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NCBC GULFPORT
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TECHNICAL MEMORANDUM TO PRESENT AND EVALUATE CONSTRUCTION METHODOLOGY ALTERNATIVES FOR THE EXCAVATION AND TRANSPORTATION OF SEDIMENTS CONTAMINATED WITH DIOXINS FROM THE NORTH OFF-BASE AREA NCBC GULFPORT MS

11/8/2002

TETRA TECH

TECHNICAL MEMORANDUM

Date: 8 November 2002

To: Art Conrad (SOUTHDIV)
Gordon Crane (NCBC Environmental)
Don Ficklen (AFCEES)

From: Tim Smith (TtNUS – Pittsburgh, PA)
Bob Mertz (TtNUS – Pittsburgh, PA)

c: Bob Fisher (TtNUS – Tallahassee, FL)
Jason Brown (TtNUS – Pittsburgh, PA)

RE: Methodologies for the Excavation and Transportation of Contaminated Sediments from Off-Base Areas
Remedial Design
Site 8 – Herbicide Orange Storage Area
Naval Construction Battalion Center
Gulfport, Mississippi

The purpose of this technical memorandum is to present and evaluate construction methodology alternatives for the excavation and transportation of sediments contaminated with dioxins from the off-base area north of the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. This evaluation is being performed in support of the wetlands disturbance permit application to select the materials removal methodology that results in the least possible short- and long-term impacts to associated wetlands and the Turkey Creek watershed. All alternatives will generally use the same excavation of contaminated sediments and haul road construction methodologies. These methodologies are therefore presented first. The haul road alignments, which define the alternatives, are presented second.

Excavation of Contaminated Sediments

All alternatives, with the exception of Alternative 5, will include measures that minimize both the transport of contaminated sediment and quantity of water removed with excavated sediment. Excavation should commence at the upstream end of the excavation area and proceed in the direction of flow to minimize the potential for movement of contaminated sediments to previously excavated areas. In addition, prior to excavation, appropriate sediment control measures should be installed to minimize the potential for transport of contaminated sediments outside of the immediate excavation areas. Because the dioxins bond strongly with organic soil particles, filtration devices will adequately control the movement of contaminated sediments. Therefore, engineering controls in the form of sediment recovery traps (SRTs) or equivalent must be used to prevent the migration of suspended contaminated soil particles from contaminated areas. SRTs in conjunction with sequential excavation (i.e., limiting work to areas that can be excavated in 2 or 3 day work periods) will be effective engineering controls to prevent the migration of contaminated sediments. An SRT is illustrated in Design Sketch 1. Water that accumulates in excavations should be pumped out of the

excavation and passed through a sediment removal system prior to being discharged downstream of the excavation area. Excavation of contaminated sediments will be complete when verification samples indicate that cleanup goals have been achieved. Following excavation and verification of contaminant removal, the off-base area will be restored to pre-construction conditions.

Haul Road Construction

A haul road will need to be constructed to access the off-base excavation area, and use of public roadways will be required to transport contaminated sediments from the off-base area to Site 8A. The haul road should be constructed and maintained to provide access to work areas and provide a means to execute the required work efficiently. Permits may be required to use public roads as a transportation corridor for contaminated sediments. Because of the expected impacts to the off-base area it is recommended that only one haul road be constructed into the off-base excavation area.

The construction method of the proposed off-base haul roads is the same haul road construction method used in November 2001 to access the Edwards property. The construction method will use trees, soil, and aggregate as shown in Design Sketch 2 to create a "corduroy road". The width of the driving surface will be 15 feet. The trees needed to construct the road will be harvested from the area surrounding the proposed haul road alignment. The soil and aggregate will be brought on-site from an off-site borrow source. Based on similar historical construction in this area, trees will be removed from an area that extends approximately 50 feet on both sides of the proposed haul road alignment (i.e., a 100-foot wide clearing of trees on average for the length of the haul road). It should be noted that in the alignment alternatives described below, the clearing of trees for a 100-foot wide may not be inclusive of the trees that need to be removed to allow for the excavation of the contaminated sediments.

Haul Road Alignment

The five alternative haul road alignments described in the following paragraphs will be evaluated based on usability, implementability, and relative cost. The haul road will be used to transport excavated contaminated sediments from the off-base area to the consolidation pad at Site 8A within the NCBC. This technical memorandum does not include discussions on usage of public roads that will be used for contaminated sediment transportation to Site 8A. Although not included in the description of each alternate alignment, each alternative will include the use of erosion and sediment controls.

Alternative 1: Under this alternative, the haul road alignment will connect with 28th Street, across from NCBC Outfall 3. The alignment will fall within the footprint of the contaminated sediments and the haul road will be constructed on top of contaminated sediments (Design Sketch 3). The haul road will be constructed along the entire length of the area of contaminated sediments and will join with the existing haul road that connects to 58th Avenue. The entire length of road will be constructed prior to excavation of contaminated sediments. During the removal of the contaminated sediments, it is assumed that contaminated sediments on either side of the haul road

would be removed first, followed by the removal of the contaminated sediments below the haul road along with the removal of the haul road. A cross-section of this alignment alternative is provided on Design Sketch 4.

Alternative 2: Under this alternative, the haul road alignment will follow the alignment described in Alternative 1 (Design Sketch 3). However, the haul road will be constructed as contaminated sediments are removed (i.e., the haul road will be constructed as the excavation of contaminated sediments proceeds downstream). Following removal of all contaminated sediments, the haul road would be removed as part of the site restoration activities. A cross-section of this alignment alternative is provided on Design Sketch 5.

Alternative 3: Under this alternative the haul road alignment will connect directly with 28th Street, across from NCBC Outfall 3. The alignment will follow along the eastern and southern sides of the area of contaminated sediments, outside the limits of contamination (Design Sketch 3). The haul road will be constructed along the entire length of the area of contaminated sediments and will join with the existing haul road that connects to 58th Avenue. The entire length of road will be constructed prior to excavation of contaminated sediments. Following the removal of all contaminated sediments, the haul road will be removed as part of the site restoration activities. A cross-section of this alignment alternative is provided on Design Sketch 6.

Alternative 4: Under this alternative the haul road alignment will follow the alignment described in Alternative 3 (Design Sketch 3). However, the addition of an excavated drainage channel will be added to the alternative. The drainage channel will be located on the eastern and southern side of the haul road, and drains will be constructed through the haul road to drain the surface waters to the drainage ditches. Like the previous alternatives, following the removal of all contaminated sediments, the haul road will be removed as part of the site restoration activities. A cross-section of this alignment alternative is provided on Design Sketch 7.

Alternative 5: Under this alternative low-ground-pressure equipment will be used to eliminate the need of a haul road. Excavators will use swamp mats to maneuver through the contaminated sediment area and off-road trucks will be used to transport excavated sediment to a staging area where conventional trucks will be loaded for transportation to the Site 8A consolidation pad. A cross-section of this alignment alternative is provided on Design Sketch 8.

Evaluation of Haul Road Alignment Alternatives

The evaluation of the alternative haul road alignments presented above will consider usability, implementability, and relative cost. It should be noted that in considering these evaluation criteria, it was assumed separate crews would be used to construct the haul road, excavate and haul contaminated sediment and backfill the excavation, and restore the site. It is understood that cost and time savings could be realized for the individual alternatives being evaluated by having more than one crew work on each of the individual construction items listed above. However, if these same adjustments were made to each alternative, the savings of time and cost would be realized for each alternative proportionally.

Usability: When considering usability the most advantageous haul road alignment has the following characteristics:

- Minimizes the distance excavation equipment must travel from the haul road to access all areas of contamination.
- Provides one directional traffic flow.
- Provides drainage features to minimize pumping distances for dewatering.
- Provides means to execute excavation activities in the direction of surface water flow.
- Limits the amount of reinstallation time for SRTs and erosion and sediment control devices.
- Limits the need for specialized excavation and hauling equipment.

Implementability: When considering implementability, the most advantageous haul road alignment has the following characteristics:

- Provides a location where the ground is best suited for the proposed haul road construction methodology.
- Requires the least amount of disturbance for construction.
- Allows for incremental excavation of contaminated sediments beginning at the upstream location.
- Provides a post excavation area that is accessible for the purposes of verification sample collection, excavation backfilling, and revegetation.
- Drainage to allow excavation during wet periods.

Relative Cost: When considering relative cost, the most advantageous haul road alignment has the following characteristics:

- Provides a construction sequence that reduces crew standby time.
- Provides an alignment that eliminates the need for realignment during excavation activities.
- Allows for a continuous construction methodology of the haul road.
- Provides continuous access for duration of project.
- Limits the amount of specialized excavation and hauling equipment.
- Eliminates the need to transfer contaminated sediments from off-road hauling equipment (i.e., low-ground-pressure equipment) to public road hauling equipment.

The five alternative access/haul road alignments were ranked using a numerical process that gave a value of 5 to the most advantageous alignment and a 1 to the least advantageous. The ranking is provided as Table 1.

Conclusions

Considering the evaluation criteria described above, usability, implementability, and relative cost, Alternatives 3 and 4 are more advantageous than Alternatives 1, 2, and 5. Although Alternatives 3 and 4 disturb more area than the other alternatives, these

alternatives result in the least amount of time that the area is disturbed, thus allowing the restoration process to occur faster than the other alternatives. In addition, because haul road construction is completed prior to the start of excavation activities for these two alternatives, interference between construction crews and delays would be minimized. When considering Alternatives 3 and 4, both alternatives disturb the same amount of area, and both alternatives provide the same advantages for site access. Although Alternative 4 may require a construction duration that slightly exceeds that for Alternative 3, the dewatering that will occur with Alternative 4 will likely accelerate sediment removal and offset the construction time difference. Although this assessment can not be evaluated further until topography of the area is made available, Alternative 4 is judged as the most advantageous haul road alignment for material removal.

TABLE 1

HAUL ROAD ALTERNATIVE ALIGNMENT RANKING
NCBC
GULFPORT, MISSISSIPPI

Alternatives		Evaluation			Overall Ranking
		Usability	Implementability	Cost	
1	Haul road within contamination area constructed in entirety prior to excavation	4.5	1	3	8.5
2	Haul road within contamination area constructed as contaminated sediments are removed	4.5	2	1.5	8
3	Haul road along side of contamination area constructed in entirety prior to excavation	2	4.5	4.5	11
4	Haul road along side of contamination area constructed in entirety prior to excavation including an excavated drainage channel	3	4.5	4.5	12
5	No haul road constructed	1	3	1.5	5.5

Notes:
1 Highest ranking 5, lowest ranking 1.
2 The Alternative with the highest ranking is the selected haul road alignment alternative.
3 Alternative with equal rankings have the same advantage ranking for that particular evaluation criteria.

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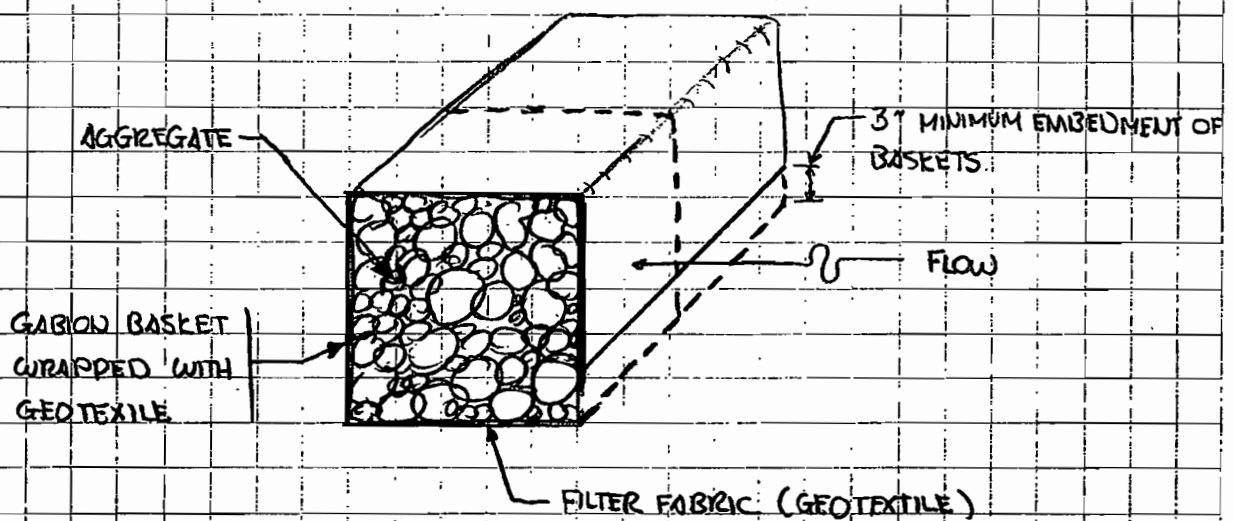
CLIENT	JOB NUMBER
NCBC GULFPORT, MISSISSIPPI	
SUBJECT HAUL ROAD ALIGNMENT DESIGN SKETCHES	
BASED ON	**DRAWING NUMBER**

BY	CHECKED BY	APPROVED BY	DATE
TWS 10/28/02			

DESIGN SKETCH #1 SEDIMENT RETENTION TRAP (SRT)
(DESIGN SKETCH IS NOT TO SCALE)



NOTES:
1) THE LENGTH OF EACH SRT WILL VARY DEPENDING ON THE TRAP LOCATION.
2) SRT SIZES CAN BE INCREASED BY STACKING GABION BASKETS.
3) GEOTEXTILES SHOULD BE OVERLAPED A MINIMUM OF 6-INCHES IF THE LENGTH OF THE SRT WARRANTS.

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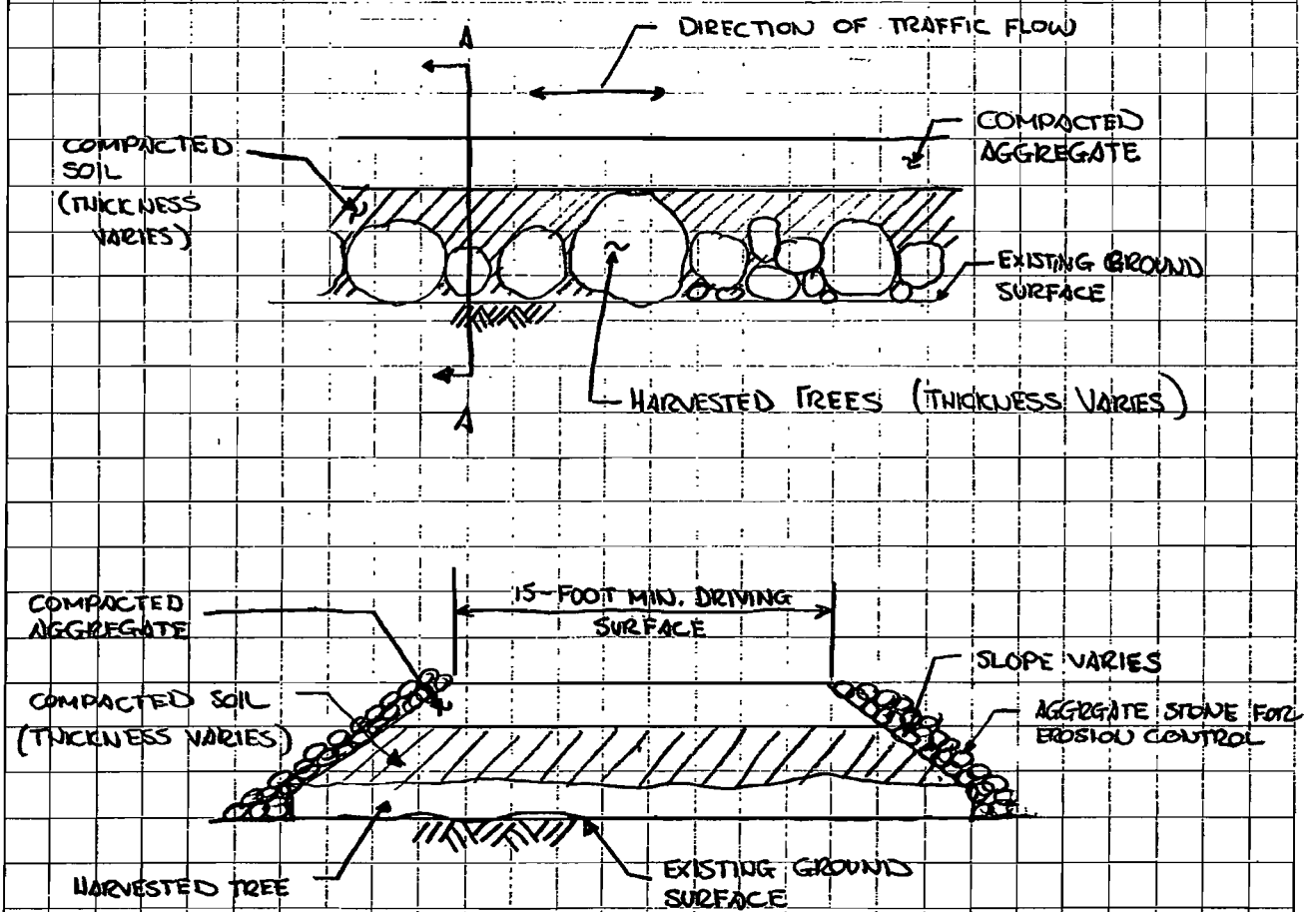
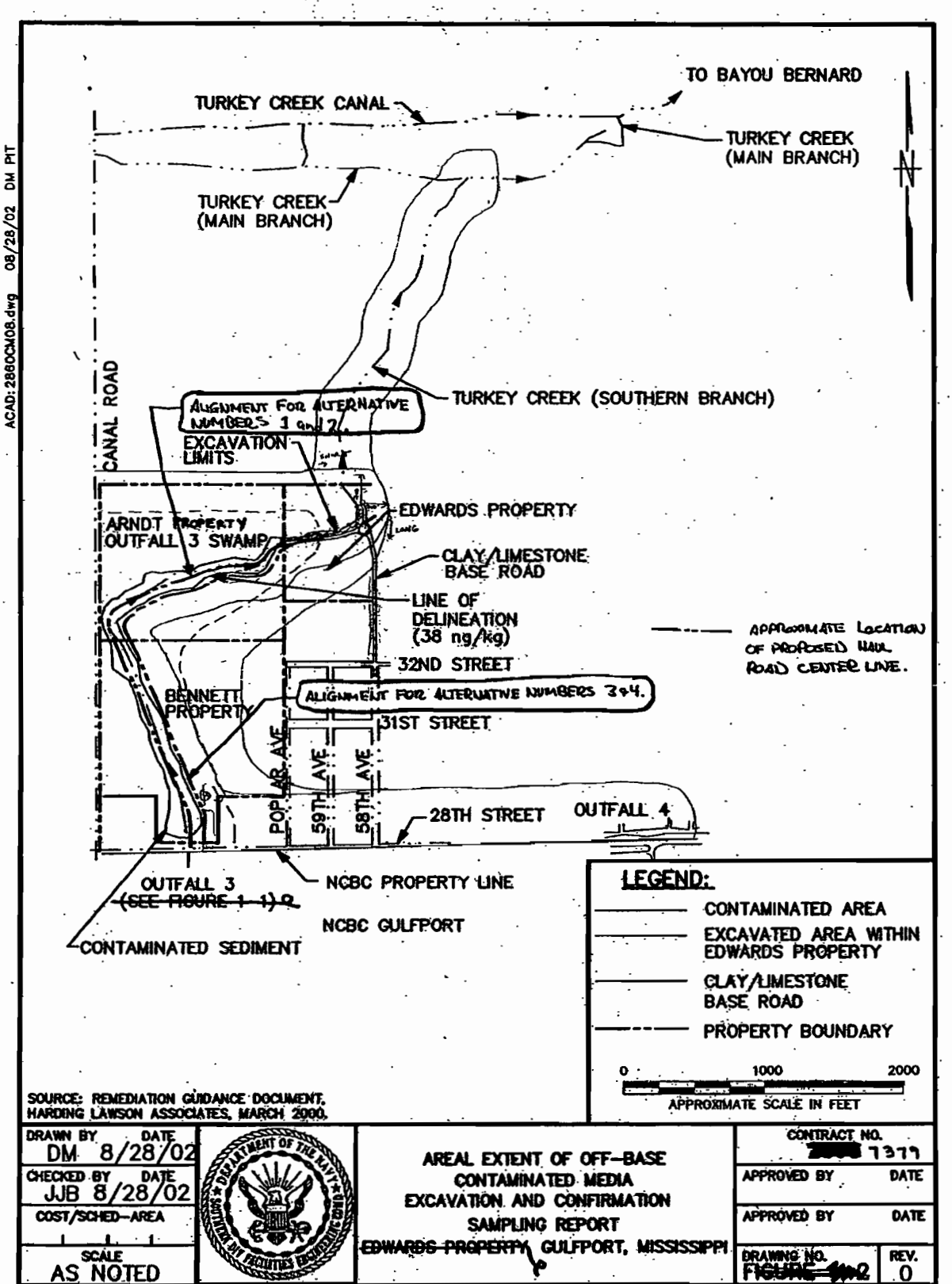
CLIENT	JOB NUMBER		
NCBC GULFPORT MISSISSIPPI			
SUBJECT: HAUL ROAD ALIGNMENT ALTERNATIVE DESIGN SKETCHES			
BASED ON	DRAWING NUMBER		
BY: TNS 10/28/02	CHECKED BY	APPROVED BY	DATE

DESIGN SKETCH #2 HAUL ROAD CONSTRUCTION DETAIL

(DESIGN SKETCH IS NOT TO SCALE)



SECTION A-A



ACAD:2860CM08.dwg 08/28/02 DM PIT

SOURCE: REMEDIATION GUIDANCE DOCUMENT, HARDING LAWSON ASSOCIATES, MARCH 2000.

DRAWN BY DM DATE 8/28/02		AREAL EXTENT OF OFF-BASE CONTAMINATED MEDIA EXCAVATION AND CONFIRMATION SAMPLING REPORT EDWARDS PROPERTY, GULFPORT, MISSISSIPPI	CONTRACT NO. [redacted] 7379
CHECKED BY JJB DATE 8/28/02			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-2 REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

DESIGN SKETCH #3

040222/P ALTERNATIVE ALIGNMENT LOCATIONS 1-5

CTO 0187

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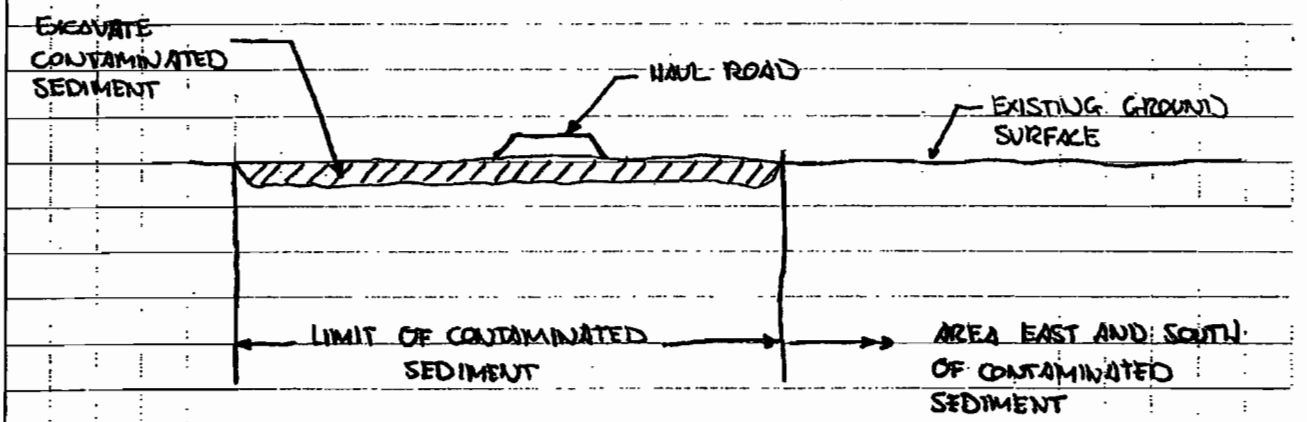
CLIENT	JOB NUMBER		
NCBC GULFPORT MISSISSIPPI			
SUBJECT: HAUL ROAD ALIGNMENT DESIGN SKETCHES			
BASED ON	DRAWING NUMBER		
BY: TWS 10/28/02	CHECKED BY	APPROVED BY	DATE

DESIGN SKETCH # 4 ALIGNMENT ALTERNATIVE NUMBER 1

(DESIGN SKETCH IS NOT TO SCALE)



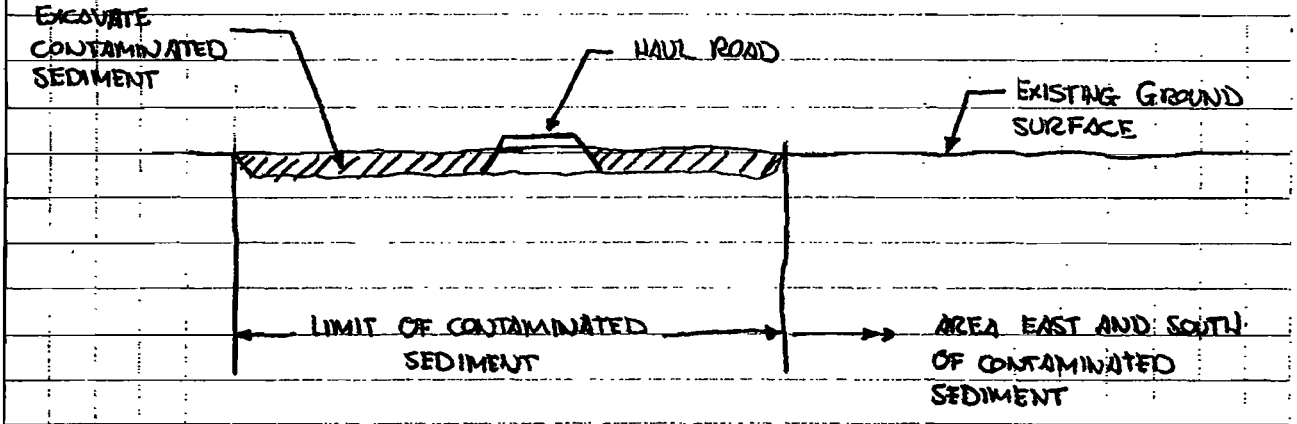
SEQUENCE:
1) CONSTRUCT HAUL ROAD.
2) EXCAVATE CONTAMINATED SEDIMENTS ON EITHER SIDE OF HAUL ROAD.
3) EXCAVATE CONTAMINATED SEDIMENTS UNDER HAUL ROAD ALONG WITH HAUL ROAD.
4) FOLLOWING VERIFICATION OF CONTAMINANT REMOVAL, RESTORE AREA OF DISTURBANCE.

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT	JOB NUMBER		
NCBC, GULFPORT, MISSISSIPPI			
SUBJECT: HAUL ROAD ALIGNMENT ALTERNATIVES DESIGN SKETCHES			
BASED ON	DRAWING NUMBER		
BY: TWS 10/28/02	CHECKED BY	APPROVED BY	DATE

DESIGN SKETCH # 5 ALIGNMENT ALTERNATIVE NUMBER 2

(DESIGN SKETCH IS NOT TO SCALE)



SEQUENCE:

1) EXCAVATE A PORTION OF CONTAMINATED SEDIMENTS (SAY 100 FT LENGTH ALONG AREA OF CONTAMINATED SEDIMENTS.
2) CONSTRUCT 100 FT LENGTH OF HAUL ROAD.
3) CONTINUE SEQUENCE FOR LENGTH OF CONTAMINATED SEDIMENT AREA.
4) FOLLOWING VERIFICATION OF CONTAMINANT REMOVAL, REMOVE HAUL ROAD AND RESTORE AREA OF DISTURBANCE.

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CLIENT		JOB NUMBER	
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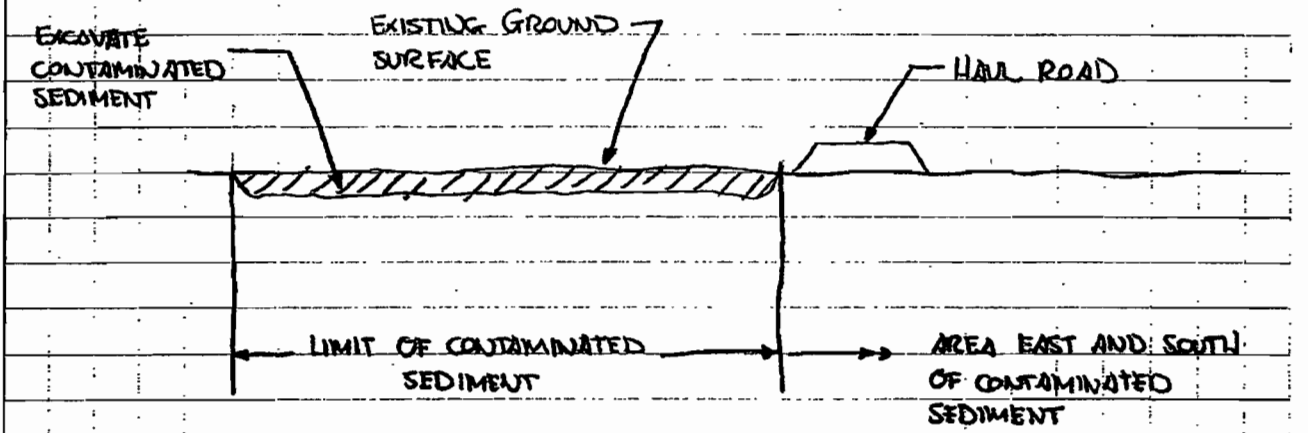
BY	CHECKED BY	APPROVED BY	DATE

DESIGN SKETCH # 6 ALIGNMENT ALTERNATIVE NUMBER 3

(DESIGN SKETCH IS NOT TO SCALE)



SEQUENCE:
1) CONSTRUCT ENTIRE LENGTH OF HAUL ROAD.
2) EXCAVATE CONTAMINATED SEDIMENT
3) FOLLOWING VERIFICATION OF CONTAMINANT REMOVAL, REMOVE HAUL ROAD AND RESTORE AREA OF DISTURBANCE.

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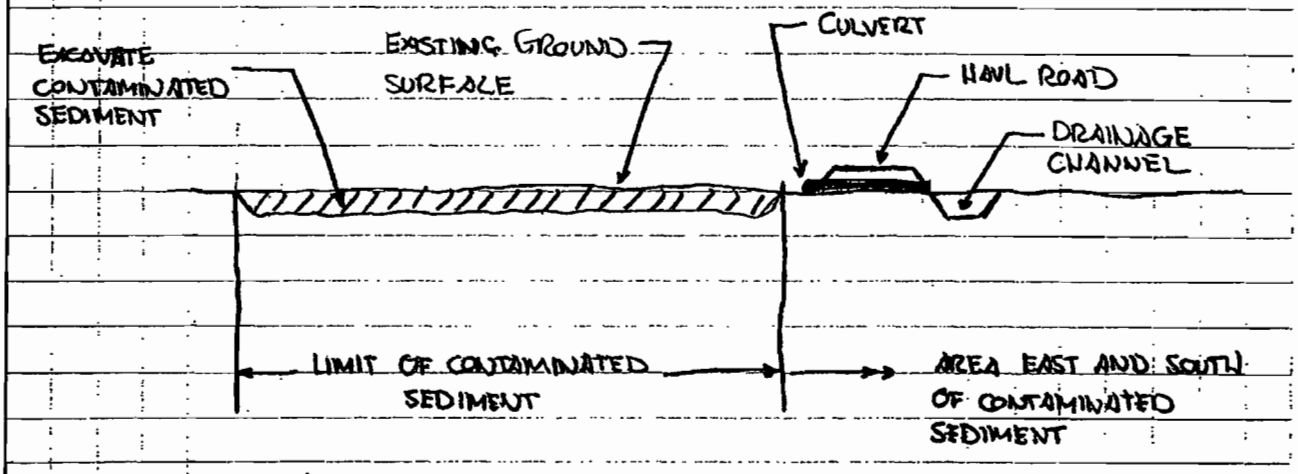
CLIENT	JOB NUMBER		
NCBC, GULFPORT, MISSISSIPPI			
SUBJECT: HAUL ROAD ALIGNMENT DESIGN ALTERNATIVES DESIGN SKETCHES			
BASED ON	DRAWING NUMBER		
BY: TWS 10/28/02	CHECKED BY	APPROVED BY	DATE

DESIGN SKETCH # 7 ALIGNMENT ALTERNATIVE NUMBER 4

(DESIGN SKETCH IS NOT TO SCALE)



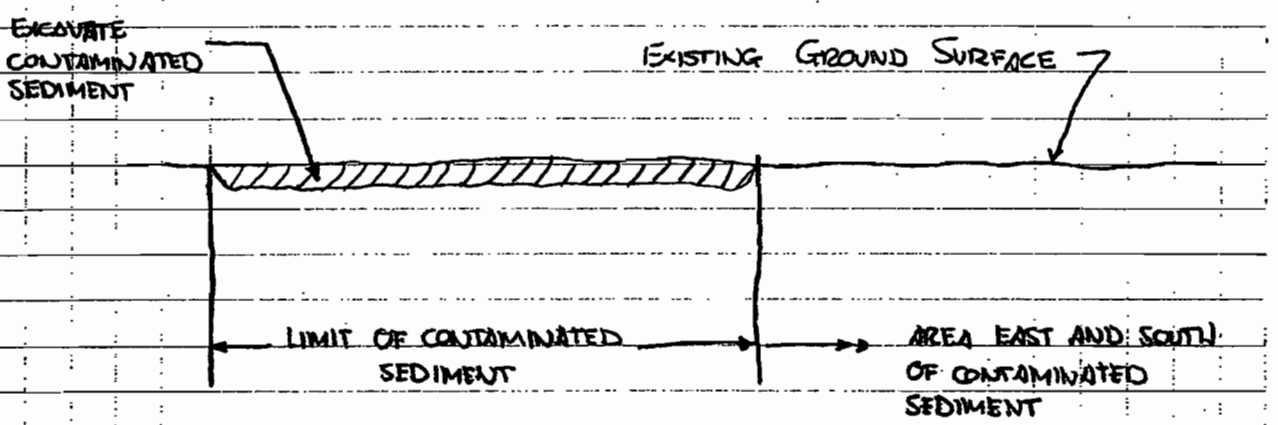
SEQUENCE:
1) CONSTRUCT ENTIRE LENGTH OF HAUL ROAD AND DRAINAGE CHANNEL WITH CULVERTS.
2) EXCAVATE CONTAMINATED SEDIMENTS.
3) FOLLOWING VERIFICATION OF CONTAMINANT REMOVAL, REMOVE HAUL ROAD AND RESTORE AREA OF DISTURBANCE.

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE _____ OF _____

CLIENT	JOB NUMBER		
NCBC GULFPORT MISSISSIPPI			
SUBJECT: NAUL ROAD ALIGNMENT DESIGN SKETCHES			
BASED ON	DRAWING NUMBER		
BY: TWS 10/28/02	CHECKED BY	APPROVED BY	DATE

DESIGN SKETCH # 8 ALIGNMENT ALTERNATIVE NUMBER 5

(DESIGN SKETCH IS NOT TO SCALE)



SEQUENCE: 1) EXCAVATE CONTAMINATED SEDIMENTS

2) FOLLOWING VERIFICATION OF CONTAMINANT REMOVAL, RESTORE AREA OF DISTURBANCE.