HYDROLOGY STUDY FOR
ALABAMA CARBON, LLC.

GLADE PREPARATION PLAN
P-3829 / REVISION R-8
JACKSON COUNTY, ALABAMA

BY

PERC ENGINEERING CO., INC.
1606 HWY. 78 WEST
JASPER, ALABAMA 35501

PRIMARY ROAD DESIGN PLANS

PRIMARY ROAD 4P STREAM CROSSING

ATTACHMENT III-B-5

JULY 12, 2012

PERC
ENGINEERING CO., INC.

Telephone: (205) 384-5553
Facsimile: (205) 295-3114 - Main Building
(205) 295-3115 - Water Lab
Web Address: www.percengineering.com

July 12, 2012

Mr. Michael Harrison, P.E.
Alabama Surface Mining Commission
Post Office Box 2390
Jasper, Alabama 35502-2390

RE: Alabama Carbon, LLC.
Glade Preparation Plant
P-3829/ Revision R-6

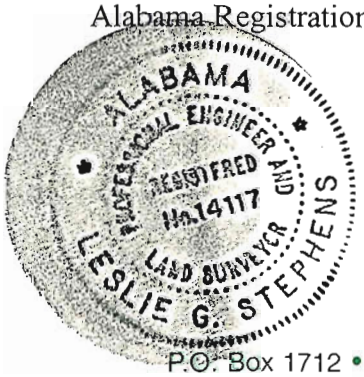
Dear Michael:

I hereby certify the attached detailed design plans for Primary Road 4P for the above referenced mine are in accordance with current prudent engineering practices and the Regulations of the Alabama Surface Mining Commission and are true and correct to the best of my knowledge and belief.

If you have any questions or required additional information, please feel free to call.

Sincerely,
PERC Engineering Co., Inc.

Leslie G. Stephens, P.E., P.L.S.
Alabama Registration No. 14117-E



SPECIFICATIONS FOR THE CONSTRUCTION, MAINTENANCE AND RECLAMATION OF PRIMARY ROADS

1. Primary roads shall be designed by or under the direction of a registered professional engineer in accordance with the Alabama Surface Mining Commission rules and regulations and prudent engineering practice.

2. Each roadway embankment will be designed and constructed so as to have a minimum static safety factor of 1.3.

3. To the extent possible, roads will be located on ridges or on the most stable available slopes to prevent or minimize erosion, downstream sedimentation and flooding in an effort to prevent adverse effects to fish, wildlife and related environmental values.

4. To the extent possible, roads will be located above the sediment basins to be constructed for the mining operation in an effort to control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area and to comply with State and Federal water quality standards applicable to receiving waters and avoid the alteration of the normal flow of water in streambeds or drainage channels while preventing or controlling damage to public or private property. Where it is not possible or is impractical to locate roads in this manner, sediment control devices such as silt fencing, hay bale check dams and rock filter check dams will be used as necessary to maintain water quality. No fording of intermittent or perennial streams will be conducted unless specifically approved by the Alabama Surface Mining Commission as temporary routes to be used during road construction.

5. Prior to construction, the roadway will be cleared, grubbed and will have the topsoil removed. The clearing limits will be kept to the minimum necessary to accommodate the roadbed and associated ditch construction.

6. Roads will be constructed of suitable compacted subgrade material. The material will be free of sod, roots, stones over 12 inches in diameter, and other objectionable materials. The material will be placed and spread over the entire fill area, starting at the lowest point in layers not to exceed 12 inches in thickness. The material will be compacted to 95 percent fo the density, based on standard proctor as outlined in ASTM.

7. Primary roads will have a minimum width of eighteen feet and a maximum width necessary to accommodate the largest equipment traveling the road.

8. Roadbeds will be cut to consolidated non-erodible material or will be surfaced with durable non-toxic, non-acid forming substances. The wearing surface will consist of durable sandstone, chert, crushed limestone, crushed concrete, crushed asphalt, red rock, ironore refuse, gravel, or other durable non-toxic, non-acid forming material approved by the Regulatory Authority. The wearing surface will be placed on the roadbed to a depth of four inches.

9. No sustained grades will exceed ten percent unless deemed necessary, in which case appropriate sediment control facilities will be constructed. If grades in excess of fifteen percent are required, cross drains, ditch relief drains and road drainways will be located at a minimum distance of three-hundred feet.

10. Roads will be constructed so as to have adequate drainage utilizing ditches, culverts, cross drains and ditch relief drains designed to safely pass the peak runoff from a ten year, six hour precipitation event. Drainage pipes and culverts shall be installed as designed and will be maintained in a free and operating condition to prevent and control erosion at inlets and outlets. Culverts have been designed to support the load of the heaviest equipment to travel the road and are based on the Handbook of Steel Drainage and Highway Construction Products by the American Iron and Steel Institute and the equipment specifications. Drainage ditches will be constructed and maintained in accordance with the

approved design to prevent uncontrolled drainage over the road surface and embankment. Roads will not be located in the channel of an intermittent or perennial stream unless specifically approved by the Alabama Surface Mining Commission. Additionally, no relocation and/or alteration of an intermittent or perennial stream will be done unless specifically approved by the Alabama Surface Mining Commission. In the event that it becomes evident that any drainage structures including culverts, bridges and/or low water crossings will be required in order to cross an intermittent or perennial stream, the structure will be designed and constructed in accordance with Alabama Surface Mining Commission requirements and prudent engineering practice and the approval of the design(s) will be acquired prior to the commencement of construction. Hay bale check dams and silt fences will be used at strategic locations when necessary to control sediment runoff. Immediately upon completion of construction, the side slopes of the road embankments and/or cuts will be fertilized, seeded with annual and perennial grasses and mulch will be added to aid in the prevention of erosion and to enhance seed germination. The seed mix will consist of, but is not limited to, some combination of the following species: bermuda grass, fescue, lespedeza, rye grass, brown top millet, clover and vetch. The particular species to be planted will vary with the planting season at the time of seed application. Upon completion of construction of each phase of the roadway the construction will be certified to the Alabama Surface Mining Commission as having been done in accordance with the approved plans for the roadway and associated facilities.

11. Routine maintenance will be required to assure that the road continually meets performance standards and will consist of periodic grading, resurfacing, dust suppression and maintenance of sediment control facilities. Dust suppression will consist of the application of water, chemical binders and/or other dust suppressants. No oil will be utilized in this process. Spot seeding, fertilizing and mulching will be performed as necessary to improve vegetative cover on roadway slopes. A road damaged by a catastrophic event shall be repaired as soon as practicable after the damage has occurred.

12. Roads not to be retained as part of the post mine land use shall be reclaimed in accordance with the approved reclamation plan for this permit as soon as practicable after they are no longer needed as part of the mining and reclamation operation, using the following procedures:

    a. The road will be closed to traffic.

    b. All bridges, culverts and other drainage structures not approved as part of the post mine land use will be removed.

    c. All road surfacing materials that are not compatible with the post mine land use or revegetation requirements will be properly disposed of on-site or removed from the site for re-use.

    d. Roadway cut and fill slopes shall be regraded and reshaped to be compatible with the post mine land use and to compliment the natural drainage pattern of the surrounding terrain.

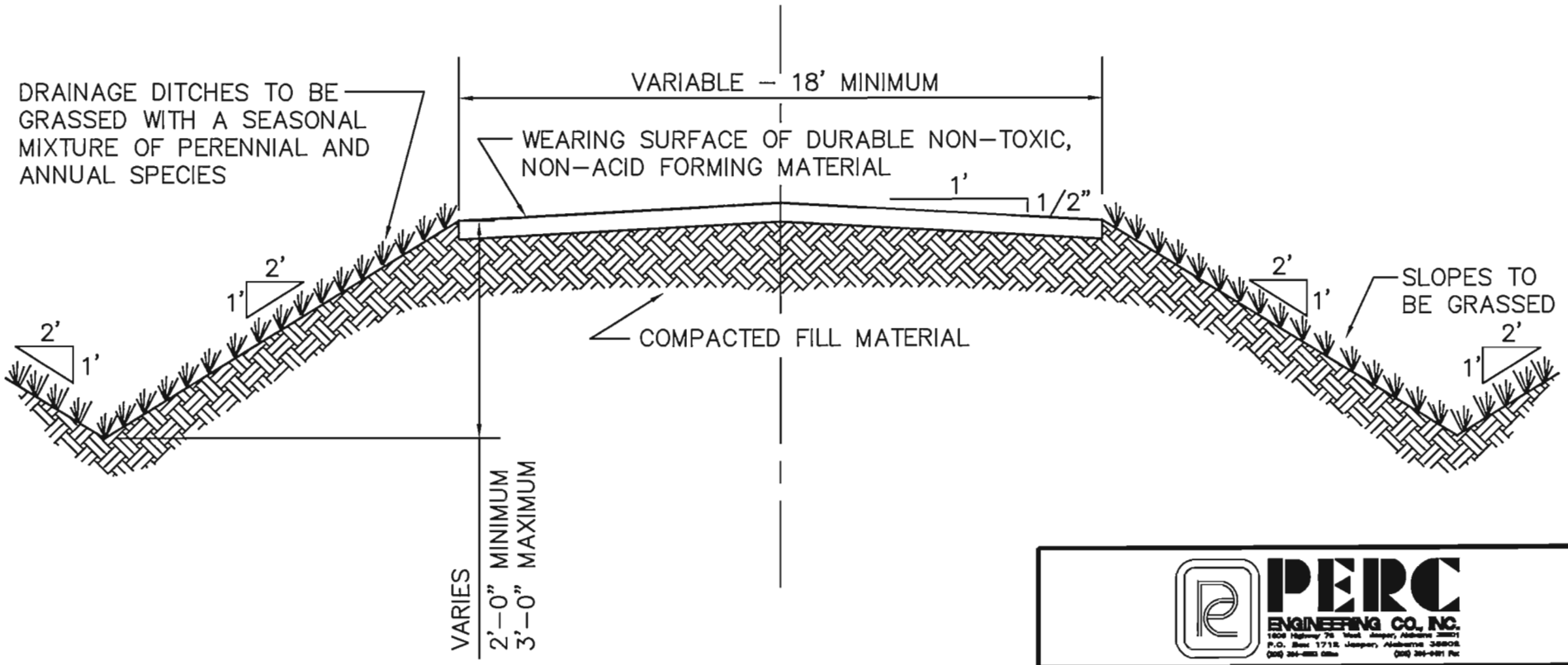
    e. The natural drainage patterns shall be protected from surface runoff and erosion utilizing the installation of dikes and/or cross drains as necessary.

    f. The roadbed shall be ripped or scarified as necessary, the topsoil or substitute or approved growing medium shall be replaced and revegetated in accordance with the approved reclamation plan for this permit.

13. The drawings and data contained in the specific design plans illustrate typical roadbed configurations for primary roads as well as site specific design of drainage structures, stability analysis and ditch sections.

TYPICAL HAUL ROAD
FILL SECTION

NO SCALE



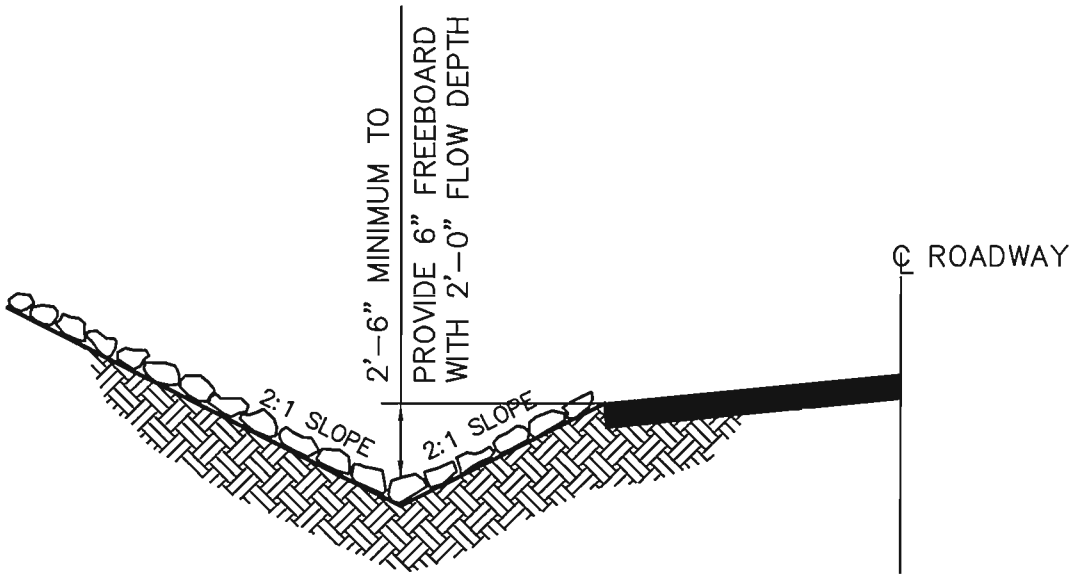
PERC ENGINEERING CO., INC.

TYPICAL FILL SECTION
PRIMARY HAUL ROAD

DRAWN BY: K.D.P. DWG. NAME: TYPHAULF	DATE: 2–3–97
APPROVED BY: S.R.I.	SCALE: NONE

ATTACHMENT III.–B.–5.

K:\S\TYPHAULF 02/03/97 16:01



DITCH GRADIENT 5% TO 10%

DITCH CHANNEL TO BE LINED WITH NON-ERODIBLE NON-TOXIC, NON-ACID FORMING SANDSTONE OR LIMESTONE RIP-RAP. THE RIP-RAP WILL BE "CLASS 1" RIP-RAP AND HAVE A MINIMUM THICKNESS OF 12".

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ENGINEERING CO., INC.
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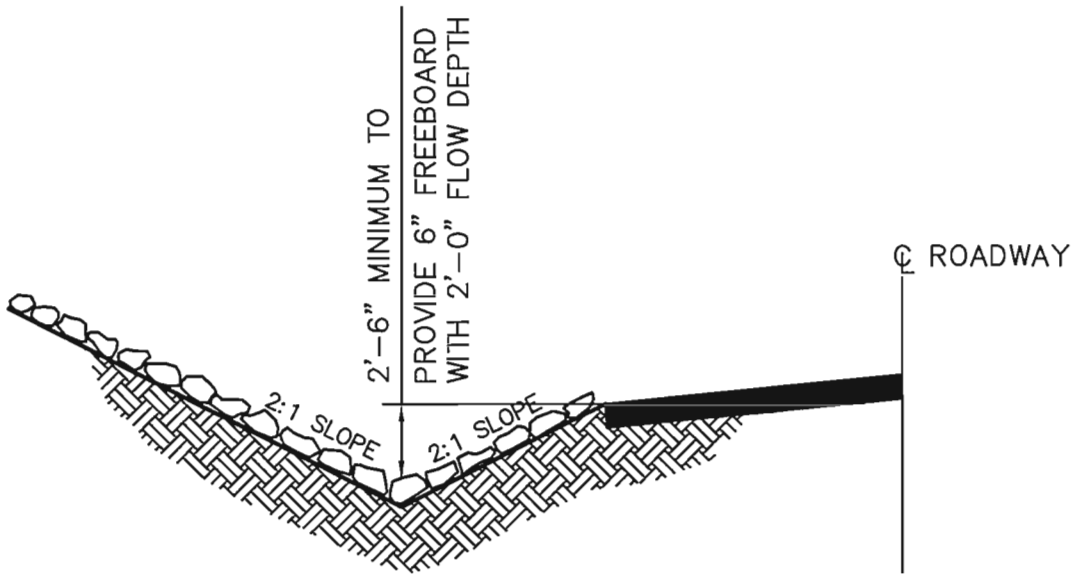
P.O. Box 1718 Jasper, Alabama 35502
(205) 384-6883 Office (205) 384-9491 Fax

TYPICAL PRIMARY ROADWAY DITCH CROSS SECTION

DRAWN BY: S.D.M. DWG. NAME: PRIMRD1	DATE: 11/8/2011
APPROVED BY: L.G.S.	SCALE: NONE



DITCH GRADIENT 11% TO 17%

DITCH CHANNEL TO BE LINED WITH NON-ERODIBLE NON-TOXIC, NON-ACID FORMING SANDSTONE OR LIMESTONE RIP-RAP. THE RIP-RAP WILL BE "CLASS 2" RIP-RAP AND HAVE A MINIMUM THICKNESS OF 16".

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TYPICAL PRIMARY ROADWAY DITCH CROSS SECTION

DRAWN BY: S.D.M. DWG. NAME: PRIMRD2	DATE: 11/8/2011
APPROVED BY: L.G.S.	SCALE: NONE

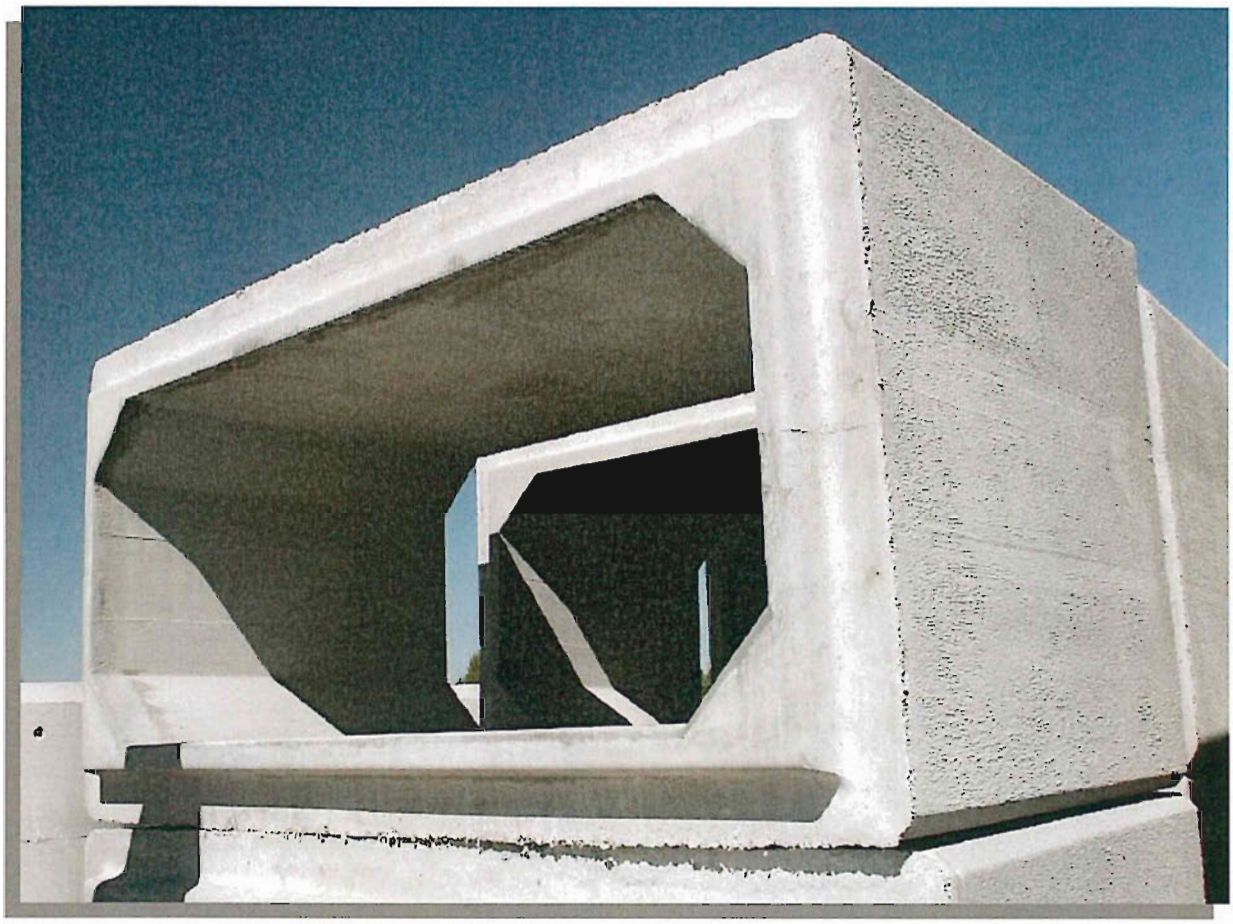
NOTES

1) Due to there being no significant cut or fill section, no stability analysis is required.

2) The proposed location of Drainage Structure DS1P has been located, by field survey, within the stream bed of Big Glade Branch.

PRECAST BOX CULVERT INSTALLATION

SHERMAN DIXIE



800.737.0707

www.shermandixie.com

WARNING

Obey all OSHA and Project Safety Guidelines for Open Trench Construction and Overhead Precautions

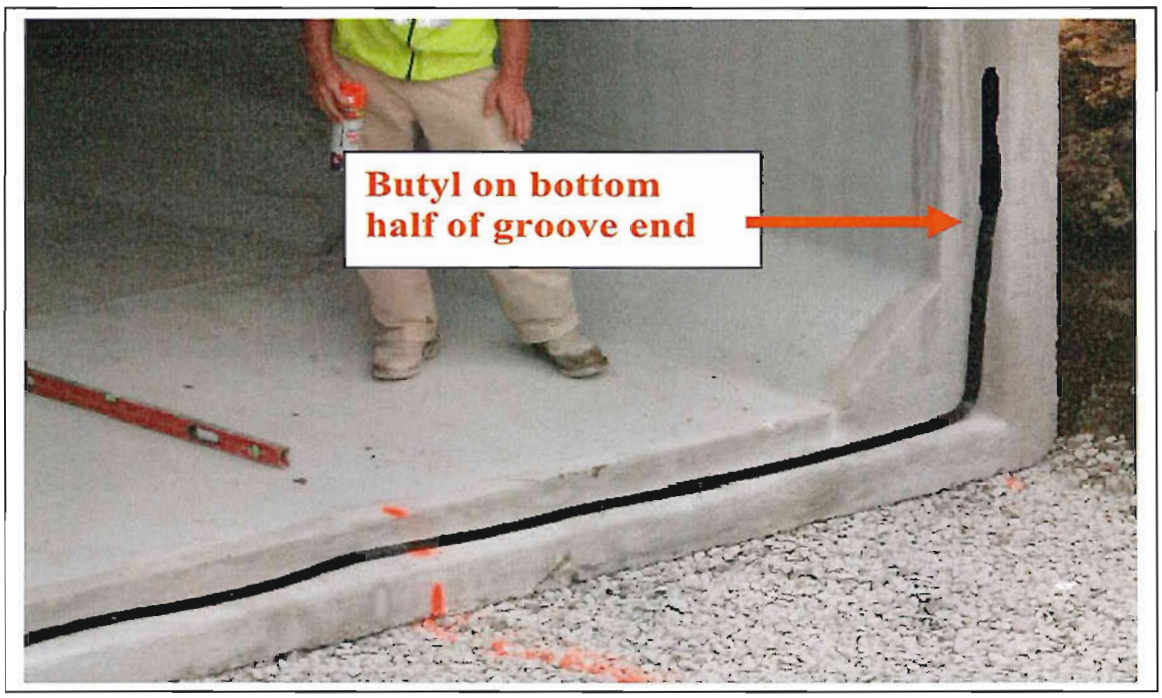
Excavation & Bedding

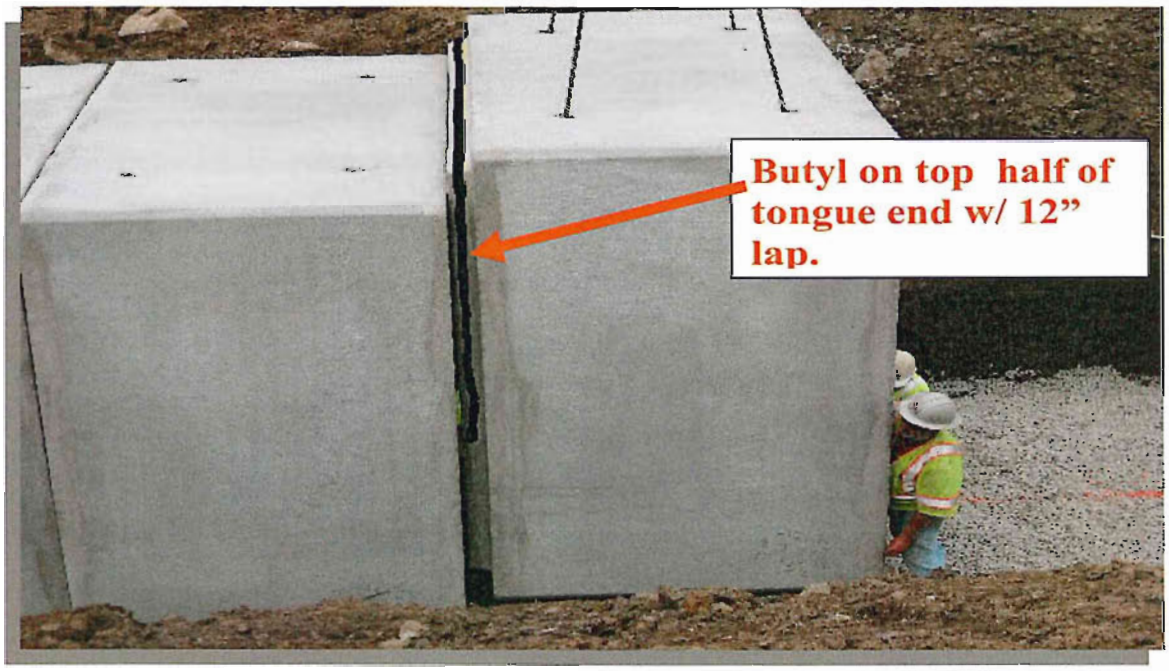
Delivery Coordinated & Orchestrated through Contractor and SDCI Project Manager

Handling & Lifting Gear

Airborne
Optional Rope Steering.
Stay Clear of Objects Overhead

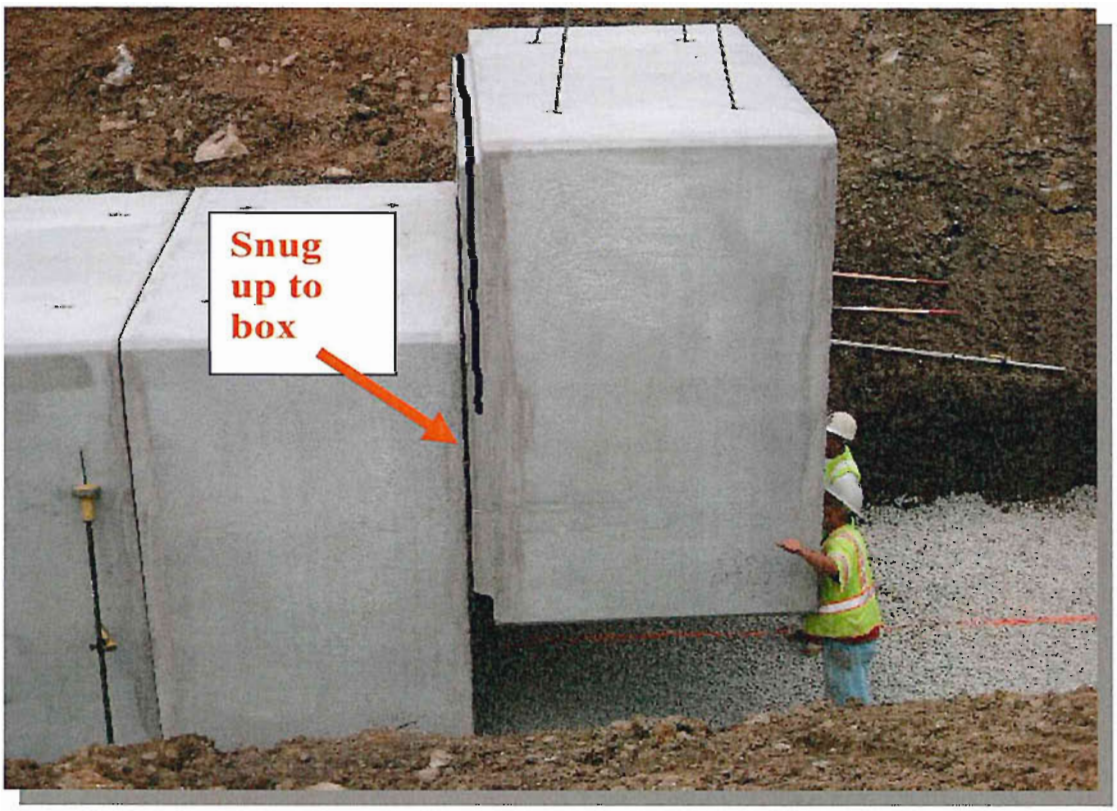
Joint Materials





Use rubber hammers to press butyl into place

Setting Boxes



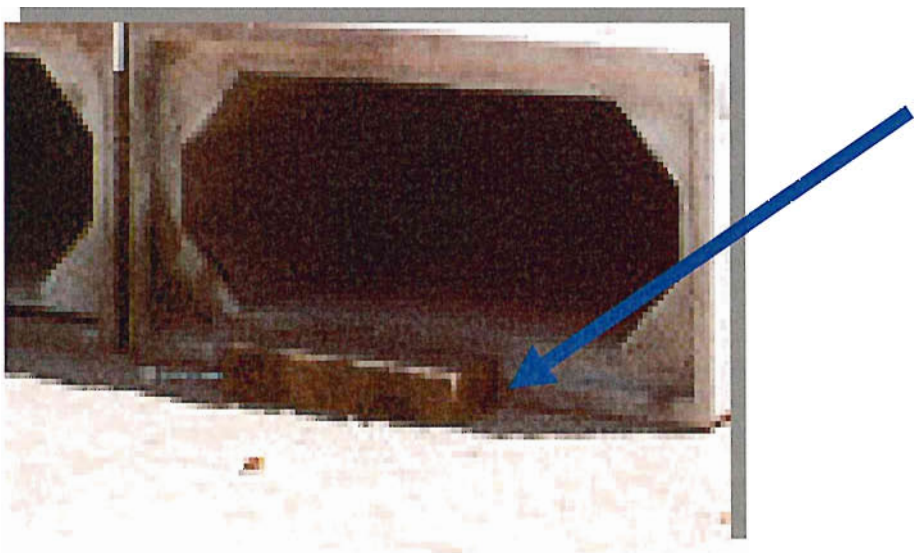

Align
Sides/width
with set box

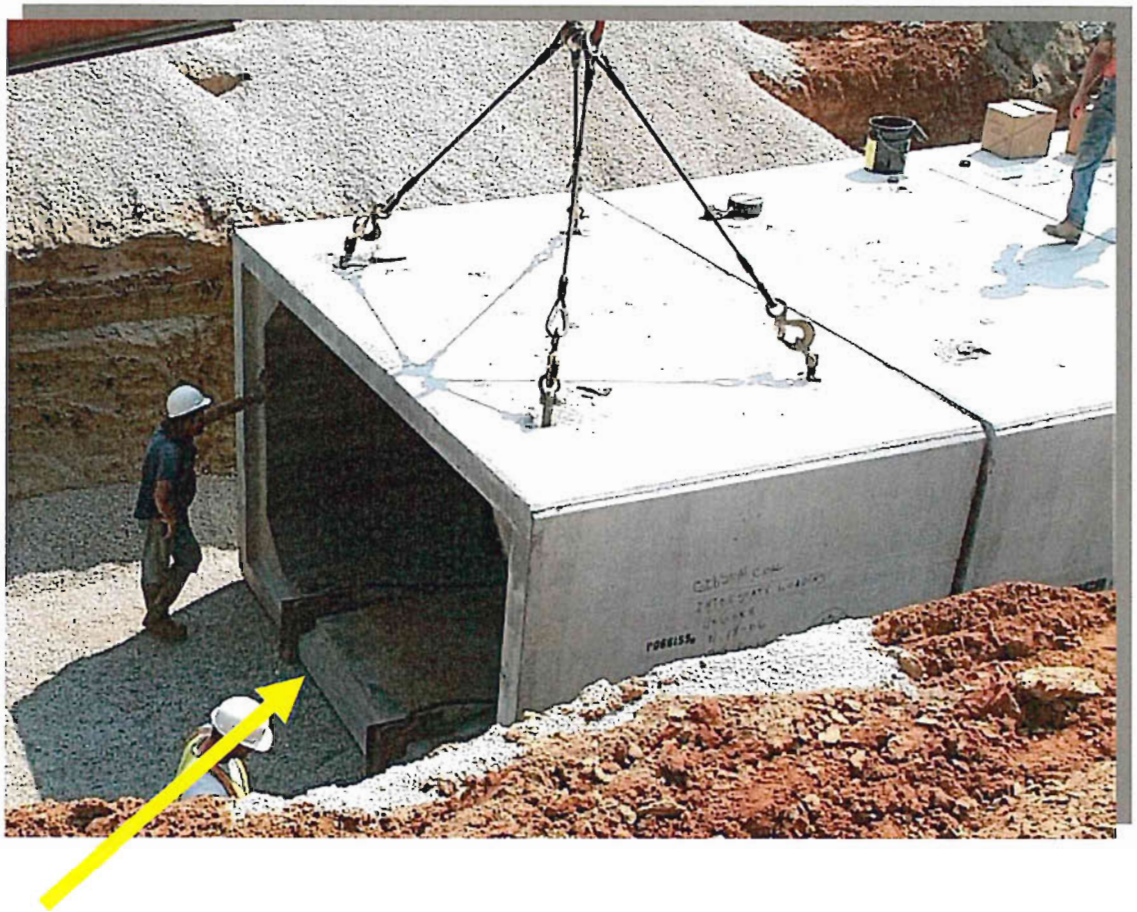

Push
bottom
in first


Not
Recommended
(page 73)

A good crane operator can "pull in" the top of box once bottom of box begins to "home".

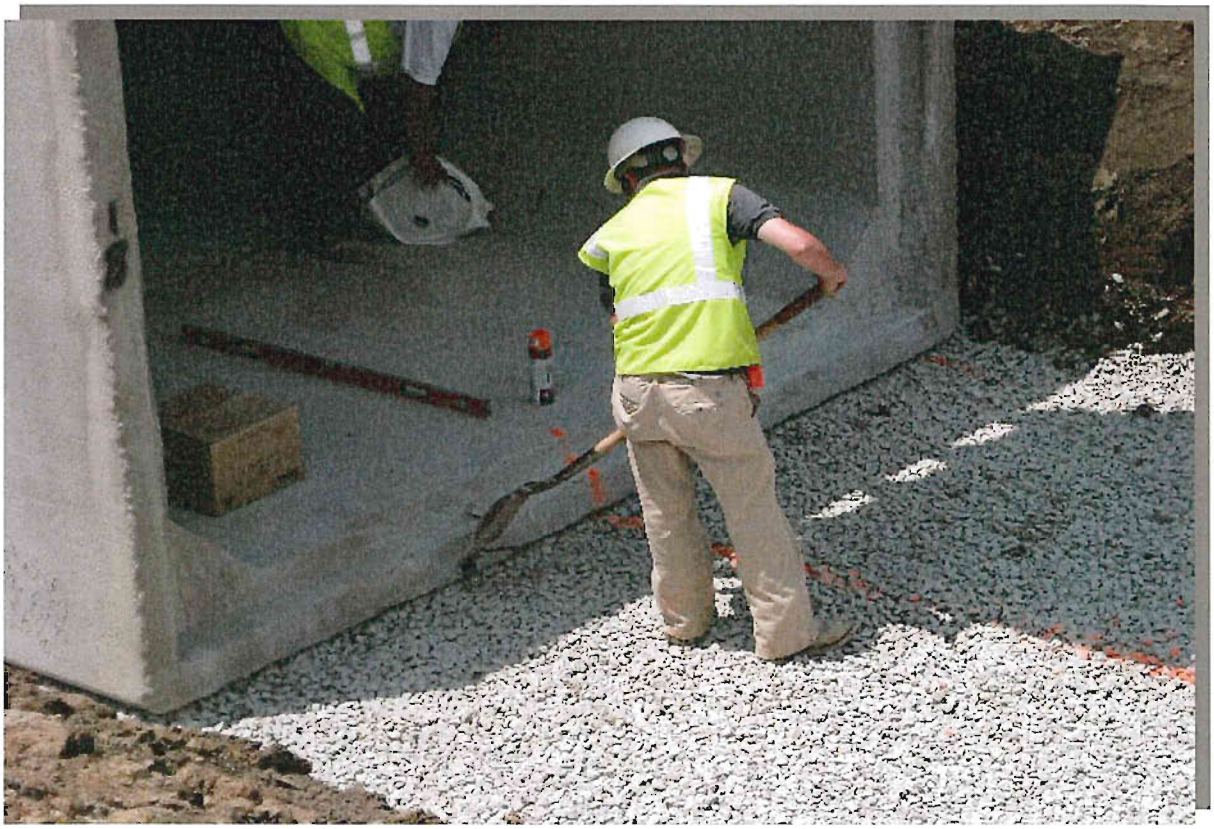
Should use a timber or similar cushion between bucket and box to eliminate spalling of concrete edge.





Contractor fabricated “come-a-long”

Pull out some stone away from bell/groove at each joint so bedding stone does not get pushed into joint surfaces when setting next box.

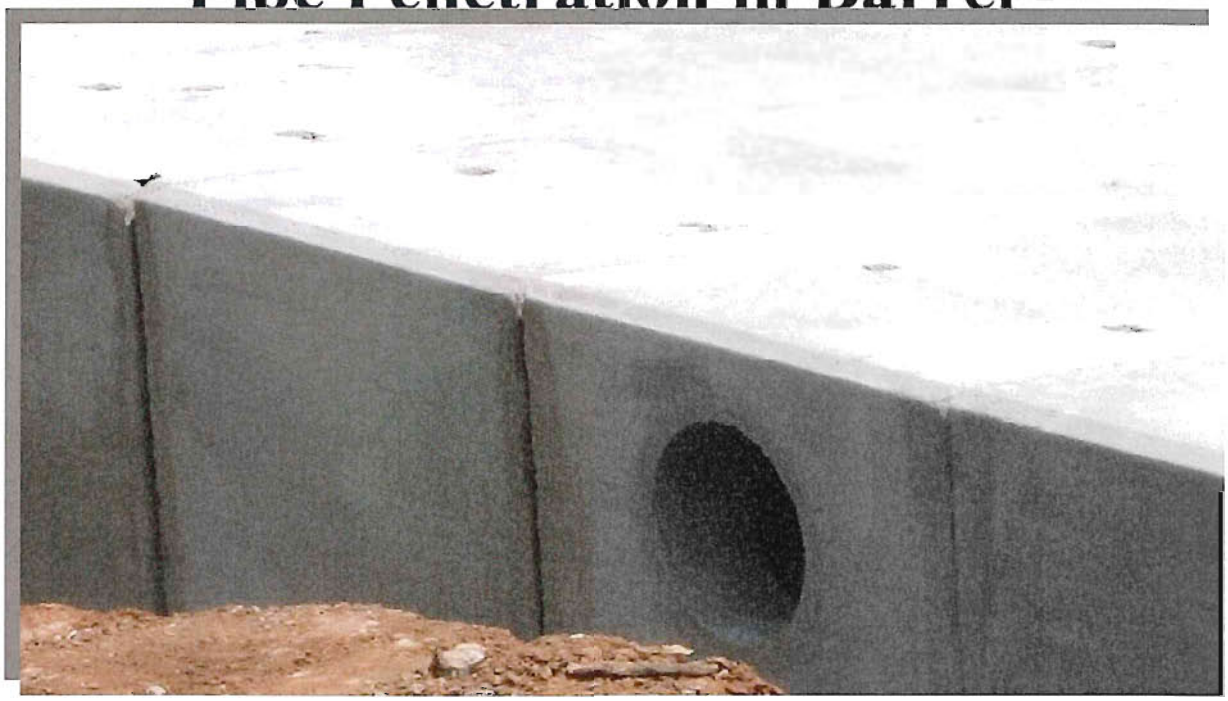


Checking "Line & Grade"

The very first piece or first section after a bend such as this, holds the key to straight and proper alignment. Spending time to get the first section of a new run exact reduces alignment issues in "setting" rest of barrel.

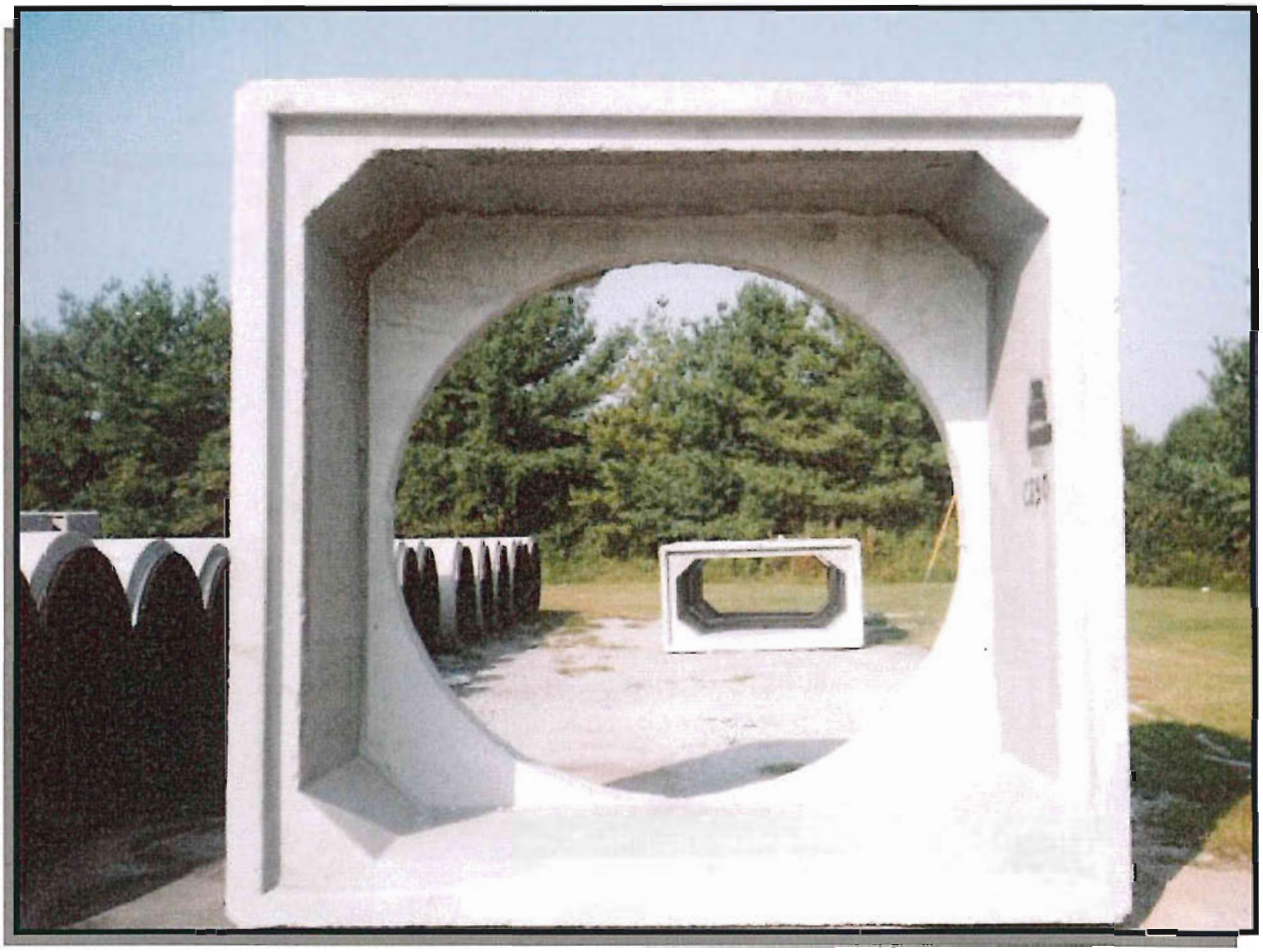
Precast Transition piece to change from one box size to another

Pipe Penetration in Barrel -



And in Joint & "Manway" in top

Large Pipe Penetration in Box Culvert Bulkhead



Backfill can begin immediately behind setting of boxes.

Good Luck!

SHERMAN DIXIE

800.737.0707

Guide to Site Practice

The proven strength and performance characteristics of precast concrete box culverts, together with their excellent service life, make them ideal for a wide variety of civil engineering and construction applications.

Box culvert sections can be manufactured in a variety of shapes and sizes, offering exceptional versatility in the uses to which they can be applied. In addition to the more common use for diverting water courses, this versatility is demonstrated in balancing tanks, pedestrian subways, access shafts, service tunnels, sea outfalls, road crossings and many other situations where the whole life costing consideration requires strength, durability and economy to be of paramount importance.

Unlike other materials, such as steel, precast concrete box culverts do not require additional treatments to prolong their useful life or improve performance, their surfaces do not rust and the smooth internal finish of concrete ensures optimum flow of water through the box culvert.

Precast concrete box culverts fulfil the current design life requirements for buried structures. The ability to provide many years of service with the minimum of maintenance makes concrete box culverts the most cost-effective means of diverting water courses, especially with the ever-present risk of corrosive elements in the water or soil.

Whilst the methods and procedures for the installation of precast concrete box culverts are familiar to contractors, careful attention to detail will lead to safer working, a smoother flow of operations and a higher standard of finished culvert.

This Guide provides a reliable checklist for anyone engaged in the installation of box culverts. It is published by the Box Culvert Association to encourage good practice in the use of precast concrete box culverts.

TAKING DELIVERY

1.The contractor is normally responsible for off-loading box culverts and should:

- Agree with the supplier well in advance the place and approximate time of delivery.
- Provide a hard access which can be used safely by standard delivery vehicles.
- Provide a suitable crane of adequate capacity.

2. Lifting methods differ between box culvert manufacturers. Proprietary lifting systems are commonly used but other methods such as holes for eyebolts, threading lifting sockets or projecting loops may be ernployed. The contractor should:

- Ascertain details of the lifting method used by the supplier.
- Provide all handling equipment necessary to operate the lifting method on site.
- Ensure that any non-standard attachment to the lifting point is supplied and that full instructions are given for its use.

3. Where other methods such as lifting forks, beams or slings are to be used the contractor should:

- Consult the box culvert supplier to ensure that the proposed method is acceptable.
- Protect the box culvert and particularly the jointing surfaces from damage whilst lifting.
- Ensure complete safety of operatives.

4. Generally, box culverts are transported as laid, but for safety or economy, the box culverts may be transported on end. The contractor should:

- Check with the supplier how the box culverts will be delivered.
- Where box culverts are delivered on end, establish a safe method of turning.
- Provide any equipment necessary for this operation.

5. The box culverts may be off-loaded into a storage area or they may be placed in line alongside the trench in which they are to be laid. In either situation:

- Before off-loading, check the box culverts for any damage which may have occurred in transit and report any defects promptly to the supplier.
- Lower them carefully on to a firm level base away from the edge of the trench.
- Move them by lifting and never by dragging.
- In cold weather, protect open lifting sockets from freezing and bursting.

JOINTING MATERIAL

1. The box culvert manufacturer may supply jointing material. If required but not supplied by the box culvert manufacturer, the jointing material should be ordered in good time.

- Establish the type of jointing material and whether any primer is necessary.
- Measure the quantity required and allow for wastage.
- Where seasonal grades are available, specify the grade required.

2. The jointing material supplier should provide detailed recommendations for the use of the product.

- Check the quantity and type of material on receipt.
- Note any special requirements for storage.
- Ensure full application instructions are followed by operatives.

3. Damage to the profile of preformed jointing materials will impair efficiency.

- Store cartons flat and protect from extremes of temperature.
- Stack to a limited height to avoid crushing.
- Prevent contamination from solvents.

PREPARING THE TRENCH

1. Keeping to the specified line and gradient, the trench should be excavated to a width equal to the box culvert width plus about 600mm for most conditions.

- Keep the width to a minimum to avoid unnecessary excavation, bedding material and backfill.
- Follow the normal requirements for safety when working in trenches.

2. Full load bearing capacity of an installed box culvert line is achieved with uniform support at the base.

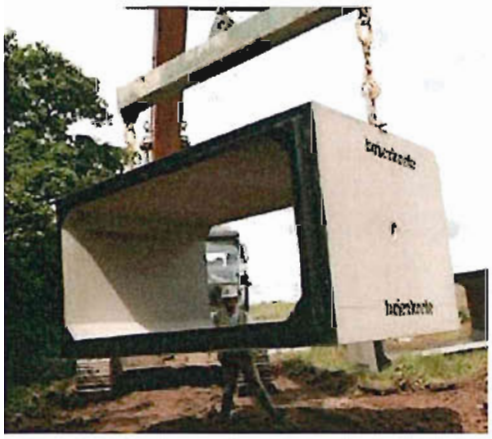
- Carefully trim the formation to the required depth and gradient making allowance for the thickness of the bedding.
- Excavate local hard or soft areas of the trench bottom which may cause uneven settlement and replace with well-compacted backfill selected to give uniform support.
- Maintain a dry formation so far as possible by diverting water courses, pumping water from the trench or other means.
- In clay soils, leave a protective layer of material in the trench bottom until just before the bedding is laid.

BEDDING

1. Bedding is intended to level out any remaining irregularities in the trench bottom and ensure uniform support under the full width and length of the box culvert.

- Lay well-compacted selected granular material over the full width of the trench to a minimum depth of 200mm, having first removed any protective layer.

Blind the surface with fine material to assist levelling.



2. Having achieved a flat, well prepared base, it should not be allowed to deteriorate.

- Lay the bedding only a minimum distance ahead of the laying of box culverts.
- Keep off the prepared base so far as is practicable.

3. As an alternative to granular bedding, a concrete blinding layer is sometimes preferred to protect the formation or to allow faster laying of box culverts.

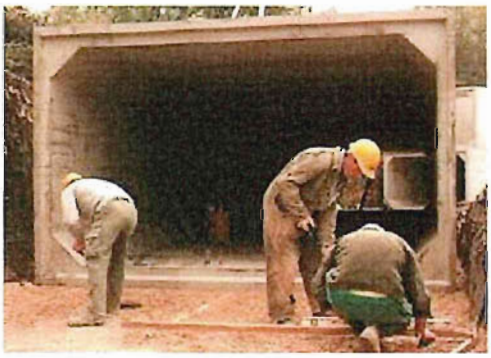
- Lay a thin flat apron of unreinforced lean-mix concrete about 75mm thick on a trench bottom which has been well prepared to a uniform firmness.

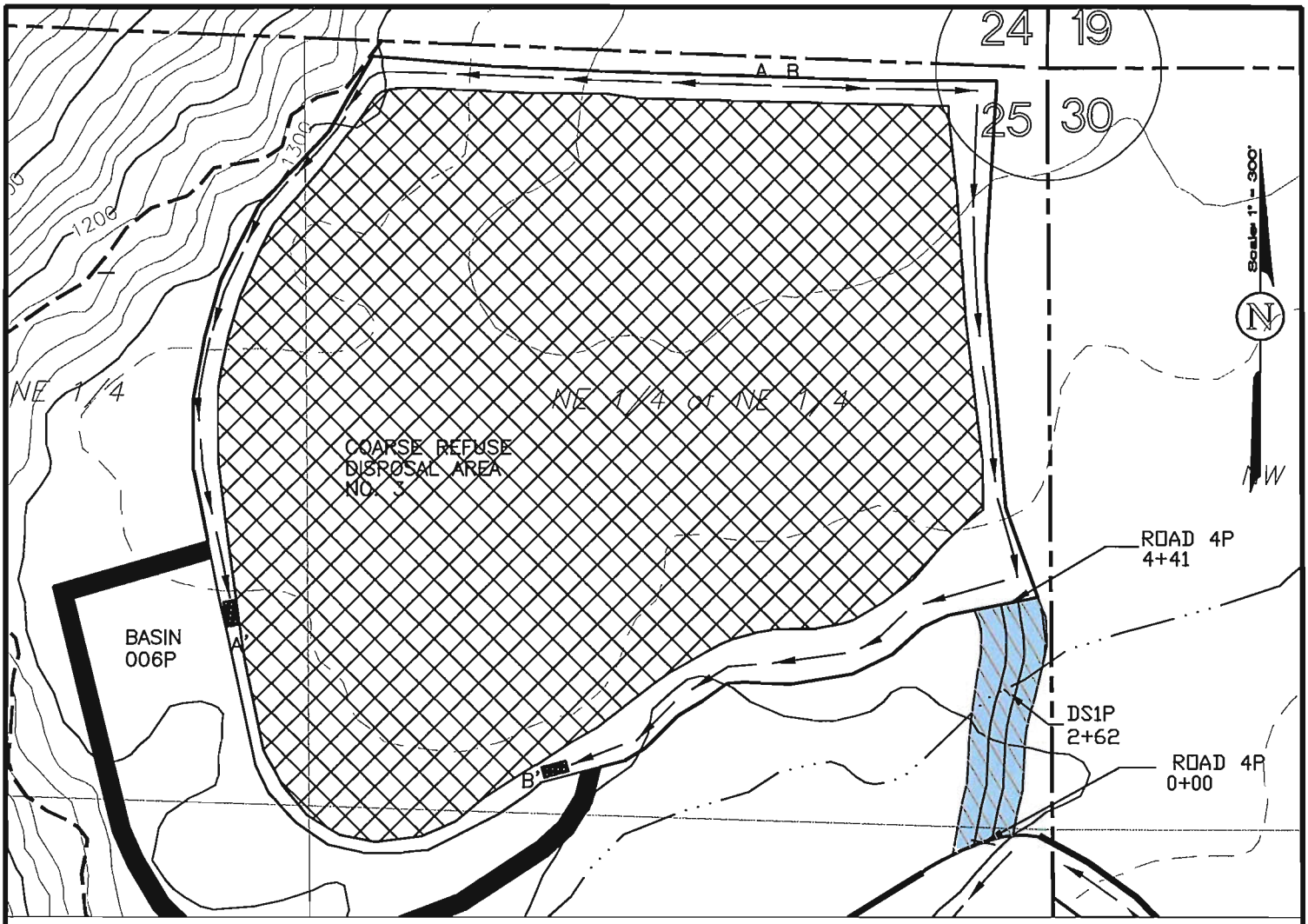
APPLYING THE JOINTING MATERIAL

Joints may be left open in certain cases but a preformed strip compressed within the joint is commonly used. The strip should be applied to the box culvert just before it is laid in the trench.

- Where necessary, clean and prime the inner and sloping faces of both spigot and socket and allow to dry.
- Place the strip in the internal corner of the socket or where otherwise directed.
- Cut mitred ends and join the strip at corners and do not bend the strip.
- Check all joints in the strip to ensure that the strip is continuous.

Always follow the recommendations of the manufacturer of the jointing material.





LEGEND

- Permit Boundary
- 400 — Surface Contour
- 001 — Sediment Basin
- Drainage Course
- % — Land Slope Measurements
- Reclamation Cross Section
- Diversion Ditch
- Occupied Dwelling
- Unoccupied Dwelling (Barn, Shed, etc.)
- Private Impoundment
- County Road (Paved unless otherwise designated)
- Road (Private unless otherwise shown)
- Primary Road
- MW-1 — Groundwater Monitoring Site
- Slurry Impoundments
- Embankment For Sediment Basin
- Coarse Refuse Disposal Area No. 3

Note: Base Map taken from the Ider and Flat Rock,ALA U.S.G.S. 7.5 Minute Quadrangle Maps.

PERC ENGINEERING CO. INC.

Attachment III-B-5
GTM Energy Partners, LLC
Glade Preparation Plant
P-3829 / Revision R-8
Primary Road Location Map

DRAWN BY: J.W.T. DWG. NAME: GPPHRLM	DATE: 6/09/2009
APPROVED BY: L.G.S.	SCALE: 1"=300'

19

20

30

29

NW 1/4 of SW 1/4 | NE 1/4 of SW 1/4 | NW 1/4 of SE 1/4 | NE 1/4 of SE 1/4

SW 1/4 of SW 1/4 | SE 1/4 of SW 1/4 | SW 1/4 of SE 1/4 | SE 1/4 of SE 1/4

NE 1/4 of NE 1/4 | NW 1/4 of NW 1/4 | NE 1/4 of NW 1/4 | NW 1/4 of NE 1/4 | NE 1/4 of NE 1/4

SE 1/4 of NW 1/4 | SW 1/4 of NE 1/4 | SE 1/4 of NE 1/4

NE 1/4 of SE 1/4 | NW 1/4 of SW 1/4 | SE 1/4 of SW 1/4 | NE 1/4 of SW 1/4

24 19
25 30

19 20
30 29

GLADE BRANCH

BIG

DS1P
2+62

TA

004A

004P

SLURRY IMPOUNDMENT NO. 2

COUNTY ROAD 464

COARSE REFUSE DISPOSAL AREA NO. 2

MW-2

MW-1

WASHER

003P

A

A'

B

B'

POND

FALLS

MORR
CEM.

1300 1400

LEGEND

- PERMIT BOUNDARY
- 001 SEDIMENT BASIN
- DRAINAGE DIVIDE
- DIVERSION DITCH
- COARSE REFUSE DISPOSAL

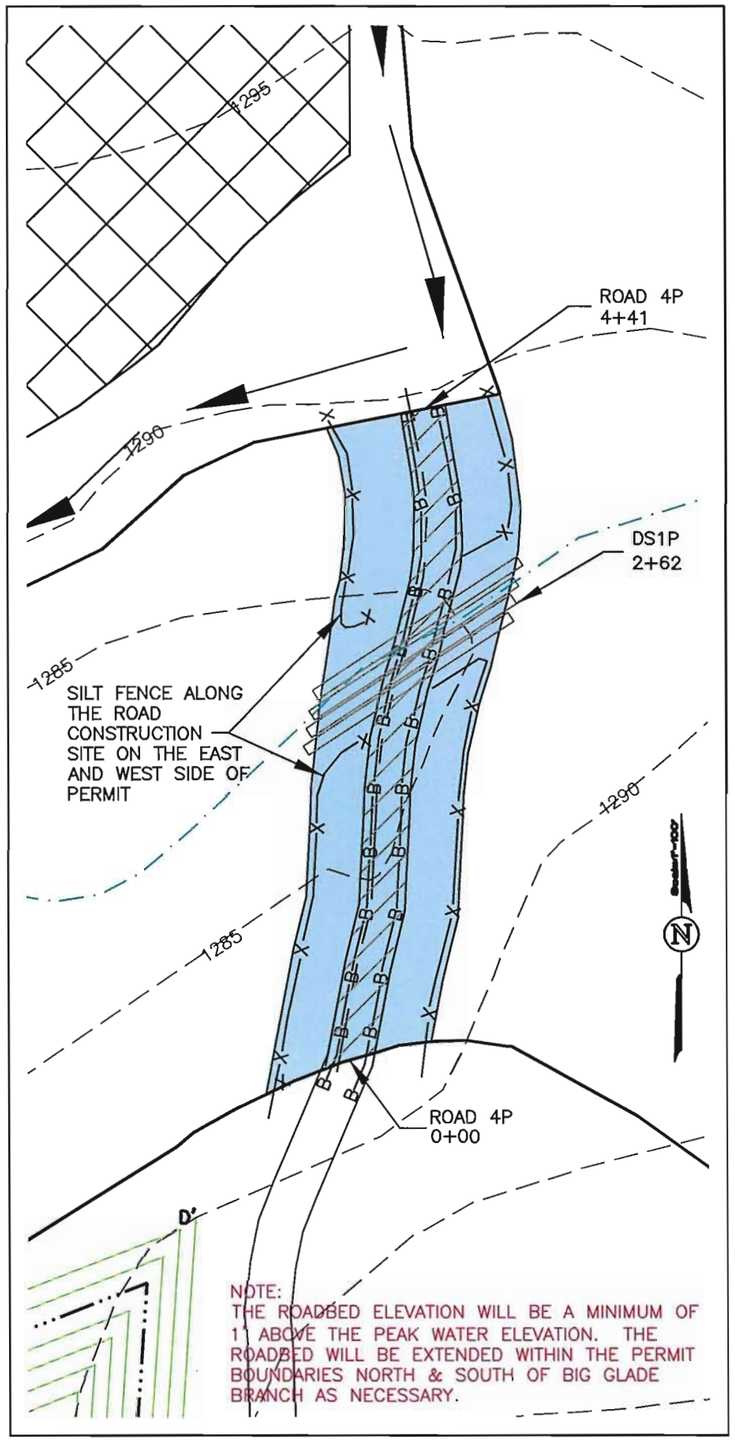
LANDUSE & CURVE NUMBER INFORMATION

AVERAGE MIIXTURE OF UNMANAGED TIMBERLAND AND PASTURELAND, CURVE NUMBER 73

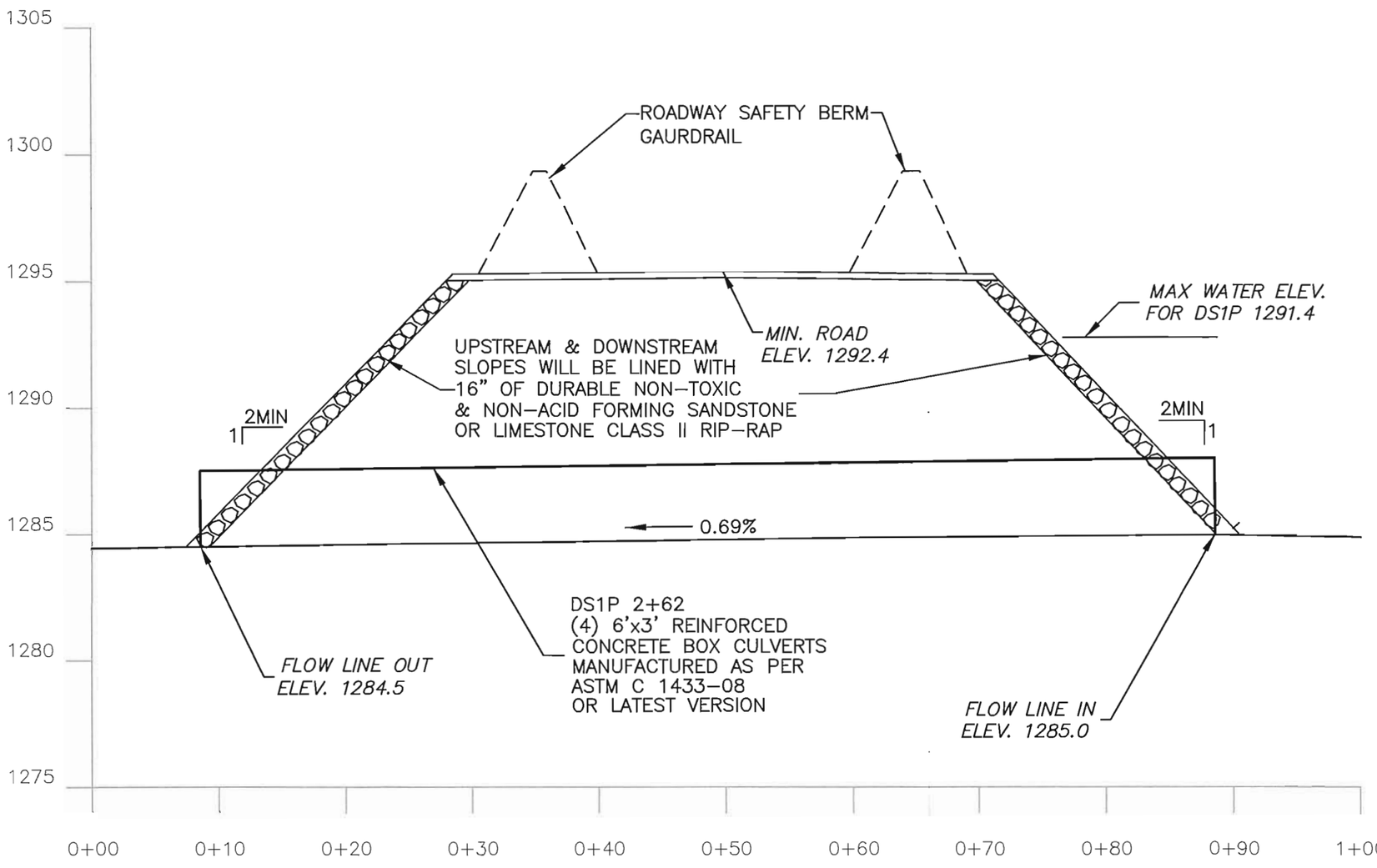
PERC ENGINEERING CO., INC.
1506 Highway 78 West, Jasper, Alabama 35501
P.O. Box 1715 Jasper, Alabama 35502
(205) 384-2482 Office (205) 384-4911 Fax

ALABAMA CARBON, L.L.C.
GLADE PREPARATION PLANT
P-3829 REVISION R-8
ATTACHMENT III-B-5
PRIMARY ROAD 4P
WATERSHED MAP

DRAWN BY:	J.W.T.	DATE:	06/23/2012
DWG. NAME:	SCWSM		
APPROVED BY:	L.G.S.	SCALE:	1"=500'



PLAN VIEW
1" = 100'



CROSS SECTION

MAP LEGEND

- PERMITTED AREA
- SILT FENCE
- ROAD DITCH
- ROADWAY SAFETY BERM
- SLURRY PIPELINE
- PERMIT BOUNDARY
- DIVERSION BERM/DITCH
- PREVIOUSLY RE-ROUTED BIG GLADE BRANCH

HYDRAULICS INFORMATION

Drainage Area = 446 Acres
100 YR.-6 HR., Q = 724.2 C.F.S.
Maximum Water Elev. = 1291.4
Minimum Fill Elev. = 1292.4
Maximum Allowable Cover 6'X3' R.C.B. = 10'
Minimum Allowable Cover 6'x3' R.C.B. = 1'
Wall Thickness = 7.0"
Minimum Freeboard = 1'

NOTE:
PROVIDE TRUCK LOAD CAPACITY AND MINIMUM/MAXIMUM COVER TO VENDOR WHEN ORDERING CULVERTS.

PERC ENGINEERING CO., INC.
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P.O. Box 1712 Jasper, Alabama 35502
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ALABAMA CARBON, LLC.
GLADE PREPARATION PLANT
P-3829 / REVISION R-8
PRIMARY ROAD 4P
DRAINAGE STRUCTURE DS1P 2+62

DRAWN BY: J.W.T. DWG. NAME: HRSCDT	DATE: 06/25/2012
APPROVED BY: L.G.S.	SCALE: AS NOTED

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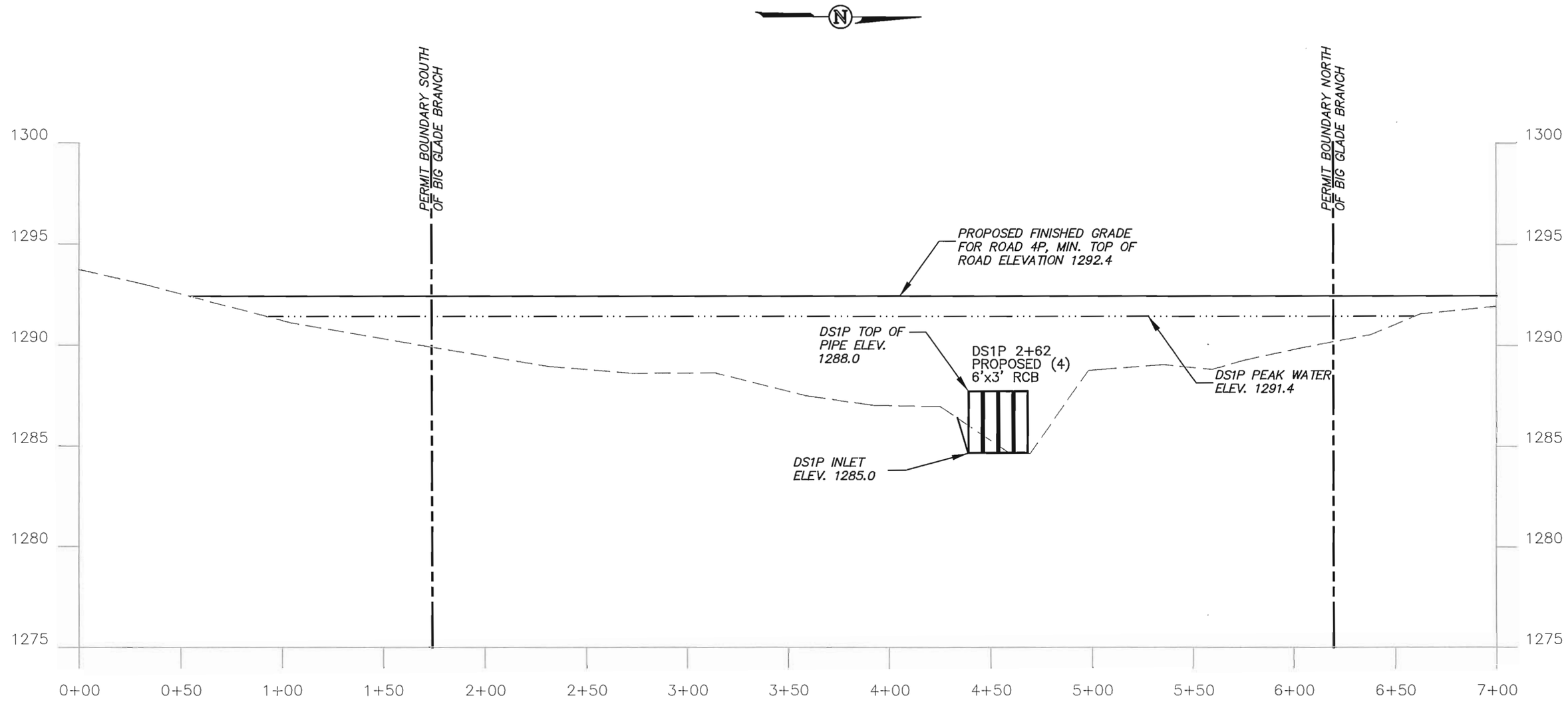

ROAD 4P

– – – – – EXISTING GRADE/ROAD

——— PROPOSED GRADE

— – – — PERMIT BOUNDARY

NOTE:
1: FINISHED GRADES SHOWN HEREON MAY VARY FROM BETWEEN 0% TO 17%.

PERC ENGINEERING CO., INC.

ALABAMA CARBON, LLC
Glade Preparation Plane
P-3829 / Revision R-8
Primary Road 4P Profile

DRAWN BY: J.W.T. DWG. NAME: GPPHRPR	DATE: 06/25/2012
APPROVED BY: L.G.S.	SCALE: AS NOTED

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Alabama Carbon LLC
Glade Preparation Plant
P-3829 Revision R-8
Drainage Structure DS1P 2+62

5.4 Inches, 100 year-6 hour, SCS 6 Hour

JWT

PERC Engineering Co., Inc.
PO BOX 1712
Jasper, AL 35503

Phone: 205-384-5553
Email: John.Taylor@percengineering.com

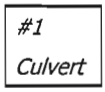
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	5.400 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Culvert	#1	==>	End	0.000	0.000	DS1P 2+62



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	446.000	446.000	724.15	66.86

Structure Detail:

Structure #1 (Culvert)

DS1P 2+62

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
100.00	1.50	0.0240	8.00	0.00	0.90

Culvert Results:

Design Discharge = 724.15 cfs

Minimum pipe diameter: 1 - 0 inch pipe(s) required

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	446.000	0.278	0.000	0.000	74.000	S	724.15	66.865
	Σ	**446.000**						**724.15**	**66.865**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	1. Forest with heavy ground litter	20.00	20.00	100.00	1.130	0.024
		8. Large gullies, diversions, and low flowing streams	5.00	80.00	1,600.00	6.700	0.066
		9. Small streams flowing bankfull	1.39	100.00	7,200.46	10.600	0.188
#1	**1**	**Time of Concentration:**					**0.278**

CURRENT DATE: 07-13-2012
CURRENT TIME: 12:14:37

FILE DATE: 07-13-2012
FILE NAME: GPPDS1P

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.2

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS	SHAPE	SHAPE, MATERIAL, INLET: SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1285.00	1284.20	80.00	4	RCB	6.00	3.00	.016	CONVENTIONAL
2									
3									
4									
5									
6									

SUMMARY OF CULVERT FLOWS (cfs) FILE: GPPDS1P DATE: 07-13-2012

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1285.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1286.48	110.0	110.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1287.32	220.0	220.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1288.05	330.0	330.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1288.81	440.0	440.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1289.67	550.0	550.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1290.71	660.0	660.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1291.40	724.2	724.2	0.0	0.0	0.0	0.0	0.0	0.00	1
1293.38	880.0	880.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1294.64	990.0	961.4	0.0	0.0	0.0	0.0	0.0	27.95	4
1295.39	1100.0	1004.9	0.0	0.0	0.0	0.0	0.0	94.97	3
1294.00	922.5	922.5	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

PEAK WATER ELEVATION

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: GPPDS1P DATE: 07-13-2012

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1285.00	0.000	0.00	0.00	0.00
1286.48	0.000	110.00	0.00	0.00
1287.32	0.000	220.00	0.00	0.00
1288.05	0.000	330.00	0.00	0.00
1288.81	0.000	440.00	0.00	0.00
1289.67	0.000	550.00	0.00	0.00
1290.71	0.000	660.00	0.00	0.00
1291.40	0.000	724.15	0.00	0.00
1293.38	0.000	880.00	0.00	0.00
1294.64	-0.004	990.00	0.62	0.06
1295.39	-0.001	1100.00	0.11	0.01

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 07-13-2012 FILE DATE: 07-13-2012
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PERFORMANCE CURVE FOR CULVERT 1 - 4(6.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1285.00	0.00	0.00	0-NF	0.00	0.00	0.00	0.80	0.00	0.00
110.00	1286.48	1.48	1.48	1-S2n	0.71	0.87	0.71	0.80	6.44	0.00
220.00	1287.32	2.32	0.00	1-S2n	1.12	1.38	1.13	0.80	8.12	0.00
330.00	1288.05	3.05	0.00	5-S2n	1.48	1.81	1.49	0.80	9.25	0.00
440.00	1288.81	3.81	0.00	5-S2n	1.81	2.19	1.82	0.80	10.08	0.00
550.00	1289.67	4.67	0.00	5-S2n	2.13	2.54	2.16	0.80	10.59	0.00
660.00	1290.71	5.71	0.00	5-S2n	2.43	2.87	2.43	0.80	11.31	0.00
724.15	1291.40	6.40	5.49	5-S2n	2.60	3.00	2.65	0.80	11.37	0.00
880.00	1293.38	8.38	7.06	5-S2n	3.00	3.00	3.00	0.80	12.22	0.00
961.43	1294.64	9.64	8.00	5-S2n	3.00	3.00	3.00	0.80	13.35	0.00
1004.92	1295.39	10.39	8.53	5-S2n	3.00	3.00	3.00	0.80	13.96	0.00

El. inlet face invert 1285.00 ft El. outlet invert 1284.20 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1285.00 ft
OUTLET STATION	80.00 ft
OUTLET ELEVATION	1284.20 ft
NUMBER OF BARRELS	4
SLOPE (V/H)	0.0100
CULVERT LENGTH ALONG SLOPE	80.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	6.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.016
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90 DEG.)
INLET DEPRESSION	NONE

CURRENT DATE: 07-13-2012 FILE DATE: 07-13-2012
CURRENT TIME: 12:14:37 FILE NAME: GPPDS1P

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ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ TAILWATER ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
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CONSTANT WATER SURFACE ELEVATION
1285.00

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ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ ROADWAY OVERTOPPING DATA ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
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ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	20.00 ft
CREST LENGTH	20.00 ft
OVERTOPPING CREST ELEVATION	1294.00 ft

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