and permanent easements required for the middle culvert replacement, an additional 35 foot wide by approximately 300 foot of ROW acquisition will be required along the west side of the roadway to accommodate the slopes for the new embankment.

OPTION 3 – NO SHIFT FOR ROAD AND STREAM

Road Alignment

This option maintains the original alignment, with the slight widening to occur on the east side.

Roadway Embankment

The embankment on the west side would not be disturbed. The embankment on the east side would be lowered to a 2:1 near the stream, and then a retaining wall installed that would support the roadway.

Stream Reconstruction

The only stream reconstruction to occur in this option would be that associated with the

middle culvert replacement along with scour protection at the toe of the slope, which would be at the west side of the stream. This would entail excavation (during the IWWW) for a rock toe that would be deep enough and large enough to resist lateral movement of the stream.

Retaining Walls

A retaining wall (either gabion or MSE) would be required along the east side that would be 12 to 15 foot high by approximately 250 feet long.

Environmental Impact

Other than the culvert replacement, impact to the stream would be limited to the toe protection along the left or west bank of the stream as described above. This option also would require removal of the trees along the east side of the roadway where the slope is being reduces but not along the west side of the roadway. Total square footage of vegetation removal including the large trees would be approximately 0.2 acres.

Stormwater

The plan for collection, treatment, and detention of stormwater in this option is to use curbs along the edges of the roadway with catch basins. These would be collected and conveyed down and across the north culvert to a new stormwater facility on the west side of the road just north of the creek.

ROW Impact

The only ROW impact would be temporary and permanent easements required for the middle culvert replacement.

OPTIONS 4a and 4b – General Discussion

These options use the existing alignment of NE Manley Road while shifting the stream alignment away from the roadway. The stream channel through this reach closely parallels the roadway alignment, turning sharply at the outlet of the middle culvert. The stream is relatively steep (approximately 20%) at the outlet of the middle culvert and transitions to a less confined and more gradual slope (approximately 2%) along this reach. Evidence of scour and erosion is present immediately downstream of the existing crossing. The erosion is occurring at the middle culvert outlet and further downstream along the oversteepened road embankment. Vegetation includes some lawn, shrubs, and some trees. Immediately adjacent to the roadway is a stand of mature trees. The stream flows through this stand. East of the forested area is a privately owned pasture that is used for grazing horses.

Two alternatives were developed for relocating the existing stream. Alternative 4a reduces impact to the grazing pasture and will require removing some of the trees along the roadway

embankment. Alternative 4b alleviates the sharp bend in the existing channel by increasing the radius of the bend. This alternative also impacts the fewest number of mature trees by routing the stream to the east of the forested area, through the pasture area. Figures of each option displaying each alternative stream alignment, profile, and section are included in Appendix B.

OPTION 4a – SHIFT STREAM 30 FEET EAST

Road Alignment

This option maintains the original alignment, both horizontal and vertical, with the slight widening to occur on the east side.

Roadway Embankment

This option includes filling the existing stream area so a stable 2:1 slope occurs to support the roadway. This removes the condition of the oversteepened bank on the east side of the roadway.

Stream Reconstruction

Alternative 4a is the shorter proposed stream route at 380 feet. This alternative shifts the stream channel to the east approximately one stream width starting from immediately downstream of the middle culvert to approximately 70 feet upstream of the private driveway. This proposed alignment will result in the top of the west bank following the toe of the 2:1 road embankment slope. This alternative flowpath remains outside of the property owner's fence line.

Placement of the stream at this location will result in the following impacts:

- Removal of approximately 19 mature trees located within the footprint of the proposed channel in addition to the trees removed for the construction of the culvert and roadway embankment.
- Approximately 800 cubic yards net of fill material in the existing stream channel.
- The stream slope can be decreased to 8.5% immediately downstream of the middle culvert and an average of 3.8% until the tie in point with the existing stream channel. This more gradual slope will improve overall fish passage through the reach.

Retaining Walls

No retaining walls are required for this option.

Environmental Impact

Approximately 20 large trees along the roadway embankment will be removed with this

option, along with 19 additional trees for the new stream location. The existing trees do provide a buffer from traffic noise and sight for the neighboring property owner. Revegetation including new trees could be reestablished in the disturbed areas.

Stormwater

The plan for collection, treatment, and detention of stormwater in this option is to use curbs along the edges of the roadway with catch basins. These would be collected and conveyed down and across the north culvert to a new stormwater facility on the west side of the road just north of the creek.

ROW Impact

In addition to the ROW required for the middle culvert replacement, this option would require an additional 30 ft wide by 350 ft long easement on the east side of the roadway to accommodate the new stream location. The ROW could either be temporary or permanent.

OPTION 4b – SHIFT STREAM 60 FEET EAST

Road Alignment

This option maintains the original alignment, both horizontal and vertical, with the slight widening to occur on the east side.

Roadway Embankment

This option includes filling the existing stream area so a stable 2:1 slope occurs up to support the roadway. This removes the condition of the oversteepened bank on the east side of the roadway.

Stream Reconstruction

Alternative 4b has the longest flowpath at 460 feet, as it routes the stream around the stand of trees. The radius of the existing sharp bend immediately downstream of the middle culvert will be increased. This will allow the stream to flow out of the stand of trees, then turn to flow parallel with the roadway in the private pasture and merge with the existing channel approximately 90 feet upstream of the private driveway. A berm will be constructed on the outside of the proposed bend to add additional protection for the barn located approximately 50 feet away. Additional trees will be planted along the east bank to provide shade and hardness. In addition to maximizing the distance between the roadway and the stream, this alternative provides room along the roadway that can potentially be used for a stormwater facility or a high flow channel.

Placement of the stream at this location will result in the following impacts:

- Encroachment beyond the fence line by 20 to 40 feet.
- Removal of approximately 2 mature trees located within the footprint of the proposed channel in addition to the trees removed for the construction of the culvert and roadway embankment.
- Approximately 900 cubic yards net of fill material in the existing stream channel.
- The stream slope can be decreased to 8.8% immediately downstream of the middle culvert and an average of 4.1% until the tie in point with the existing stream channel. This more gradual slope will improve overall fish passage through the reach.
- Addition of meanders, creating more complexity within the channel and further improving fish habitat.

Retaining Walls

No retaining walls are required for this option.

Environmental Impact

Approximately 20 large trees along the roadway embankment will be removed with this option. The existing trees on each side of the stream which provide a buffer from traffic noise and sight for the neighboring property owner would remain, as the new stream location would be routed just to the east of them in the current pasture area. Revegetation including new trees could be reestablished in the disturbed areas.

Stormwater

This option provides an alternative location for a stormwater facility in the flat area just east of the roadway near STA 30+00

ROW Impact

In addition to the ROW required for the middle culvert replacement, this option would require an additional 100 ft wide by 350 ft long easement on the east side of the roadway to accommodate the new stream location. The ROW could either be temporary or permanent.

Cost Summary

The approximate construction costs shown broken down in Appendix C and summarized in the Comparison Matrix in Appendix A were developed for the section of roadway from STA 26+00 to STA 31+00. The estimated amounts are the base costs of the major items, and each alternate includes the construction cost of replacing the middle culvert. Costs not included in each option are mobilization, contingency, ROW costs at the middle culvert, and costs for stormwater conveyance, treatment, and detention. Relative costs for stormwater can be provided by the County staff that is providing the stormwater design.

Preferred Alternate

After review of the five alternates, it is our recommendation that Alternate 4a or 4b be considered. These two alternates have the following advantages:

- No retaining walls, allows significant area for vegetation and tree replanting
- Maintains existing road alignment, keeping the same horizontal and vertical profiles
- Allows more length for reducing the stream gradient coming from the middle culvert, which allows improved fish passage.
- Better horizontal stream alignment, eliminates sharp corners, and reduces scour and lateral movement potential. This is important as when both the middle and southern culverts are replaced, more stream flow during flood events will occur.
- Both are at the lower end of the comparative costs

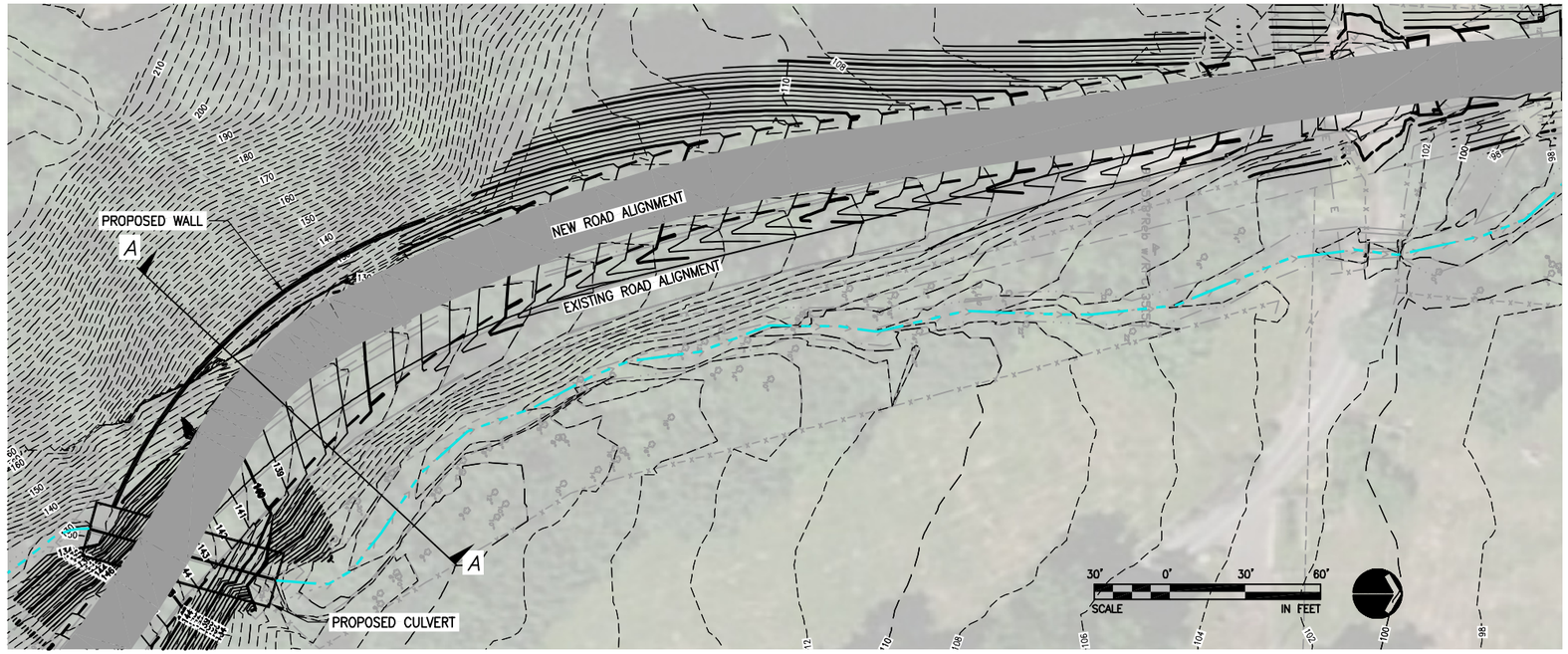
The main differences between Options 4a and 4b is the removal of (or preserving of) the number of large trees that provide a buffer between the existing property and the roadway, and the proximity of the relocated stream to the neighboring pasture and barn. If the buffer is desired, than Option 4b would be preferred, but if it the desire to keep the stream closer to the roadway is important, Option 4a would be preferred. We recommend that discussions with the property owner regarding preferences occur prior to selection of the final alternate.

Appendix A:
Comparison Matrix

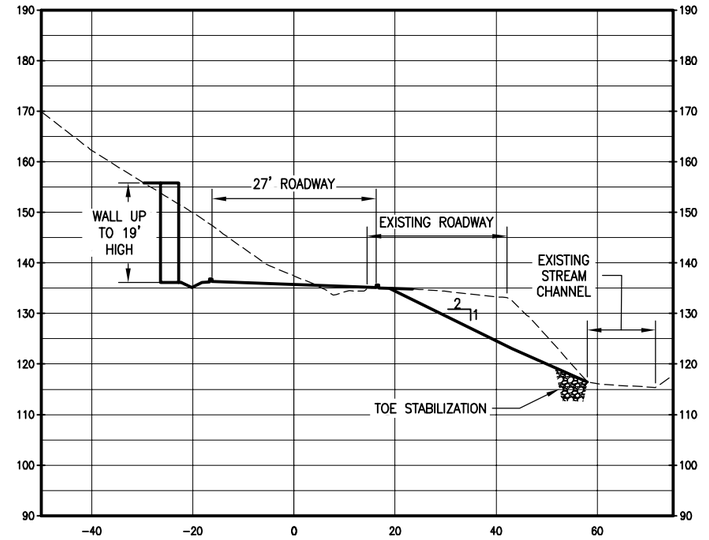
Appendix A – NE Manley Rd Comparison Matrix, Sta 26+00 to 31+00

Option	Roadway Alignment	Roadway Embankment	Stream Reconstruction	Walls	Environmental	Stormwater	ROW	Approximate Cost
1	Shift 30 feet west	Construct new embankment on west side, grade out existing on east side.	Limited to vicinity of culvert and armoring toe of slope	200 ft tie-back wall on west side of road	Tree removal (20 count), 0.5 acre vegetation grubbing, embankment armoring	Collected and conveyed to north of northern culvert.	40ft x 500 ft (20,000 sf)	$1,158,000
2	Shift 15 feet west	Construct new embankment on west side, grade out existing on east side	Limited to vicinity of culvert and armoring toe of slope	100 ft of retaining wall on west side o road; 150 ft of fill wall on east side of roadway	Tree removal (20 count), 0.4 acre vegetation grubbing, embankment armoring	Collected and conveyed to north of northern culvert.	35ft x 300 ft (10,500 sf)	$880,000
3	Existing	Regrade slope below wall	Limited to vicinity of culvert and armoring toe of slope	250 ft of fill wall on east side of roadway	Tree removal (20 count), 0.2 acre vegetation grubbing, embankment armoring	Collected and conveyed to north of northern culvert.	No permanent, some temporary for culvert and wall installation	$665,000
4a	Existing	Construct embankment on east side	Shift stream alignment 30 ft east, regrade 380 ft of stream parallel to roadway	None	Tree removal (40 count), 0.25 acre vegetation grubbing, embankment armoring	Collected and conveyed to north of northern culvert.	30ft x 350 ft (10,500 sf)	$687,000
4b	Existing	Construct embankment on east side	Shift stream alignment 60 ft east, regrade 460 ft of stream parallel to roadway	None	Tree removal (22 count), 0.3 acre vegetation grubbing, embankment armoring	Potential for facility located at STA 30+00 between road and stream	100ft x 350 ft (35,000 sf)	$757,000

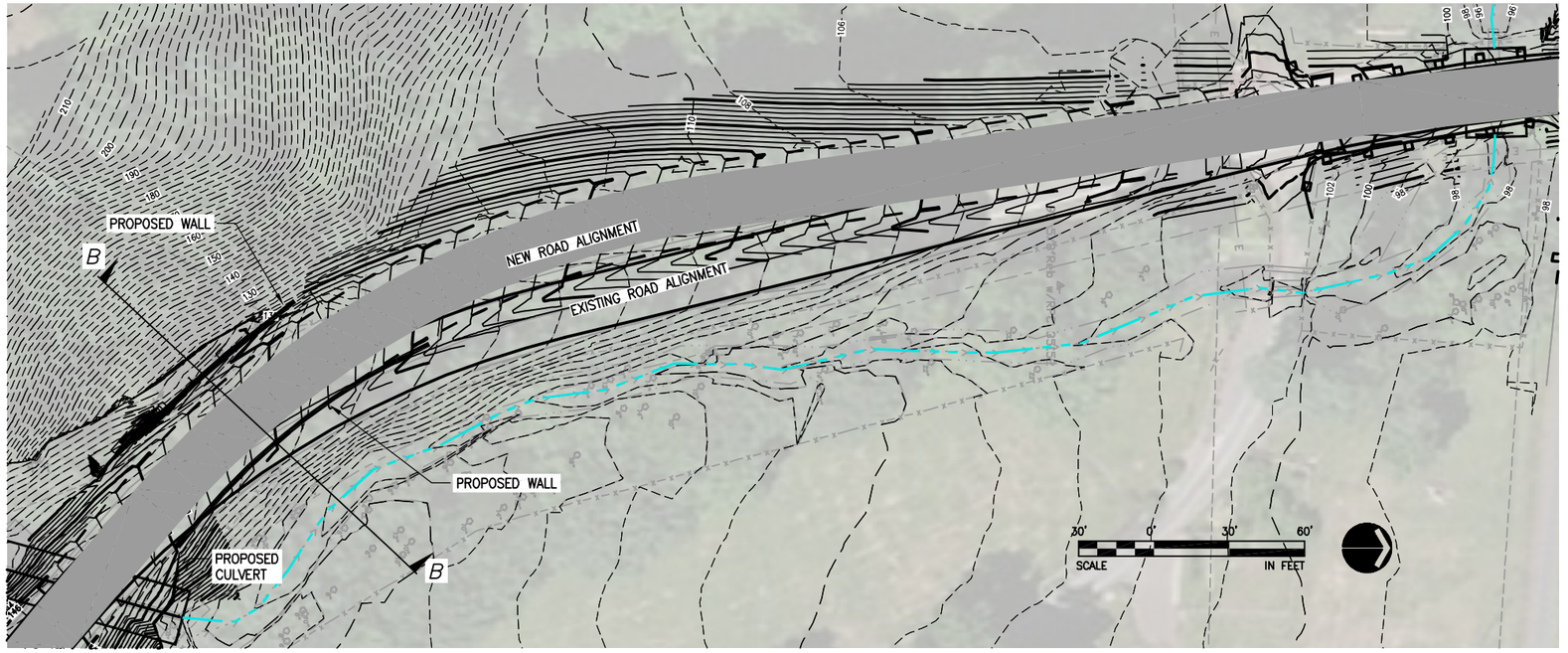
Appendix B:
Alternate Drawings



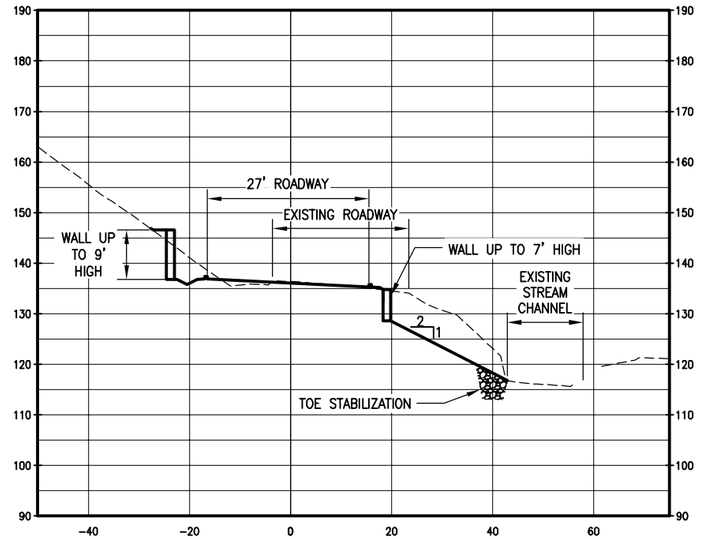
PLAN – OPTION 1



SECTION A–A – OPTION 1



PLAN – OPTION 2



SECTION B–B – OPTION 2

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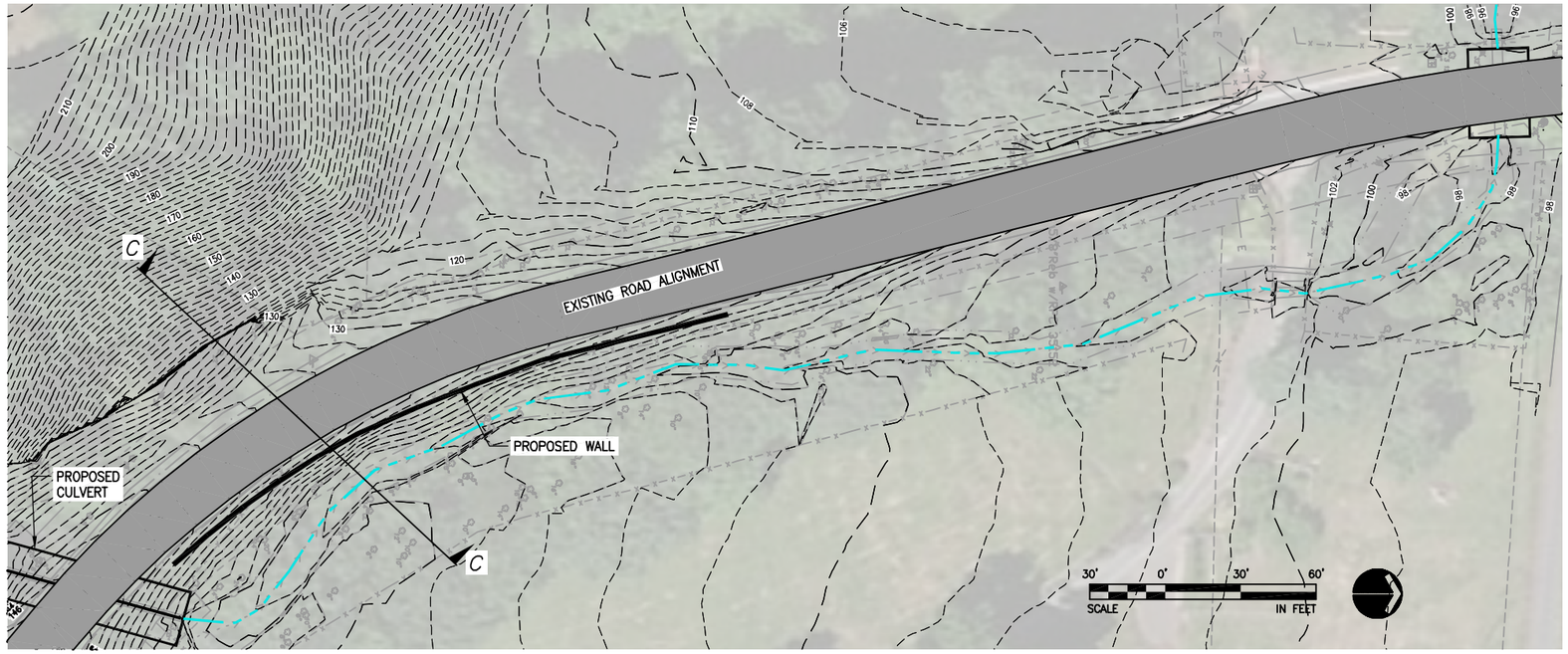
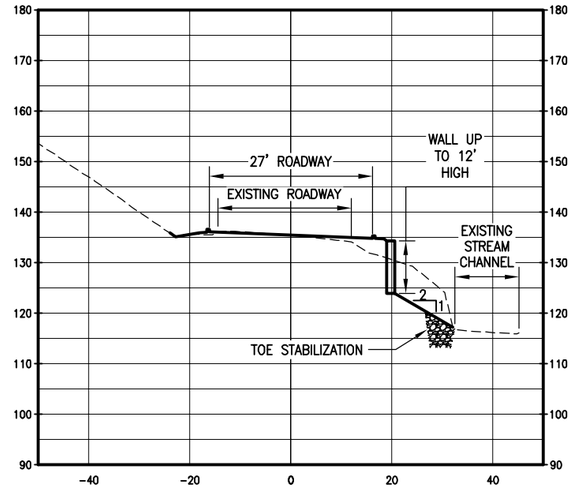
WALL AND ROADWAY ALIGNMENT OPTIONS 1 AND 2
NE MANLEY ROAD AND CULVERT PROJECT
ROADWAY AND STREAM ANALYSIS



PLAN – OPTION 3



SECTION C–C – OPTION 3

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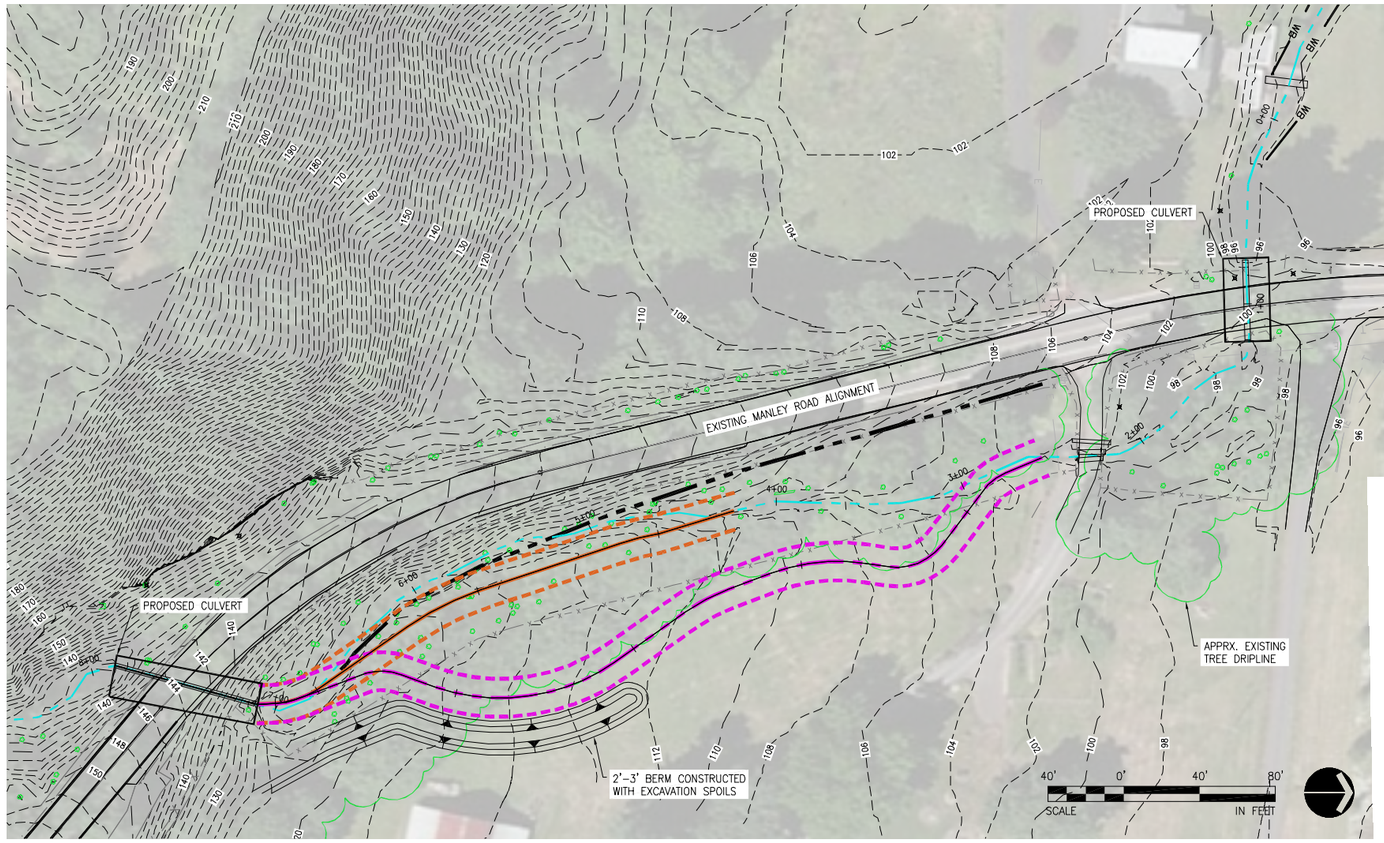
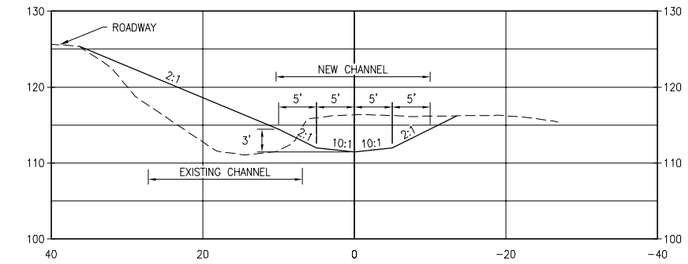
WALL AND ROADWAY ALIGNMENT
OPTION 3
NE MANLEY ROAD AND CULVERT PROJECT
ROADWAY AND STREAM ANALYSIS

LEGEND

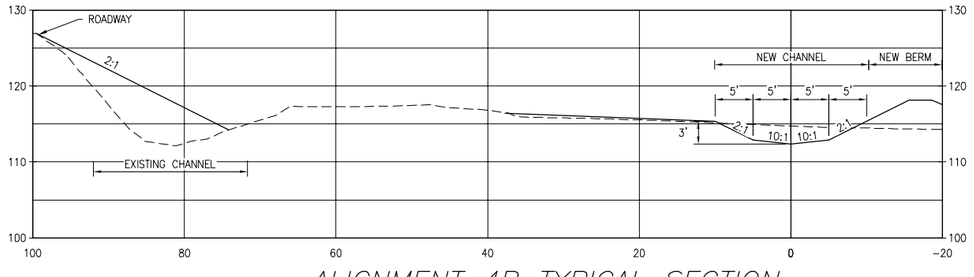
- EXISTING STREAM ALIGNMENT
- PROPOSED STREAM ALIGNMENT 4A
- ESTIMATED TOP OF BANK FOR STREAM ALIGNMENT 4B
- PROPOSED STREAM ALIGNMENT 4B
- ESTIMATED TOP OF BANK FOR STREAM ALIGNMENT 4B
- APPROXIMATE TOE OF 2:1 ROAD EMBANKMENT SLOPE
- EXISTING TREES



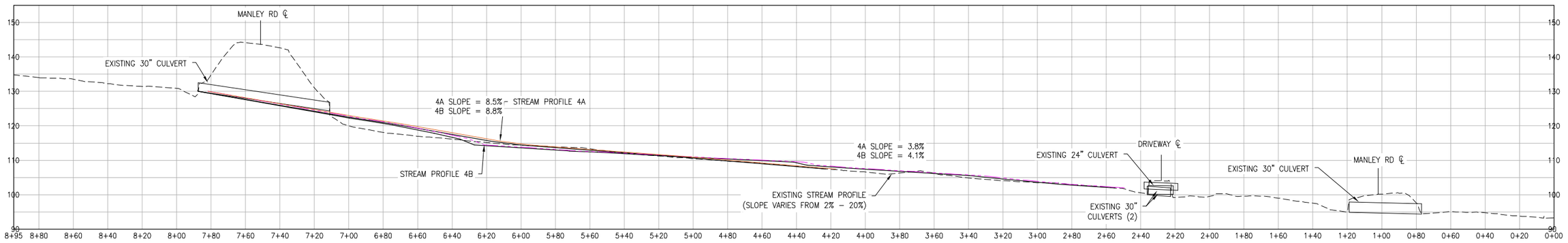
PLAN – OPTIONS 4A AND 4B



ALIGNMENT 4A TYPICAL SECTION



ALIGNMENT 4B TYPICAL SECTION



HORIZ. SCALE : 1"=60' (FOR 11X17" SHEETS)
VERT. SCALE : 1"=30' (FOR 11X17" SHEETS)

PROFILE VIEW

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STREAM ALIGNMENT OPTIONS 4A AND 4B

NE MANLEY ROAD AND CULVERT PROJECT
ROADWAY AND STREAM ANALYSIS

Appendix C:
Cost Estimates

NE Manley Rd
Sta 26+00 to 31+00

Alternate 1 - Shift Rd Alignment 30 ft West

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED TOTAL PRICE
1	EROSION CONTROL	1	LS	$12,000	$12,000
2	CLEARING AND GRUBBING	1	LS	$10,000	$10,000
3	ASPHALT REMOVAL	1	LS	$5,000	$5,000
4	HMA	457	TON	$100	$45,700
5	BASE COURSE	544	CY	$60	$32,640
6	ROADWAY EMBANKMENT (FILL)	3065	CY	$40	$122,600
7	ROADWAY EXCAVATION INCL HAUL (CUT)	650	CY	$30	$19,500
8	REPLANTING/TOPSOIL	24000	SF	$1.50	$36,000
9	MIDDLE CULVERT REPLACEMENT	1	LS	$425,800	$425,800
10	CUT WALL	1800	SF	$160	$288,000
11	FILL WALL	0	SF	$50	$0
12	STREAM RECONSTRUCTION, AT CULVERT	1	LS	$12,000	$12,000
13	STREAM RECONSTRUCTION, REALIGN	1	LS	$8,000	$8,000
14	GUARDRAIL	1050	LF	$30	$31,500
15	ROW (PERMANENT)	16400	SF	$6	$98,400
16	ROW (TEMPORARY)	3600	SF	$3	$10,800

Total Estimated Construction Cost **$1,158,000**

NE Manley Rd
Sta 26+00 to 31+00

Alternate 2 - Shift Rd Alignment 15 ft West

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED TOTAL PRICE
1	EROSION CONTROL	1	LS	$12,000	$12,000
2	CLEARING AND GRUBBING	1	LS	$10,000	$10,000
3	ASPHALT REMOVAL	1	LS	$5,000	$5,000
4	HMA	452	TON	$100	$45,200
5	BASE COURSE	539	CY	$60	$32,340
6	ROADWAY EMBANKMENT (FILL)	2800	CY	$40	$112,000
7	ROADWAY EXCAVATION INCL HAUL (CUT)	346	CY	$30	$10,380
8	REPLANTING/TOPSOIL	22000	SF	$1.50	$33,000
9	MIDDLE CULVERT REPLACEMENT	1	LS	$425,800	$425,800
10	CUT WALL	500	SF	$140	$70,000
11	FILL WALL	400	SF	$50	$20,000
12	STREAM RECONSTRUCTION, AT CULVERT	1	LS	$12,000	$12,000
13	STREAM RECONSTRUCTION, REALIGN	1	LS	$8,000	$8,000
14	GUARDRAIL	1040	LF	$30	$31,200
15	ROW (PERMANENT)	7000	SF	$6	$42,000
16	ROW (TEMPORARY)	3500	SF	$3	$10,500

Total Estimated Construction Cost **$880,000**

NE Manley Rd
Sta 26+00 to 31+00

Alternate 3 - Existing Alignment with Walls

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED TOTAL PRICE
1	EROSION CONTROL	1	LS	$12,000	$12,000
2	CLEARING AND GRUBBING	1	LS	$5,000	$5,000
3	ASPHALT PLANING	1222	SF	$15	$18,333
4	HMA	220	TON	$100	$22,000
5	BASE COURSE	0	CY	$60	$0
6	ROADWAY EMBANKMENT (FILL)	400	CY	$40	$16,000
7	ROADWAY EXCAVATION INCL HAUL (CUT)	120	CY	$30	$3,600
8	REPLANTING/TOPSOIL	8000	SF	$1.50	$12,000
9	MIDDLE CULVERT REPLACEMENT	1	LS	$425,800	$425,800
10	CUT WALL	0	SF	$160	$0
11	FILL WALL	2000	SF	$50	$100,000
12	STREAM RECONSTRUCTION, AT CULVERT	1	LS	$12,000	$12,000
13	STREAM RECONSTRUCTION, REALIGN	1	LS	$8,000	$8,000
14	GUARDRAIL	1000	LF	$30	$30,000
15	ROW (PERMANENT)	0	SF	$6	$0
16	ROW (TEMPORARY)	0	SF	$3	$0

Total Estimated Construction Cost **$665,000**

NE Manley Rd
Sta 26+00 to 31+00

Alternate 4a - Existing Alignment Stream Regrade

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED TOTAL PRICE
1	EROSION CONTROL	1	LS	$20,000	$20,000
2	CLEARING AND GRUBBING	1	LS	$10,000	$10,000
3	ASPHALT PLANING	1222	SY	$15	$18,333
4	HMA	220	TON	$100	$22,000
5	BASE COURSE	0	CY	$60	$0
6	ROADWAY EMBANKMENT (FILL)	900	CY	$40	$36,000
7	ROADWAY EXCAVATION INCL HAUL (CUT)	129	CY	$30	$3,870
8	REPLANTING/TOPSOIL	8000	SF	$1.50	$12,000
9	MIDDLE CULVERT REPLACEMENT	1	LS	$425,800	$425,800
10	CUT WALL	0	SF	$160	$0
11	FILL WALL	0	SF	$50	$0
12	STREAM RECONSTRUCTION, AT CULVERT	1	LS	$12,000	$12,000
13	STREAM RECONSTRUCTION, REALIGN	1	LS	$48,000	$48,000
14	GUARDRAIL	1000	LF	$30	$30,000
15	ROW (PERMANENT)	5500	SF	$6	$33,000
16	ROW (TEMPORARY)	5000	SF	$3	$15,000

Total Estimated Construction Cost **$687,000**

NE Manley Rd
Sta 26+00 to 31+00

Alternate 4b - Existing Alignment Stream Regrade

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED TOTAL PRICE
1	EROSION CONTROL	1	LS	$20,000	$20,000
2	CLEARING AND GRUBBING	1	LS	$10,000	$10,000
3	ASPHALT PLANING	1222	SY	$15	$18,333
4	HMA	220	TON	$100	$22,000
5	BASE COURSE	0	CY	$60	$0
6	ROADWAY EMBANKMENT (FILL)	900	CY	$40	$36,000
7	ROADWAY EXCAVATION INCL HAUL (CUT)	129	CY	$30	$3,870
8	REPLANTING/TOPSOIL	8000	SF	$1.50	$12,000
9	MIDDLE CULVERT REPLACEMENT	1	LS	$425,800	$425,800
10	CUT WALL	0	SF	$160	$0
11	FILL WALL	0	SF	$50	$0
12	STREAM RECONSTRUCTION, AT CULVERT	1	LS	$12,000	$12,000
13	STREAM RECONSTRUCTION, REALIGN	1	LS	$56,000	$56,000
14	GUARDRAIL	1000	LF	$30	$30,000
15	ROW (PERMANENT)	20000	SF	$4	$80,000
16	ROW (TEMPORARY)	15000	SF	$2	$30,000

Total Estimated Construction Cost **$757,000**

Appendix D:
Photo Log

View Looking North from Roadway

Steep Bank at West Side of Roadway

View Looking South from Roadway

Stream along Roadway, Looking North

East Side of Stream

East Side of Stream