

Via Email

August 20, 2018

Kimley-Horn
12740 Gran Bay Parkway West
Suite 2350
Jacksonville, FL 32258

Attention: Mr. David Goldman, PG

Subject: Remedial Alternatives Evaluation
828 Martin Luther King Jr Blvd. Property
Chapel Hill, North Carolina
H&H Job No. TCH-002

Dear David:

In accordance with our authorized scope of work, Hart & Hickman, PC (H&H) has prepared an evaluation of remedial alternatives for the coal combustion products (CCPs) present at the property located at 828 Martin Luther King, Jr. Blvd. in Chapel Hill. In our evaluation, we considered the following two options:

- Option 1 - Removal of the CCPs and restoration of the property. The estimated costs for this alternative are \$13.4MM to \$15.9MM, with the range dependent upon costs obtained from different remedial contractors.
- Option 2 – Removal of the erosional CCP along the Bolin Creek Greenway trail, installation of an earth retention system along the embankment at the base of the CCP fill area to obtain an appropriate embankment grade, cover of exposed CCP along the embankment and in areas where minimal cover is present, and restoration of the property. The estimated costs for this alternative are \$1.6MM to \$3.5MM, with the range largely dependent upon the type of earth retention system used.

Mr. David Goldman, PG

August 20, 2018

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The assumptions for each option are summarized in Table 1, with additional details provided in Table 2 for Option 1 and in Tables 3 and 4 for Option 2.

If you have any questions or comments concerning our evaluation, please let me know.

Sincerely,

Hart & Hickman, PC

A handwritten signature in black ink, appearing to read "Steve Hart", with a stylized flourish extending from the end.

Steve Hart, PG
Principal

cc: David Goldman – Kimley-Horn

Attachments

Table 1 (Page 1 of 2)
Remedial Options and Costs Summary
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Option 1 - Full Removal of CCP and Site Restoration	
Option 1 includes full removal of CCP at the site to the extent practicable and is based upon the following assumptions: - Pre-construction sampling to obtain pre-approval to direct load CCP and cover soil for off-site disposal. - Implementation of Erosion and Sediment Control measures. - Site clearing and grubbing. - Existing police building structure demolition. Costs assume no significant asbestos containing materials in building. - Excavation, transportation, and disposal of approximately 60,700 cubic yards (91,000 tons) of non-hazardous CCP in Areas (includes estimated 60,000 cubic yards in main placement area and approximately 700 cubic yards of erosional CCP along the Bolin Creek Greenway Trail). - Excavation, transportation, and disposal of approximately 19,000 cubic yards (28,500 tons) of non-hazardous cover soil overlying the CCP which contains CCP constituents. - Backfill placement and compaction of 90,000 tons and grading to promote positive drainage in the disturbed area. - Engineering and oversight costs. Total of approximately 200 field days of work assumed. - Area of disturbance of approximately 5 acres. - 20% Contingency applied to all costs. Table 2 details costs associated with the full removal remedial option. Costs from two different remedial contractors were obtained to provide a range of costs.	Estimated Cost
	\$13.4MM - \$15.9MM

Table 1 (Page 2 of 2)
Remedial Options and Costs Summary
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Option 2 - Removal of Erosional CCP, Installation of Earth Retention System Along Embankment, Cover of Exposed CCP Along Embankment and Where Existing Cover is Minimal, and Site Restoration	
Option 2 includes removal of the erosional CCP along the Bolin Creek Greenway trail, placement of additional soil cover in an upland area of the site where the existing soil cover is less than 2 ft thick, installation of an earth retention system at the base of the CCP fill area, and placement of backfill behind the earth retention system and to cover exposed CCP along the embankment. Key assumptions for this option are as follows: - Performance of geotechnical evaluation to determine feasibility and design of earth retention system. - Implementation of Erosion and Sediment Control measures. - Site clearing and grubbing. - Excavation, transportation, and disposal of approximately 1,000 tons of non-hazardous erosional CCP along Bolin Creek Greenway Trail. - Placement of approximately 800 cubic yards (1,200 tons) of additional soil cover over Area A where existing soil cover is less than 2 ft thick. - Installation of a variable height (approximately 2 to 19 ft high), approximately 9,000 sq ft area, and 370-ft long earth retention system at the base of the CCP fill area (see Appendix A). Costs are provided for four types of earth retention systems: Mesa® Wall , Mechanically Stabilized Earth (MSE) Wall, Cast-In-Place Wall, or Soldier Pile System. - Backfill placement and compaction of approximately 21,000 tons of import soil to support the earth retention system and cover the exposed CCP along the embankment. The soil import volumes are based upon the cut/fill analysis as summarized in Appendix A and assume a maximum 3:1 slope and at least 2 ft of additional soil cover on the embankment. - Removal and off-site disposal of approximately 200 to 500 tons of non hazardous soil impacted with CCP for the earth retention system foundation. Volume dependent upon the type of earth retention system selected. - Area of total site disturbance estimated to be approximately 1.2 acres. - Engineering and oversight costs. Total of 110 field days assumed. - 20% Contingency applied to all costs. Tables 3A through 3D detail costs associated with Option 2. Each table represents a different type of earth retention system and also includes costs for two different remedial contractors. Details regarding installation of an earth retention system and the associated cut/fill analysis are included in Table 4 and Appendix A, respectively.	Estimated Cost \$1.6MM-\$3.5MM¹

¹ Estimated cost range represents Mesa® Wall (low end), MSE Wall (mid range), Soldier Pile System (mid range), and Cast-In-Place Wall (high end).

cy = cubic yard

Table 2
Option 1 Details - Full Removal of CCP
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Task Description	Remedial Contractor #1		Remedial Contractor #2	
	Unit Cost	Total	Unit Cost	Total
Remedial Subcontractor Costs				
Planning, Permitting, Mobilization, & Demobilization	LS	\$20,000	LS	\$15,000
Erosion & Sediment Control	LS	\$30,000	LS	\$30,000
Clearing and Tree Removal (5 acres)	LS	\$75,000	\$18,000/AC	\$90,000
Removal of On-Site Structure	LS	\$165,000	LS	\$250,000
Remove Asphalt Parking Lot and Driveway	--	--	\$25/ton	\$41,250
Non-Haz CCP Excavation, Transportation, & Disposal for Areas A-I (61,000 cy / 91,500 tons)	\$85/ton	\$7,735,000	\$65/ton	\$5,947,500
Non-Haz Cover Soil Excavation, Transportation, & Disposal for Areas A, B, C, and E (19,000 cy / 28,500 tons)	\$85/ton	\$2,422,500	\$65/ton	\$1,852,500
Import, Place, & Compact Backfill (90,000 tons)	\$25/ton	\$2,250,000	\$28/ton	\$2,520,000
Site Restoration (5 acres)	LS	\$175,000	\$7,500/AC	\$37,500
Remedial Subcontractor Subtotals	\$12,872,500		\$10,783,750	
Engineering/Oversight Costs				
Planning and Permitting	--	\$30,000	--	\$30,000
Live Loading Grid Sampling (84,000 cy)	\$140/1,000 cy	\$11,760	\$140/1,000 cy	\$11,760
Oversight & Project Management (200 days)	\$1,500/day	\$300,000	\$1,500/day	\$300,000
Final Reporting and As Built Drawings	--	\$30,000	--	\$30,000
20% Contingency				
Contingency Costs (20%)	%	\$2,636,852	%	\$2,219,102
Estimated Project Totals (Rounded)	\$15,900,000		\$13,400,000	

Notes:

cy = cubic yard; LS = lump sum; AC = acre

Table 3A
Option 2A Details - Removal of Erosional CCP and Installation of Earth Retention System (Mesa® Wall)
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Task Description	Remedial Contractor #1		Remedial Contractor #2	
	Unit Cost	Total	Unit Cost	Total
Remedial Subcontractor Costs				
Planning, Permitting, Mobilization, & Demobilization	LS	\$20,000	LS	\$10,000
Erosion & Sediment Control	LS	\$30,000	LS	\$15,000
Clearing and Tree Removal (1.2 acres)	LS	\$35,000	\$40,000/AC	\$48,000
Access Road Base of Embankment	LS	\$50,000	LS	\$50,000
Non-Haz CCP Excavation, Transportation, & Disposal for Areas G, H, and I (700 cy / 1,050 tons)	\$105/ton	\$110,250	\$85/ton	\$89,250
Import, Place, & Compact Backfill for Area A (800 cy / 1,200 tons)	\$30/ton	\$36,000	\$32/cy	\$48,000
Earth Retention System (370 ft long with variable height)*	--	\$289,280	--	\$289,280
Earth Retention System Drainage Layer	--	\$74,000	--	\$74,000
Non-Haz Foundation Excavation, Transportation, & Disposal for Retaining Wall (500 tons)	\$105/ton	\$52,500	\$85/ton	\$42,500
Import, Place, & Compact Backfill for Retaining Wall (7,093 cy / 10,640 tons)** Amount of soil backfil reduced by one-half to account for some backfill costs included in estimate of retention wall system.	\$30/ton	\$319,200	\$32/ton	\$340,480
Site Restoration (1.2 acres)	LS	\$85,000	LS	\$30,000
Remedial Subcontractor Subtotal	\$1,101,230		\$1,036,510	
Engineering/Oversight Costs				
Planning and Permitting	--	\$30,000	--	\$30,000
Geotechnical Evaluation for Earth Retention System Selection	--	\$50,000	--	\$50,000
Live Loading Grid Sampling (700 cy)	\$140/250 cy	\$420	\$140/250 cy	\$420
Oversight & Project Management (110 days)	\$1,500/day	\$165,000	\$1,500/day	\$165,000
Final Reporting and As Built Drawings	--	\$30,000	--	\$30,000
Engineering/Oversight Subtotal	\$275,420		\$275,420	
20% Contingency				
Contingency Costs (20%)	%	\$253,330	%	\$240,386
Estimated Project Totals (Rounded)	\$1,600,000		\$1,600,000	

Notes:

cy = cubic yard; ft = feet; LS = lump sum; * = See Table 4; ** = see Appendix A

Table 3B
Option 2B Details - Removal of Erosional CCP and Installation of Earth Retention System (MSE Wall)
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Task Description	Remedial Contractor #1		Remedial Contractor #2	
	Unit Cost	Total	Unit Cost	Total
Remedial Subcontractor Costs				
Planning, Permitting, Mobilization, & Demobilization	LS	\$20,000	LS	\$10,000
Erosion & Sediment Control	LS	\$30,000	LS	\$15,000
Clearing and Tree Removal (1.2 acres)	LS	\$35,000	\$40,000/AC	\$48,000
Access Road Base of Embankment	LS	\$50,000	LS	\$50,000
Non-Haz CCP Excavation, Transportation, & Disposal for Areas G, H, and I (700 cy / 1,050 tons)	\$105/ton	\$110,250	\$85/ton	\$89,250
Import, Place, & Compact Backfill for Area A (800 cy / 1,200 tons)	\$30/ton	\$36,000	\$32/ton	\$48,000
Earth Retention System (370 ft long with variable height)*	--	\$1,265,600	--	\$1,265,600
Earth Retention System Drainage Layer	--	\$74,000	--	\$74,000
Non-Haz Foundation Excavation, Transportation, & Disposal for Retaining Wall (500 tons)	\$105/ton	\$52,500	\$85/ton	\$42,500
Import, Place, & Compact Backfill for Retaining Wall (7,093 cy / 10,640 tons)** Amount of soil backfil reduced by one-half to account for some backfill costs included in estimate of retention wall system.	\$30/ton	\$319,200	\$32/ton	\$340,480
Site Restoration (1.2 acres)	LS	\$85,000	LS	\$30,000
Remedial Subcontractor Subtotals	\$2,077,550		\$2,012,830	
Engineering/Oversight Costs				
Planning and Permitting	--	\$30,000	--	\$30,000
Geotechnical Evaluation for Earth Retention System Selection	--	\$50,000	--	\$50,000
Live Loading Grid Sampling (700 cy)	\$140/250 cy	\$420	\$140/250 cy	\$420
Oversight & Project Management (110 days)	\$1,500/day	\$165,000	\$1,500/day	\$165,000
Final Reporting and As Built Drawings	--	\$30,000	--	\$30,000
Engineering/Oversight Subtotal	\$275,420		\$275,420	
20% Contingency				
Contingency Costs (20%)	%	\$448,594	%	\$435,650
Estimated Project Totals (Rounded)	\$2,800,000		\$2,700,000	

Notes:

cy = cubic yard; ft = feet; LS = lump sum; * = See Table 4; ** = see Appendix A

Table 3C
Option 2C Details - Removal of Erosional CCP and Installation of Earth Retention System (Soldier Piles)
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Task Description	Remedial Contractor #1		Remedial Contractor #2	
	Unit Cost	Total	Unit Cost	Total
Remedial Subcontractor Costs				
Planning, Permitting, Mobilization, & Demobilization	LS	\$20,000	LS	\$10,000
Erosion & Sediment Control	LS	\$30,000	LS	\$15,000
Clearing and Tree Removal (1.2 acres)	LS	\$35,000	\$40,000/AC	\$48,000
Access Road Base of Embankment	LS	\$50,000	LS	\$50,000
Non-Haz CCP Excavation, Transportation, & Disposal for Areas G, H, and I (700 cy / 1,050 tons)	\$105/ton	\$110,250	\$85/ton	\$89,250
Import, Place, & Compact Backfill for Area A (800 cy / 1,200 tons)	\$30/ton	\$36,000	\$32/ton	\$48,000
Earth Retention System (370 ft long with variable height)*	--	\$1,220,400	--	\$1,220,400
Earth Retention System Drainage Layer	--	\$74,000	--	\$74,000
Non-Haz Foundation Excavation, Transportation, & Disposal for Retaining Wall (200 tons)	\$105/ton	\$21,000	\$85/ton	\$17,000
Import, Place, & Compact Backfill for Retaining Wall (13,850 cy / 20,775 tons)**	\$30/ton	\$623,250	\$32/ton	\$664,800
Site Restoration (1.2 acres)	LS	\$85,000	LS	\$30,000
Remedial Subcontractor Subtotal	\$2,304,900		\$2,266,450	
Engineering/Oversight Costs				
Planning and Permitting	--	\$30,000	--	\$30,000
Geotechnical Evaluation for Earth Retention System Selection	--	\$50,000	--	\$50,000
Live Loading Grid Sampling (700 cy)	\$140/250 cy	\$420	\$140/250 cy	\$420
Oversight & Project Management (110 days)	\$1,500/day	\$165,000	\$1,500/day	\$165,000
Final Reporting and As Built Drawings	--	\$30,000	--	\$30,000
Engineering/Oversight Subtotal	\$275,420		\$275,420	
20% Contingency				
Contingency Costs (20%)	%	\$494,064	%	\$486,374
Estimated Project Totals (Rounded)	\$3,100,000		\$3,000,000	

Notes:

cy = cubic yard; ft = feet; LS = lump sum; * = See Table 4; ** = see Appendix A

Table 3D
Option 2D - Removal of Erosional CCP and Installation of Earth Retention System (Cast-In-Place)
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Task Description	Remedial Contractor #1		Remedial Contractor #2	
	Unit Cost	Total	Unit Cost	Total
Remedial Subcontractor Costs				
Planning, Permitting, Mobilization, & Demobilization	LS	\$20,000	LS	\$10,000
Erosion & Sediment Control	LS	\$30,000	LS	\$15,000
Clearing and Tree Removal (1.2 acres)	LS	\$35,000	\$40,000/AC	\$48,000
Access Road Base of Embankment	LS	\$50,000	LS	\$50,000
Non-Haz CCP Excavation, Transportation, & Disposal for Areas G, H, and I (700 cy / 1,050 tons)	\$105/ton	\$110,250	\$85/ton	\$89,250
Import, Place, & Compact Backfill for Area A (800 cy / 1,200 tons)	\$30/ton	\$36,000	\$32/ton	\$48,000
Earth Retention System (370 ft long with variable height)*	--	\$1,582,000	--	\$1,582,000
Earth Retention System Drainage Layer	--	\$74,000	--	\$74,000
Non-Haz Foundation Excavation, Transportation, & Disposal for Retaining Wall (500 tons)	\$105/ton	\$52,500	\$85/ton	\$42,500
Import, Place, & Compact Backfill for Retaining Wall (13,850 cy / 20,775 tons)**	\$30/ton	\$623,250	\$32/ton	\$664,800
Site Restoration (1.2 acres)	LS	\$85,000	LS	\$30,000
Remedial Subcontractor Subtotal	\$2,698,000		\$2,653,550	
Engineering/Oversight Costs				
Planning and Permitting	--	\$30,000	--	\$30,000
Geotechnical Evaluation for Earth Retention System Selection	--	\$50,000	--	\$50,000
Live Loading Grid Sampling (700 cy)	\$140/250 cy	\$420	\$140/250 cy	\$420
Oversight & Project Management (110 days)	\$1,500/day	\$165,000	\$1,500/day	\$165,000
Final Reporting and As Built Drawings	--	\$30,000	--	\$30,000
Engineering/Oversight Subtotal	\$275,420		\$275,420	
20% Contingency				
Contingency Costs (20%)	%	\$572,684	%	\$563,794
Estimated Project Totals (Rounded)	\$3,500,000		\$3,500,000	

Notes:

cy = cubic yard; ft = feet; LS = lump sum; * = See Table 4; ** = see Appendix A

Table 4
Earth Retention Systems Details
828 Martin Luther King, Jr. Blvd
Chapel Hill, North Carolina
H&H Job No. TCH-002

Earth Retention Systems	Estimated Cost Range			
	Unit Cost		Total	
	Low End	High End	Low End	High End
Mesa® Retaining Wall System	\$30/sqft	\$32/sqft	\$271,200	\$289,280
MSE Retaining Wall System	\$35/sqft	\$140/sqft*	\$316,400	\$1,265,600
Cast-In-Place Concrete Retaining Wall System	\$70/sqft	\$175/sqft	\$632,800	\$1,582,000
Soldier Pile System	\$100/sqft	\$135/sqft	\$904,000	\$1,220,400

Notes:

Budgetary estimations utilize a 9,040 sqft earth retention system with variable height. Estimations also assume retention system foundations will be set on bedrock, approximated at 10 feet below ground surface. See Appendix A for further details regarding system heights.

sqft = square feet; MSE = mechanically stabilized earth; * = pricing includes partial backfill costs;



LEGEND

- SITE PROPERTY BOUNDARY
- BOLIN CREEK
- TOPOGRAPHIC CONTOUR ELEVATION (FT MSL)
- MONITORING WELL LOCATION (FALCON ENGINEERING)
- TEMPORARY MONITORING WELL LOCATION (FALCON ENGINEERING)
- SOIL BORING LOCATION (FALCON ENGINEERING)
- ABANDONED MONITORING WELL LOCATION
- MONITORING WELL LOCATION (H&H)
- SOIL BORING LOCATION (H&H)
- COVER EVALUATION BORING LOCATION
- CCP UNDER > 2 FT COVER
- CCP UNDER < 2 FT COVER
- CCP EXPOSED AT GROUND SURFACE
- CCP DEPOSITIONAL LAYER
- APPROXIMATE CCP DEPOSITIONAL LAYER AREA REPORTED BY DEQ

NOTE:

EXISTING MONITORING WELLS & OCTOBER/ NOVEMBER 2016 SAMPLING LOCATIONS SURVEYED BY CE GROUP ON DECEMBER 8, 9, & 20, 2016.



APPROXIMATE
100
200
SCALE IN FEET

TITLE
CCP LOCATION & COVER EVALUATION MAP

PROJECT
TOWN OF CHAPEL HILL
828 MARTIN LUTHER KING JR. BOULEVARD
CHAPEL HILL, NORTH CAROLINA

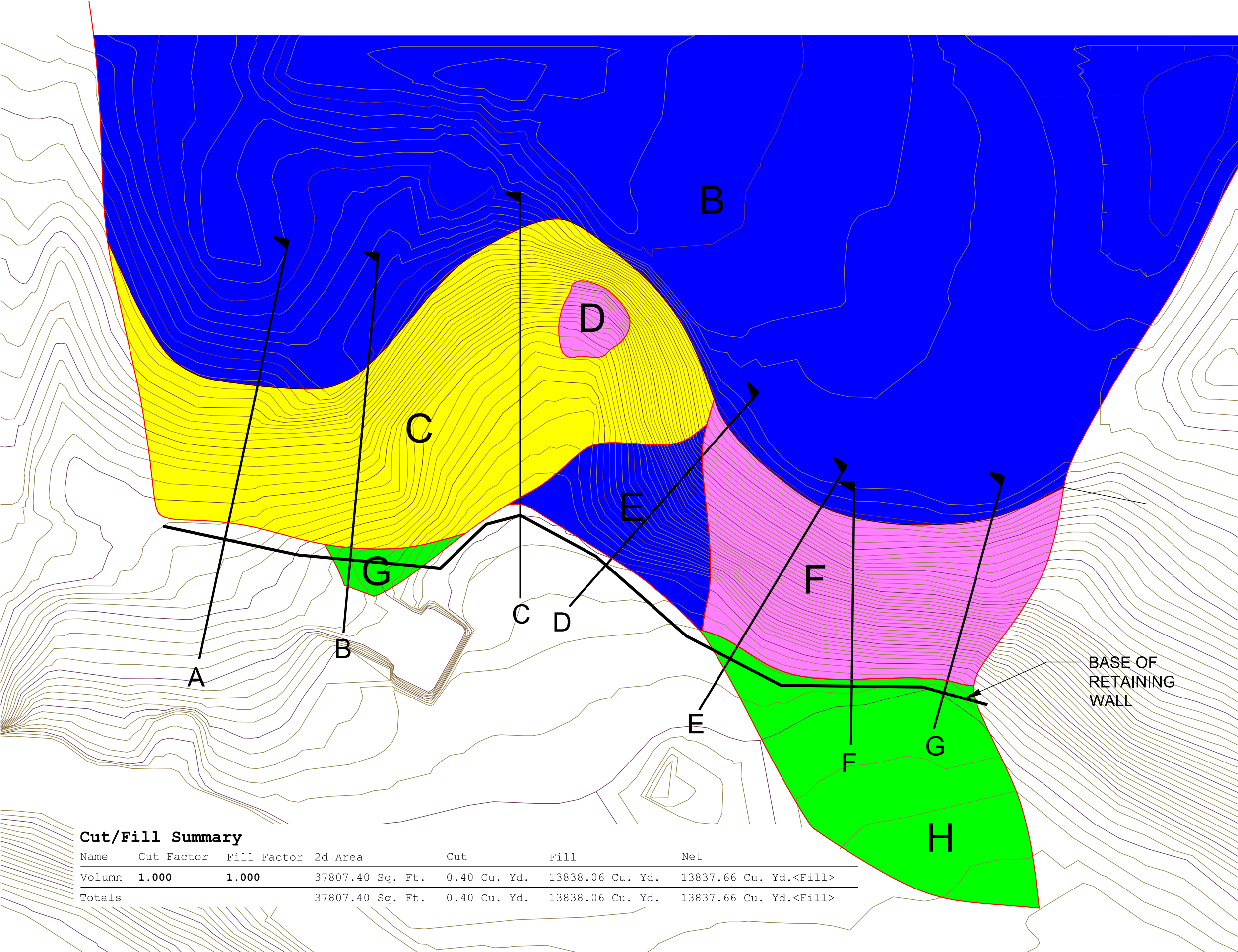
hart hickman
SMARTER ENVIRONMENTAL SOLUTIONS
2923 South Tryon Street-Suite 100
Charlotte, North Carolina 28203
704-586-0007(p) 704-586-0373(f)
License # C-1269 / #C-245 Geology

DATE: 7-27-18
REVISION NO. 0

JOB NO. TCH-002
FIGURE NO. 1

Appendix A

Cut/Fill Analysis for Earth Retention System

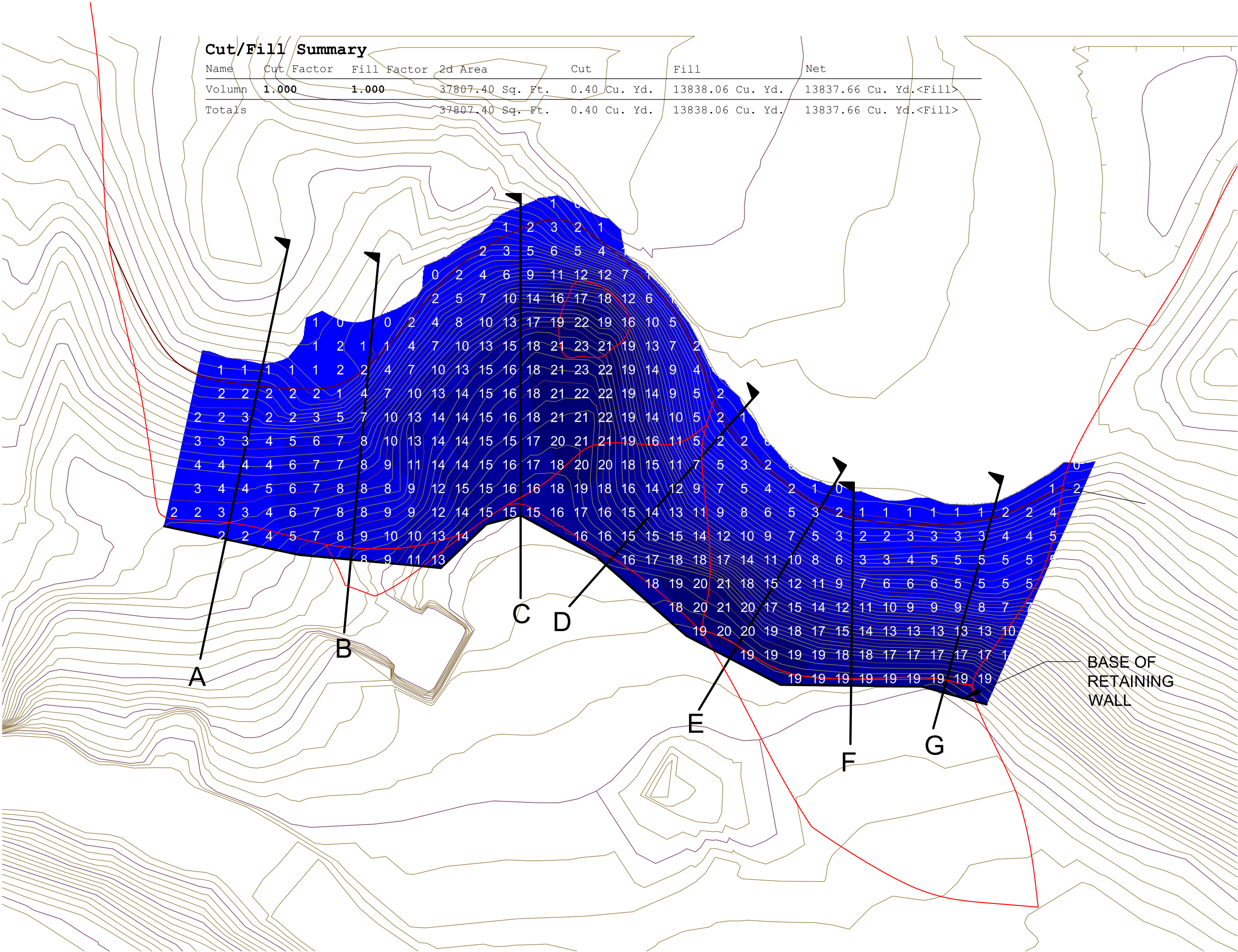


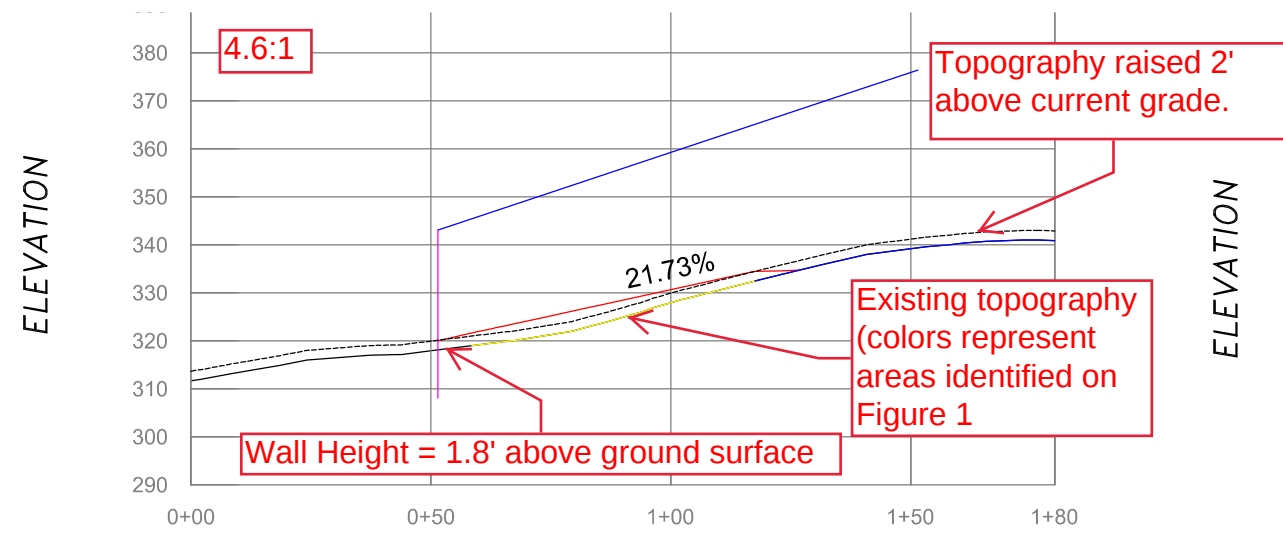
Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Volumn	1.000	1.000	37807.40 Sq. Ft.	0.40 Cu. Yd.	13838.06 Cu. Yd.	13837.66 Cu. Yd.<Fill>
Totals			37807.40 Sq. Ft.	0.40 Cu. Yd.	13838.06 Cu. Yd.	13837.66 Cu. Yd.<Fill>

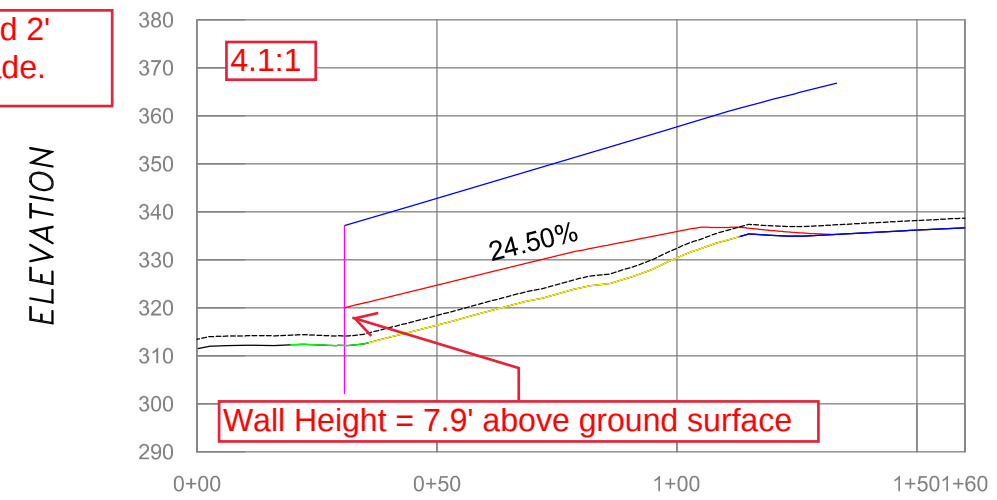
Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Volume	1.000	1.000	37807.40 Sq. Ft.	0.40 Cu. Yd.	13838.06 Cu. Yd.	13837.66 Cu. Yd.<Fill>
Totals			37807.40 Sq. Ft.	0.40 Cu. Yd.	13838.06 Cu. Yd.	13837.66 Cu. Yd.<Fill>

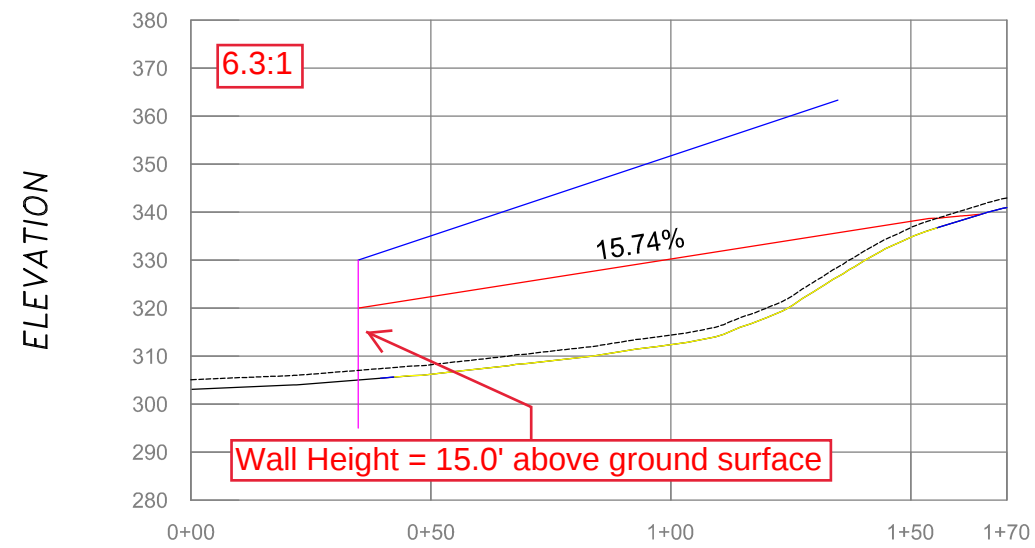




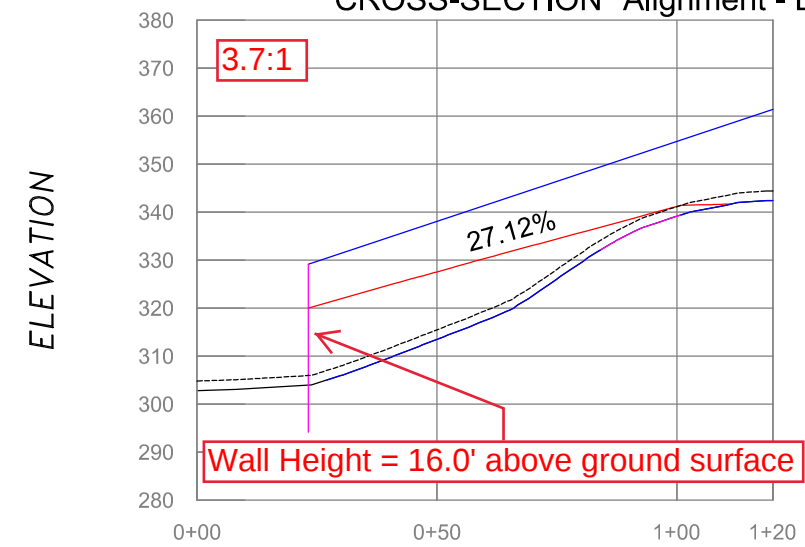
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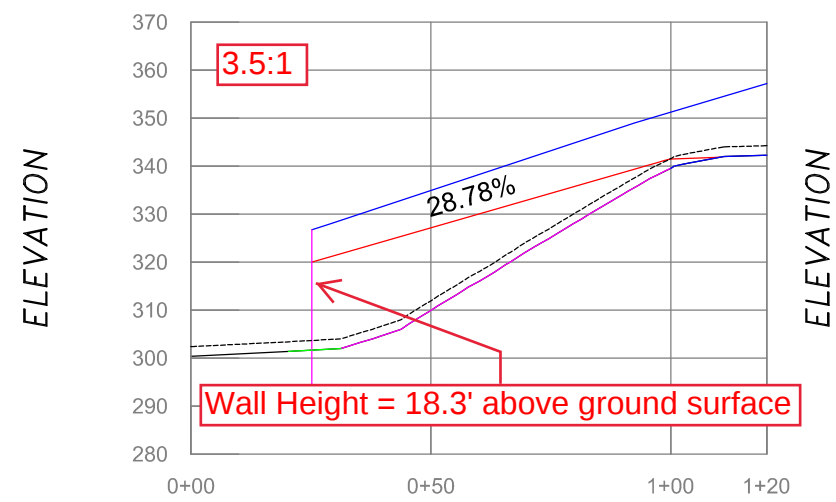
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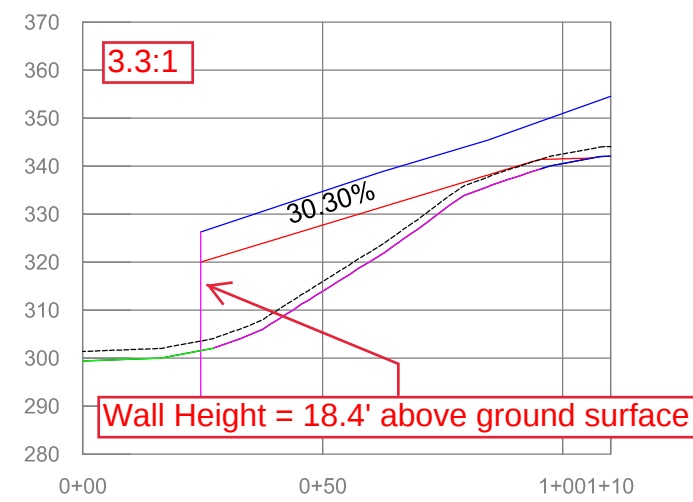
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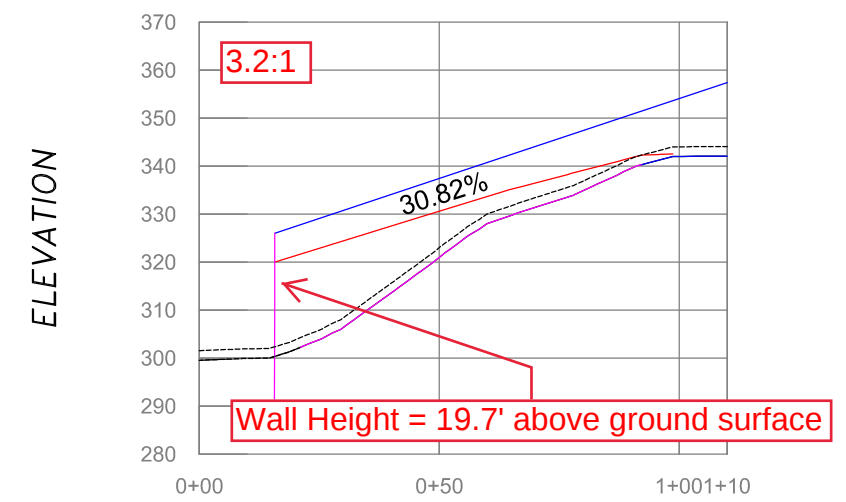
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CROSS-SECTION "Alignment - E"



CROSS-SECTION "Alignment - F"



CROSS-SECTION "Alignment - G"