2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

FOR

BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

Rec'd 8/25/2015 . 1304-MSWLF-1992 DIN 24900

CABARRUS COUNTY, NORTH CAROLINA

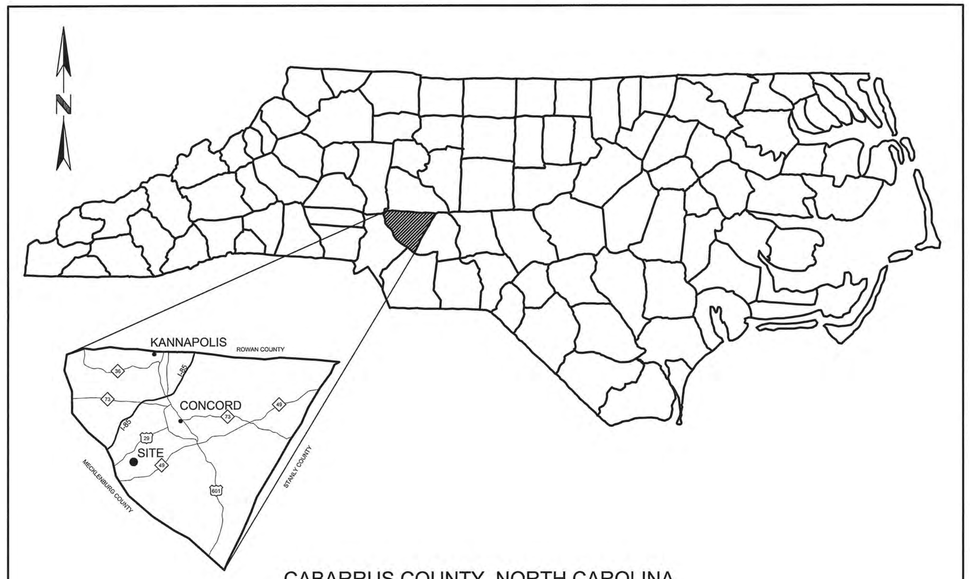
MAY 2015
REVISED: AUGUST 2015

REPUBLIC SERVICES

OWNER AND OPERATOR

BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
5105 MOREHEAD ROAD
CONCORD, NC 28027
PHONE: (704) 782-2004

INDEX TO DRAWINGS



CABARRUS COUNTY, NORTH CAROLINA
N.T.S

LEGEND

EXISTING 10' CONTOUR 250
EXISTING 2' CONTOUR
PROPERTY LINE
PROPERTY LINE BUFFER
FLOODPLAIN
EXISTING CELL BOUNDARY
EXISTING UNPAVED ACCESS ROAD
EXISTING PAVED ACCESS ROAD
EXISTING STORM WATER PIPE
PERMANENT BENCHMARK
PROPOSED 10' CONTOUR 270
PROPOSED 2' CONTOUR
PROPOSED SIDE SLOPE DRAINAGE BERM
PROPOSED STORM WATER DIVERSION BERM
DOWNDRAIN PIPE AND INLETS (INLET EL. 228 / 1, INLET EL. 208 / 2)
INLET PROTECTION
OUTLET PROTECTION

REVISION HISTORY

DATE	SHEET NO.
8-24-15	1-4, 6-8 (REDUCED CLOSURE AREA)

NORTH CAROLINA PROFESSIONAL SEAL 15142 ENGINEER W. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 032491 ENGINEER K. MATTHEW CHEEK

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers
(N. C. Corp. License No. C-0813)
3920 ARKWRIGHT ROAD, SUITE 101
MACON, GEORGIA 31210
PHONE: (478) 743-7175

REFERENCE NOTES:

1. EXISTING TOPOGRAPHY FROM AERIAL SURVEY PROVIDED BY COOPER AERIAL SURVEYS CO. DATED 2-5-15.
2. SITE BOUNDARY INFORMATION PROVIDED BY CHARLOTTE MOTOR SPEEDWAY LANDFILL.
3. THE EXISTING EDGE OF CELL (WASTE FOOTPRINT) LINE WAS DELINEATED BY HODGES, HARBIN, NEWBERRY & TRIBBLE, INC. AND CONFIRMED BY THE LAWRENCE ASSOCIATES SURVEY.
4. FLOODPLAIN DATA OBTAINED FROM F.E.M.A. F.I.R.M. MAP # 3710550800J, DATED NOVEMBER 5, 2008, AND ADJUSTED TO ACTUAL TOPOGRAPHIC CONTOURS USING THE BASE FLOOD ELEVATIONS IN THE ABOVE REFERENCED MAP.
5. EXISTING CLOSED AREA BOUNDARY WAS SURVEYED BY LAWRENCE ASSOCIATES IN FEBRUARY 2012 AND CONFIRMED BY ON-SITE PERSONNEL IN THE FIELD.

GENERAL NOTES:

1. CONTRACTOR SHALL USE EXTREME CARE TO ASSURE THERE IS NO DAMAGE TO THE EXISTING BASE LINER, FML CAP OR GAS EXTRACTION SYSTEMS. ANY DAMAGE TO THESE SYSTEMS MUST BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD LOCATING AND UNCOVERING THE EXISTING EDGE OF LINER AT THE CONNECTION TO THE CLOSURE CAP AND BASE LINER SYSTEMS.
3. CONTRACTOR SHALL NOT INTERFERE WITH WASTE FILLING OPERATIONS AND SHALL CONCEDE RIGHT OF WAY TO WASTE TRANSFER TRUCKS AND OWNER'S EQUIPMENT.

300' BUFFER
EXISTING SEDIMENT BASIN NO. 3
FURR TRACT
EXISTING SEDIMENT BASIN NO. 1
CONTRACTOR MATERIAL LAY DOWN AREA
EXISTING PAVED ACCESS ROAD (TYP.)
PERMITTED FACILITY BOUNDARY LINE (TYP.)
PROPOSED AREA OF PARTIAL CAP CONSTRUCTION (±15.2 ACRES)
EXISTING CELL NO. 2I
EXISTING PHASE 3
EXISTING CELL NO. 2H
EXISTING CELL NO. 2G
EXISTING CELL NO. 2F
PROPOSED CELL NO. 2K
PROPOSED CELL NO. 2M
PROPOSED CELL NO. 2J
PITTS SCHOOL ROAD
EXISTING POWER SUBSTATIONS
EXISTING CLOSED AREA
ROCKY RIVER
EXISTING SOLIDIFICATION FACILITY
EXISTING CELL NO. 2E
EXISTING CELL NO. 2C
EXISTING CELL NO. 2A
EXISTING SEDIMENT BASIN NO. 2
LIMITS OF 100 YEAR FLOODPLAIN
EXISTING SEDIMENT BASIN NO. 4
EXISTING ACCESS ROAD
JURISDICTIONAL WETLANDS (TYP.)
EXISTING SEDIMENT BASIN
EXISTING CELL NO. 2D
EXISTING CELL NO. 2B
EXISTING CELL NO. 1B
EXISTING CELL NO. 1A
EXISTING CELL NO. 2
EXISTING CLOSED AREA
EXISTING HAULING COMPANY MAINTENANCE BUILDING
EXISTING GAS RECOVERY FACILITY
EXISTING SEDIMENT BASIN
EXISTING ADMINISTRATIVE BUILDINGS
EXISTING ON-SITE POND
EXISTING HAULING OPERATIONS AREA
EXISTING ACCESS ROAD TO BE USED FROM PROJECT SITE TO BORROW AREA
MALLARD CREEK
EXISTING SOIL BORROW PIT
BORROW AREA LIMITS
EXISTING BORROW AREA SEDIMENT BASIN
EXISTING OVERFLOW STRUCTURE
LIMITS OF BORROW AREA FOR CLOSURE PROJECT
EXISTING SCALES AND SCALEHOUSE
EXISTING LANDFILL MAINTENANCE BUILDING
EXISTING LF GAS TO ENERGY PLANT
ACCESS CONTROL GATE
EXISTING LEACHATE PRETREATMENT BLDG
EXISTING LEACHATE SURFACE IMPOUNDMENT
EXISTING SITE ENTRANCE
PERMITTED FACILITY BOUNDARY LINE (TYP.)
EXISTING ENTRANCE FROM MOREHEAD ROAD
MOREHEAD ROAD

300 150 0 300 600
GRAPHIC SCALE IN FEET

REVISED: AUGUST, 2015 - REDUCED THE CLOSURE AREA

REPUBLIC SERVICES

NORTH CAROLINA PROFESSIONAL SEAL 15142 ENGINEER N. LOWRY TRIBBLE, JR. 8-28-15

NORTH CAROLINA PROFESSIONAL SEAL 32248 ENGINEER K. MATTHEW CHEEK 9/2/15

OVERALL SITE PLAN

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

FOR

BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

CABARRUS COUNTY, NORTH CAROLINA

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers
N.C.Corp. License # C-0813
(478) 743-7175
(478) 743-7175 (FAX)
3920 ARKWRIGHT RD.
SUITE 101
MACON, GEORGIA 31210

PROJ. NO.	6703-631-01	DWG. CMS-2015CL-1-OV	EDIT 8-21-15
SCALE	1" = 300'	SHEET 1 OF 11	
DATE	MAY 2015		

REFERENCE NOTES:

1. EXISTING TOPOGRAPHY FROM AERIAL SURVEY PROVIDED BY COOPER AERIAL SURVEYS CO. DATED 2-5-15.
2. SITE BOUNDARY INFORMATION PROVIDED BY CHARLOTTE MOTOR SPEEDWAY LANDFILL.
3. THE EXISTING EDGE OF CELL (WASTE FOOTPRINT) LINE WAS DELINEATED BY HODGES, HARBIN, NEWBERRY & TRIBBLE, INC. AND CONFIRMED BY THE LAWRENCE ASSOCIATES SURVEY.
4. FLOODPLAIN DATA OBTAINED FROM F.E.M.A. F.I.R.M. MAP # 3710550800J, DATED NOVEMBER 5, 2008, AND ADJUSTED TO ACTUAL TOPOGRAPHIC CONTOURS USING THE BASE FLOOD ELEVATIONS IN THE ABOVE REFERENCED MAP.
5. EXISTING CLOSED AREA BOUNDARY WAS SURVEYED BY LAWRENCE ASSOCIATES IN FEBRUARY 2012 AND CONFIRMED BY ON-SITE PERSONNEL IN THE FIELD.
6. EXISTING LANDFILL GAS SYSTEM AS-BUILTS PROVIDED BY SCS ENGINEERS, PC., FILE DATED MARCH 2015.

GENERAL NOTES:

1. CONTRACTOR SHALL USE EXTREME CARE TO ASSURE THERE IS NO DAMAGE TO THE EXISTING BASE LINER, FML CAP OR GAS EXTRACTION SYSTEMS. ANY DAMAGE TO THESE SYSTEMS MUST BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD LOCATING AND UNCOVERING THE EXISTING EDGE OF LINER AT THE CONNECTION TO THE CLOSURE CAP AND BASE LINER SYSTEMS. LOCATIONS SHOWN ARE BASED ON THE BEST AVAILABLE DATA BUT SHOULD BE CONSIDERED APPROXIMATE.
3. CONTRACTOR SHALL NOT INTERFERE WITH WASTE FILLING OPERATIONS AND SHALL CONCEDE RIGHT OF WAY TO WASTE TRANSFER TRUCKS AND OWNER'S EQUIPMENT.
4. CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING ALL GAS SYSTEM COMPONENTS WITHIN THE PROPOSED CLOSURE AREA PRIOR TO CONSTRUCTION TO AVOID ANY DAMAGE TO THE EXISTING SYSTEM.
5. ALL EXISTING GAS EXTRACTION WELLS WITHIN THE PROPOSED CLOSURE AREA SHALL BE BOOTED BY THE GEOSYNTHETICS INSTALLER. LANDFILL GAS PIPING THAT CROSSES THE PERMANENT ANCHOR TRENCH SHALL ALSO BE BOOTED BY THE GEOSYNTHETICS INSTALLER.

BENCHMARK			
NORTHING	EASTING	ELEVATION	DESCRIPTION
585,073.90	1,505,958.83	592.79	NAIL IN PAD

APPROXIMATE CLOSURE CONSTRUCTION LIMIT STAKEOUT PLAN

NAME	NORTHING	EASTING
CA-1	585245.57	1505326.50
CA-2	584803.74	1505508.91
CA-3	584017.64	1505690.66
CA-4	583950.79	1505706.34
CA-5	584054.48	1506136.00
TP-1	585631.51	1505495.11
TP-2	585800.11	1505012.66

NOTES:
1. CERTIFICATION LIMIT ALONG NORTH BOUNDARY WILL BE BASED ON EXISTING LIMITS OF CAP LINER SYSTEM.
2. CERTIFICATION LIMIT ALONG EAST BOUNDARY AT TOE OF SLOPE WILL BE BASED ON EXISTING BASE LINER SYSTEM ANCHOR TRENCH.

EXISTING LANDFILL GAS SYSTEM LEGEND
- REMOTE WELLHEAD
- VERTICAL EXTRACTION WELL

GRAPHIC SCALE IN FEET
100 50 0 100 200

REVISED: AUGUST, 2015 - REDUCED THE CLOSURE AREA

EXISTING TOPOGRAPHIC SURVEY

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
CABARRUS COUNTY, NORTH CAROLINA

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PROJ. NO.	6703-631-01	DWG. CMS-2015CL-2-TP	EDIT 8-21-15
SCALE	1" = 100'	SHEET 2 OF 11	
DATE	MAY 2015		

REFERENCE NOTES:

1. EXISTING TOPOGRAPHY FROM AERIAL SURVEY PROVIDED BY COOPER AERIAL SURVEYS CO. DATED 2-5-15.
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5. EXISTING CLOSED AREA BOUNDARY WAS SURVEYED BY LAWRENCE ASSOCIATES IN FEBRUARY 2012 AND CONFIRMED BY ON-SITE PERSONNEL IN THE FIELD.
6. EXISTING LANDFILL GAS SYSTEM AS-BUILTS PROVIDED BY SCS ENGINEERS, PC., FILE DATED MARCH 2015.

GENERAL NOTES:

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5. ALL EXISTING GAS EXTRACTION WELLS WITHIN THE PROPOSED CLOSURE AREA SHALL BE BOOTED BY THE GEOSYNTHETICS INSTALLER.LANDFILL GAS PIPING THAT CROSSES THE PERMANENT ANCHOR TRENCH SHALL ALSO BE BOOTED BY THE GEOSYNTHETICS INSTALLER.

BENCHMARK			
NORTHING	EASTING	ELEVATION	DESCRIPTION
585,073.90	1,505,958.83	592.79	NAIL IN PAD

PROPOSED AREA OF PARTIAL CAP CONSTRUCTION (±15.2 ACRES)

EXISTING CELL NO. 2I

EXISTING CELL NO. 2H

EXISTING CELL NO. 2G

EXISTING CELL NO. 2F

EXISTING CELL NO. 2E

EXISTING CLOSED AREA

FUTURE CELL NO. 2J

EXISTING OVERFLOW STRUCTURE
EXISTING SEDIMENT BASIN NO. 1
EXISTING EMERGENCY OVERFLOW SPILLWAY
EXISTING SEDIMENT BASIN NO. 3
EXISTING EMERGENCY OVERFLOW SPILLWAY
100-YEAR FLOODPLAIN (TYP.)
EXISTING SEWER MANHOLE
EXISTING FENCE
EXISTING WETLANDS (TYP.)
LIMITS OF EXISTING ASPHALT PAVING
EXISTING ACCESS ROAD
EXISTING 2- 36" DIA. STORM WATER PIPES
EXISTING 14" DIA. STORM WATER PIPE
EXISTING 24" DIA. STORM WATER PIPE
EXISTING 18" DIA. STORM WATER PIPE
EXISTING 36" DIA. STORM WATER PIPE
EXISTING 54" DIA. STORM WATER PIPE
EXISTING 36" DIA. STORM WATER PIPE
PERMITTED FACILITY BOUNDARY LINE (TYP.)
EXISTING DRAINAGE DITCH (TYP.)
FUTURE CELL BOUNDARY (TYP.)
BENCHMARK
300' BUFFER
EXISTING MANHOLE
EXISTING DOWNDRAIN PIPE. TERMINATION POINT UNKNOWN
EXISTING SIDE SLOPE DIVERSION BERM (TYP.)
EXISTING CLOSED AREA BOUNDARY (TYP.)
EXISTING DIVERSION BERM
ALL GAS WELLS, CONDENSATE LINES, AND LATERAL LINE PENETRATION LOCATIONS WILL BE RAISED BY OTHERS, AS NECESSARY
EXISTING CELL BOUNDARY (TYP.)
EXISTING SEDIMENT BASIN NO. 2
PERMITTED FACILITY BOUNDARY LINE (TYP.)

EXISTING LANDFILL GAS SYSTEM LEGEND

- LFG HEADER PIPE
- LFG LATERAL PIPE
- EW-127 LFG EXTRACTION WELL
- VALVE
- EW-127 R REMOTE WELLHEAD
- CT-4 CONDENSATE TRAP
- CS-10 CONDENSATE SUMP

100 50 0 100 200
GRAPHIC SCALE IN FEET

NORTH CAROLINA PROFESSIONAL SEAL 35142 ENGINEER H. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 32249 ENGINEER J. MATTHEW CHEEK

REVISED: AUGUST, 2015 - REDUCED THE CLOSURE AREA

EXISTING LANDFILL GAS SYSTEM

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
CABARRUS COUNTY, NORTH CAROLINA

REPUBLIC SERVICES

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MACON, GEORGIA 31210

PROJ. NO.	6703-631-01	DWG. CMS-2015CL-3-LFG	EDIT 8-21-15
SCALE	1" = 100'	SHEET 3 OF 11	
DATE	MAY 2015		

REFERENCE NOTES:

1. EXISTING TOPOGRAPHY FROM AERIAL SURVEY PROVIDED BY COOPER AERIAL SURVEYS CO. DATED 2-5-15.
2. SITE BOUNDARY INFORMATION PROVIDED BY CHARLOTTE MOTOR SPEEDWAY LANDFILL.
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6. EXISTING LANDFILL GAS SYSTEM AS-BUILTS PROVIDED BY SCS ENGINEERS, PC., FILE DATED MARCH 2015.

GENERAL NOTES:

1. CONTRACTOR SHALL USE EXTREME CARE TO ASSURE THERE IS NO DAMAGE TO THE EXISTING BASE LINER, FML CAP OR GAS EXTRACTION SYSTEMS. ANY DAMAGE TO THESE SYSTEMS MUST BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER.
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3. CONTRACTOR SHALL NOT INTERFERE WITH WASTE FILLING OPERATIONS AND SHALL CONCEDE RIGHT OF WAY TO WASTE TRANSFER TRUCKS AND OWNER'S EQUIPMENT.

BENCHMARK			
NORTHING	EASTING	ELEVATION	DESCRIPTION
585,073.90	1,505,958.83	592.79	NAIL IN PAD

HEADWALL NO. 100 · EXISTING OVERFLOW STRUCTURE · OVERFLOW STRUCTURE NO. 1 · EXISTING SEDIMENT BASIN NO. 1 · PROPOSED SEDIMENT BASIN NO. 1 · 30' WIDE PROPOSED EMERGENCY OVERFLOW SPILLWAY (6" DIA. RIP-RAP) · EXISTING EMERGENCY OVERFLOW SPILLWAY · EXISTING 24" DIA. STORM WATER PIPE · PERMITTED FACILITY BOUNDARY LINE (TYP.) · EXISTING SCC 3 · EXISTING 18" DIA. STORM WATER PIPE · MW-27 · EXISTING 36" DIA. STORM WATER PIPE · EXISTING DRAINAGE DITCH (TYP.) · EXISTING SCC 2 · BENCHMARK · MW-26 · MMW-7 · EXISTING SCC 1B · EXISTING SCC 1A · MW-16 · MMW-6 · EXISTING ACCESS ROAD · 300' BUFFER · EXISTING 54" DIA. STORM WATER PIPE · EXISTING MANHOLE · EXISTING DOWNDRAIN PIPE. TERMINATION POINT UNKNOWN · EXISTING SIDE SLOPE DIVERSION BERM (TYP.) · EXISTING CLOSED AREA · EXP-21 · PROPOSED 24" DIA PERMANENT DOWNDRAIN PIPE (TYP.) · EXISTING SEDIMENT BASIN NO. 3 · EXISTING WETLANDS (TYP.) · EXISTING SEWER MANHOLE · EXISTING EMERGENCY OVERFLOW SPILLWAY · 100-YEAR FLOODPLAIN (TYP.) · RELOCATED FENCE MUST BE INSTALLED PRIOR TO REMOVAL OF THE EXISTING FENCE TO CONTROL LIVESTOCK. · EXISTING FENCE · LIMITS OF EXISTING ASPHALT PAVING · EXISTING SCC 4 · EXISTING 14" DIA. STORM WATER PIPE · EXISTING 2- 36" DIA. STORM WATER PIPES · EXISTING 36" DIA. STORM WATER PIPE · MW-8 · MW-28 · MMW-9 · MW-29R · MMW-10 · MW-42 · SW-3A · PROPOSED 24" DIA DOWNDRAIN PIPE · RE-GRADE EXISTING STORMWATER DIVERSION BERM AND PULL EXISTING HIGH POINT BACK TO THE EDGE OF THE PROPOSED CLOSURE AREA TO ENSURE POSITIVE DRAINAGE TO EXISTING DOWNDRAIN · PROPOSED FLARED END SECTION (TYP.) · PROPOSED LIMIT OF CERTIFIED FINAL COVER AND TEMPORARY ANCHOR TRENCH (15.2 AC. IN 2D-VIEW) · END PERMANENT DOWNDRAIN PIPE INSTALLATION AND TRANSITION TO TEMPORARY DOWNDRAIN PIPE · EXISTING DIVERSION BERM · PROPOSED SIDE SLOPE DRAINAGE BERM (TYP.) · EXISTING CELL NO. 2F · EXISTING CELL NO. 2G · EXISTING CELL NO. 2H · EXISTING CELL NO. 2I · FUTURE CELL NO. 2J · FUTURE CELL BOUNDARY (TYP.) · EXISTING DRAINAGE DITCH (TYP.) · PERMITTED FACILITY BOUNDARY LINE (TYP.) · MW-30R · MW-29 · MW-31 · MMW-12 · MW-32R · MW-33 · MMW-13 · EXISTING SEDIMENT BASIN NO. 2 · INLET EL. 598 · INLET EL. 616 · INLET EL. 636 · INLET EL. 656 · INLET EL. 676 · INLET EL. 696 · INLET EL. 714 · INLET EL. 606 · INLET EL. 624 · INLET EL. 644 · INLET EL. 664 · INLET EL. 684 · INLET EL. 704 · INLET EL. 625 · INLET EL. 644 · INLET EL. 664 · INLET EL. 684 · INLET EL. 704

GRAPHIC SCALE IN FEET
100 50 0 100 200

STORM WATER CONTROL STRUCTURES

PIPE NO.	SIZE	LENGTH	SLOPE	MATERIAL
100	48"	55'	3.64%	RCP
100E	24"	50'	1.00%	HDPE
200R*	2-30"	75'	5.33%	HDPE
300R**	2-36"	100'	6.00%	HDPE
400R**	2-54"	90'	6.67%	HDPE
500E	2-36"	55'	3.64%	HDPE

* EXISTING 18" DIA. PIPE TO BE REPLACED WITH 2-30" PIPES.
**ADDITIONAL STORMWATER PIPE (TO MATCH THE EXISTING PIPE SIZE) TO BE ADDED NEAR THE EXISTING STORMWATER PIPE.

FLARED END SECTION NO.	INVERT
FES-1	707.00'
FES-6A	622.00'
FES-6B	622.00'
FES-7	736.00'
FES-13	602.00'
FES-14	723.00'
FES-21	592.00'

HEADWALL NO.	INVERT
100	568.00'

GENERAL NOTES CONT'D:

4. ALL PROPOSED DOWNDRAIN PIPES SHALL BE 24" DIA. CORRUGATED POLYETHYLENE PIPE.
5. ALL SIDE SLOPE DRAINAGE BERMS SHALL BE GRADED TO PROVIDE A MINIMUM SLOPE OF 2% ; LOCATION, HIGH POINTS AND INLET ELEVATIONS SHOWN FOR SIDE SLOPE DRAINAGE BERMS ON PLAN SHEETS ARE APPROXIMATE; CONTRACTOR SHALL MEET THE SLOPE AND 20' VERTICAL SEPARATION CRITERIA WHILE AVOIDING THE LANDFILL GAS COLLECTION SYSTEM.
6. SIDE SLOPE DRAINAGE BERMS SHALL BE POSITIONED TO AVOID CONFLICT WITH EXISTING GAS WELLS. WELLS SHALL NOT BE LOCATED IN THE BERM OR WITHIN 6' OF THE UPHILL SIDE OF THE BERM. FIELD ADJUSTMENTS MAY BE NECESSARY AND MUST BE APPROVED BY THE ENGINEER.
7. HIGH POINT AND INLET ELEVATIONS SHOWN ON THIS SHEET FOR SIDE SLOPE DRAINAGE BERMS EQUAL THE DITCH CENTERLINE INVERT ELEVATIONS.
8. SIDE SLOPE DRAINAGE BERMS SHALL BE CAREFULLY COMPACTED TO AVOID DAMAGE TO THE FML CAP. BERMS SHALL BE COMPACTED TO A MINIMUM 95% OF THE STANDARD PROCTOR DRY DENSITY.

NORTH CAROLINA PROFESSIONAL SEAL 15142 ENGINEER H. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 30249 ENGINEER K. MATTHEW CHEEK

REVISED: AUGUST, 2015 - REDUCED THE CLOSURE AREA

FINAL DRAINAGE PLAN

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
CABARRUS COUNTY, NORTH CAROLINA

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PROJ. NO.	6703-631-01	DWG. CMS-2015CL-4-FD	EDIT 8-24-15
SCALE	1" = 100'	SHEET 4 OF 11	
DATE	MAY 2015		

REPUBLIC SERVICES

EROSION CONTROL DEVICES

XX XX DOUBLE ROW SILT FENCE

(TS) TEMPORARY SEEDING
(PS) PERMANENT SEEDING
(M) MULCHING
(DC) DUST CONTROL

EXISTING BORROW AREA

MALLARD CREEK

BORROW AREA BOUNDARY

EXISTING OFF-SITE POND

PROPOSED SILT FENCE

PROPOSED LIMITS OF DISTURBANCE

EXISTING BORROW AREA SEDIMENT BASIN

DIRECTION OF MINING

CONTRACTOR TO PROVIDE PERMANENT ACCESS TO BOTTOM FLOOR GRADES OF BORROW AREA

EXISTING OVERFLOW STRUCTURE WITH SKIMMERS

ROAD TO BE USED FOR ACCESS INTO BORROW AREA AND MAINTAINED BY THE CONTRACTOR

CONTRACTOR TO RETURN ALL ROADWAYS TO PRE-CONSTRUCTION CONDITIONS AT THE COMPLETION OF GRADING ACTIVITIES.

EXISTING PAVED ACCESS ROADS/PARKING AREA

PROPOSED LIMITS OF DISTURBANCE

MOREHEAD ROAD

NOTES:
1. PROPOSED GRADES SHOWN REPRESENT APPROXIMATELY 150,000 CY OF EXCAVATED MATERIAL.
2. FLOOR GRADES SHOWN REPRESENT PERMITTED BOTTOM GRADES OF THE BORROW AREA AND SHOULD BE ACHIEVED WHILE PROGRESSING IN A NORTHEASTERLY DIRECTION.
3. ALL SOIL SHALL BE REMOVED AND THE BORROW AREA RESTORED TO PRE-CONSTRUCTION CONDITIONS PRIOR TO SEPTEMBER 10, 2015. THIS INCLUDES SLOPING GRADES TO PROVIDE POSITIVE DRAINAGE INTO THE EXISTING BORROW AREA SEDIMENT BASIN, RE-SEEDING AND RE-ESTABLISHING ACCESS ROADS.
4. BORROW AREA BASE GRADE TAKEN FROM DRAWING TITLED " POST DEVELOPMENT DRAINAGE AREA FOR THE MOREHEAD ROAD CAMPGROUND / BORROW AREA" PREPARED BY BROWN AND CALDWELL, DATED 12/21/2007.

100 50 0 100 200
GRAPHIC SCALE IN FEET

NORTH CAROLINA PROFESSIONAL SEAL 032498 ENGINEER H. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 32249 ENGINEER K. MATTHEW CHEEK

REPUBLIC SERVICES

BORROW AREA GRADING PLAN

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

FOR

BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

CABARRUS COUNTY, NORTH CAROLINA

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers
N.C.Corp. License # C-0813
3920 ARKWRIGHT RD.
SUITE 101
MACON, GEORGIA 31210
(478) 743-7175
(478) 743-7175 (FAX)

PROJ. NO.	6703-631-01	DWG.CMS-2015CL-5-BA-IG	EDIT 5-22-15
SCALE	1" = 100'	SHEET 5 OF 11	
DATE	MAY 2015		

REFERENCE NOTES:

1. EXISTING TOPOGRAPHY FROM AERIAL SURVEY PROVIDED BY COOPER AERIAL SURVEYS CO. DATED 2-5-15.
2. SITE BOUNDARY INFORMATION PROVIDED BY CHARLOTTE MOTOR SPEEDWAY LANDFILL.
3. THE EXISTING EDGE OF CELL (WASTE FOOTPRINT) LINE WAS DELINEATED BY HODGES, HARBIN, NEWBERRY & TRIBBLE, INC. AND CONFIRMED BY THE LAWRENCE ASSOCIATES SURVEY.
4. FLOODPLAIN DATA OBTAINED FROM F.E.M.A. F.I.R.M. MAP # 3710550800J, DATED NOVEMBER 5, 2008, AND ADJUSTED TO ACTUAL TOPOGRAPHIC CONTOURS USING THE BASE FLOOD ELEVATIONS IN THE ABOVE REFERENCED MAP.
5. EXISTING CLOSED AREA BOUNDARY WAS SURVEYED BY LAWRENCE ASSOCIATES IN FEBRUARY 2012 AND CONFIRMED BY ON-SITE PERSONNEL IN THE FIELD.
6. EXISTING LANDFILL GAS SYSTEM AS-BUILTS PROVIDED BY SCS ENGINEERS, PC., FILE DATED MARCH 2015.

GENERAL NOTES:

1. CONTRACTOR SHALL USE EXTREME CARE TO ASSURE THERE IS NO DAMAGE TO THE EXISTING BASE LINER, FML CAP OR GAS EXTRACTION SYSTEMS. ANY DAMAGE TO THESE SYSTEMS MUST BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD LOCATING AND UNCOVERING THE EXISTING EDGE OF LINER AT THE CONNECTION TO THE CLOSURE CAP AND BASE LINER SYSTEMS. LOCATIONS SHOWN ARE BASED ON THE BEST AVAILABLE DATA BUT SHOULD BE CONSIDERED APPROXIMATE.
3. CONTRACTOR SHALL NOT INTERFERE WITH WASTE FILLING OPERATIONS AND SHALL CONCEDE RIGHT OF WAY TO WASTE TRANSFER TRUCKS AND OWNER'S EQUIPMENT.
4. ALL PROPOSED DOWNDRAIN PIPES SHALL BE 24" DIA. CORRUGATED POLYETHYLENE PIPE.
5. ALL SIDE SLOPE DRAINAGE BERMS SHALL BE GRADED TO PROVIDE A MINIMUM SLOPE OF 2% ; LOCATION, HIGH POINTS AND INLET ELEVATIONS SHOWN FOR SIDE SLOPE DRAINAGE BERMS ON PLAN SHEETS ARE APPROXIMATE; CONTRACTOR SHALL MEET THE SLOPE AND 20' VERTICAL SEPARATION CRITERIA WHILE AVOIDING THE LANDFILL GAS COLLECTION SYSTEM.
6. SIDE SLOPE DRAINAGE BERMS SHALL BE POSITIONED TO AVOID CONFLICT WITH EXISTING GAS WELLS. WELLS SHALL NOT BE LOCATED IN THE BERM OR WITHIN 6' OF THE UPHILL SIDE OF THE BERM. FIELD ADJUSTMENTS MAY BE NECESSARY AND MUST BE APPROVED BY THE ENGINEER.
7. HIGH POINT AND INLET ELEVATIONS SHOWN ON THIS SHEET FOR SIDE SLOPE DRAINAGE BERMS EQUAL THE DITCH CENTERLINE INVERT ELEVATIONS.
8. SIDE SLOPE DRAINAGE BERMS SHALL BE CAREFULLY COMPACTED TO AVOID DAMAGE TO THE FML CAP. BERMS SHALL BE COMPACTED TO A MINIMUM 95% OF THE STANDARD PROCTOR DRY DENSITY.

BENCHMARK			
NORTHING	EASTING	ELEVATION	DESCRIPTION
585,073.90	1,505,958.83	592.79	NAIL IN PAD

EROSION CONTROL DEVICES

	PIPE NO.	RIP-RAP SIZE	LENGTH (L)	W1	W2
RIP-RAP OUTLET PROTECTION	DD6A	15"	28'	6'	34'
	DD6B	6"	12'	6'	18'
	DD13	15"	28'	6'	34'
	DD21	6"	13'	6'	19'
	100E	6"	10'	6'	16'
	200R	12"	28'	15'	43'
	300R	12"	28'	18'	46'
	400R	15"	34'	27'	61'
	500E	15"	34'	27'	61'
	100	9"	22'	12'	34'

- TS TEMPORARY SEEDING
- PS PERMANENT SEEDING
- IP INLET PROTECTION
- RECP ROLLED EROSION CONTROL PRODUCTS (EXCELSIOR)
- M MULCHING
- DC DUST CONTROL
- RR RIPRAP-LINED CHANNEL
- EM EXCELSIOR-LINED CHANNEL
- CHECK DAM

RIP-RAP LINED SCC	SCC NO.	RIP-RAP SIZE	LENGTH	SLOPE
	1B*	6"	530'	2.26%
	2*	6"	615'	1.95%

EXCELSIOR LINED SCC	SCC NO.	MAT TYPE	LENGTH	SLOPE
	1A*	DOUBLE SIDED	170'	0.59%
	3*	DOUBLE SIDED	320'	1.88%
	4*	DOUBLE SIDED	760'	1.32%

* EXISTING DITCH

HEADWALL NO. 100 · EXISTING OVERFLOW STRUCTURE · OVERFLOW STRUCTURE NO. 1 · ROCK BERM · EXISTING SEDIMENT BASIN NO. 1 · PROPOSED SEDIMENT BASIN NO. 1 · SILT GAGE · 30' WIDE PROPOSED EMERGENCY OVERFLOW SPILLWAY (6" DIA. RIP-RAP) · EXISTING EMERGENCY OVERFLOW SPILLWAY · PROPOSED ROCK FILTER DAM (TYP.) · EXISTING 24" DIA. STORM WATER PIPE · PERMITTED FACILITY BOUNDARY LINE (TYP.) · 100-YEAR FLOODPLAIN (TYP.) · EXISTING SEWER MANHOLE · EXISTING FENCE · EXISTING EMERGENCY OVERFLOW SPILLWAY · EXISTING SEDIMENT BASIN NO. 3 · LIMITS OF EXISTING ASPHALT PAVING · EXISTING 14" DIA. STORM WATER PIPE · EXISTING 2 DIA. STORM WATER PIP · EXISTING ACCESS ROAD · EXISTING SCC 4 · EXISTING SCC 3 · EXISTING 18" DIA. STORM WATER PIPE · EXISTING 36" DIA. STORM WATER PIPE · EXISTING DRAINAGE DITCH (TYP.) · CHECK DAM (TYP.) · BENCHMARK · EXISTING SCC 2 · EXISTING SCC 1B · EXISTING SCC 1A · 300' BUFFER · EXISTING 54" DIA. STORM WATER PIPE · EXISTING MANHOLE · EXISTING DOWNDRAIN PIPE. TERMINATION POINT UNKNOWN · EXISTING SIDE SLOPE DIVERSION BERM (TYP.) · EXISTING CLOSED AREA · EXISTING CLOSED AREA BOUNDARY (TYP.) · PROPOSED 24" DIA PERMANENT DOWNDRAIN PIPE (TYP.) · EXISTING ACCESS ROAD · EXISTING CELL NO. 2E · EXISTING CELL NO. 2F · EXISTING CELL NO. 2G · EXISTING CELL NO. 2H · EXISTING CELL NO. 2I · FUTURE CELL NO. 2J · FUTURE CELL BOUNDARY (TYP.) · EXISTING DIVERSION BERM · PROPOSED SIDE SLOPE DRAINAGE BERM (TYP.) · END PERMANENT DOWNDRAIN PIPE INSTALLATION AND TRANSITION TO TEMPORARY DOWNDRAIN PIPE · PROPOSED LIMIT OF CERTIFIED FINAL COVER AND TEMPORARY ANCHOR TRENCH (15.2 AC. IN 2D-VIEW) · PROPOSED FLARED END SECTION (TYP.) · RE-GRADE EXISTING STORMWATER DIVERSION BERM AND PULL EXISTING HIGH POINT BACK TO THE EDGE OF THE PROPOSED CLOSURE AREA TO ENSURE POSITIVE DRAINAGE TO EXISTING DOWNDRAIN · EXISTING CELL BOUNDARY (TYP.) · PERMITTED FACILITY BOUNDARY LINE (TYP.) · EXISTING SEDIMENT BASIN NO. 2 · MMW-6 · MMW-7 · MMW-8 · MMW-9 · MMW-12 · MMW-13 · MMW-29 · MW-16 · MW-26 · MW-27 · MW-28 · MW-30R · MW-31 · MW-32R · MW-33 · EXP-20 · EXP-21

GRAPHIC SCALE IN FEET (100 50 0 100 200)

NORTH CAROLINA PROFESSIONAL SEAL 15142 ENGINEER W. LOWRY TRIBBLE, JR. 8-28-15

NORTH CAROLINA PROFESSIONAL SEAL 32249 ENGINEER K. MATTHEW CHEEK

REVISED: AUGUST, 2015 - REDUCED THE CLOSURE AREA

EROSION CONTROL PLAN

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
CABARRUS COUNTY, NORTH CAROLINA

REPUBLIC SERVICES

HHNT
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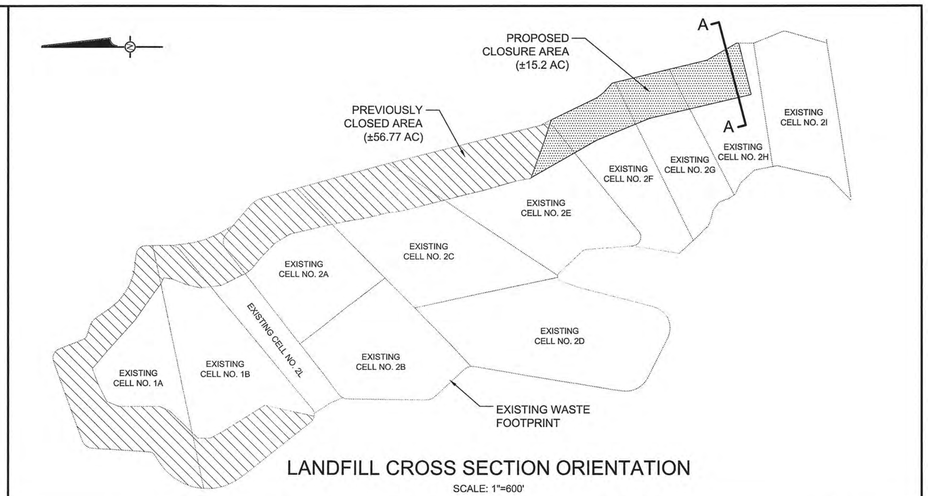
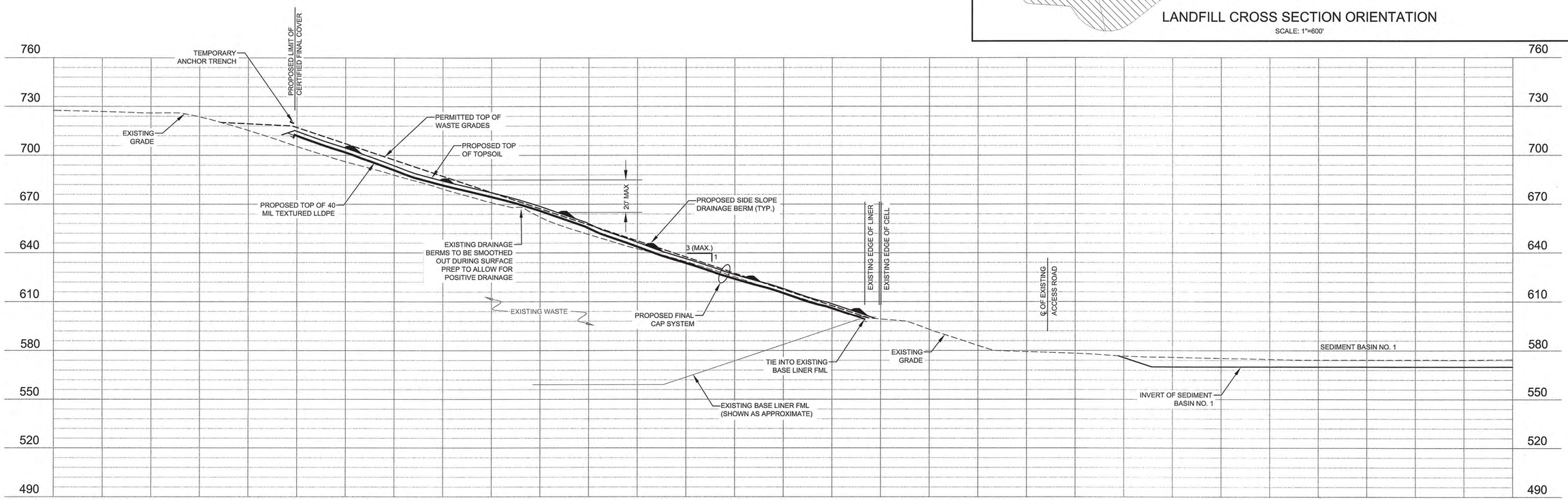
PROJ. NO.	6703-631-01	DWG. CMS-2015CL-6-EC	EDIT 8-24-15
SCALE	1" = 100'	SHEET 6 OF 11	
DATE	MAY 2015		



LANDFILL CROSS SECTION ORIENTATION

SCALE: 1"=600'



CROSS SECTION A

SCALE: HOR: 1"=100'
VERT: 1"=30'

NOTES:
1. EXISTING GRADE ELEVATIONS TAKEN FROM THE AERIAL SURVEY PREPARED BY COOPER AERIAL SURVEYS, CO., DATE OF PHOTOGRAPHY 2-5-2015.
2. GAS LINES ARE NOT SHOWN FOR CLARITY.

30 15 0 30 60
GRAPHIC SCALE IN FEET

REPUBLIC SERVICES

NORTH CAROLINA PROFESSIONAL SEAL 15142 ENGINEER W. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 32249 ENGINEER K. MATTHEW CHEEK

REVISED: AUGUST, 2015 - REDUCED THE CLOSURE AREA

CROSS SECTION

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

FOR

BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

CABARRUS COUNTY, NORTH CAROLINA

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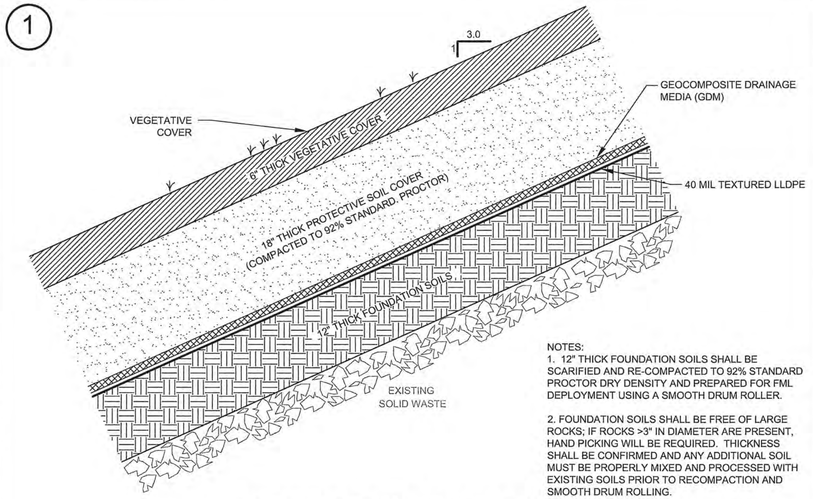
PROJ. NO.	6703-631-01	DWG. CMS-2015CL-7-XSEC	EDIT 8-21-15
SCALE	AS SHOWN	SHEET 7 OF 11	
DATE	APRIL 2015		

1

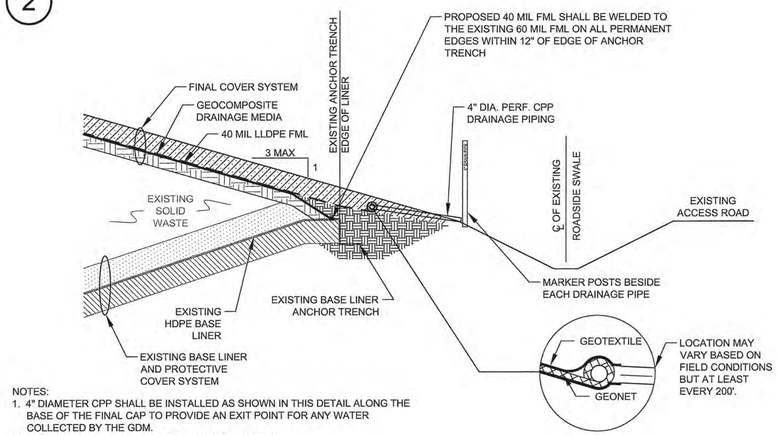


NOTES:
1. 12" THICK FOUNDATION SOILS SHALL BE SCARIFIED AND RE-COMPACTED TO 92% STANDARD PROCTOR DRY DENSITY AND PREPARED FOR FML DEPLOYMENT USING A SMOOTH DRUM ROLLER.

2. FOUNDATION SOILS SHALL BE FREE OF LARGE ROCKS; IF ROCKS >3" IN DIAMETER ARE PRESENT, HAND PICKING WILL BE REQUIRED. THICKNESS SHALL BE CONFIRMED AND ANY ADDITIONAL SOIL MUST BE PROPERLY MIXED AND PROCESSED WITH EXISTING SOILS PRIOR TO RECOMPACTION AND SMOOTH DRUM ROLLING.

PROPOSED FINAL CAP SYSTEM
SCALE: 1" = 1'

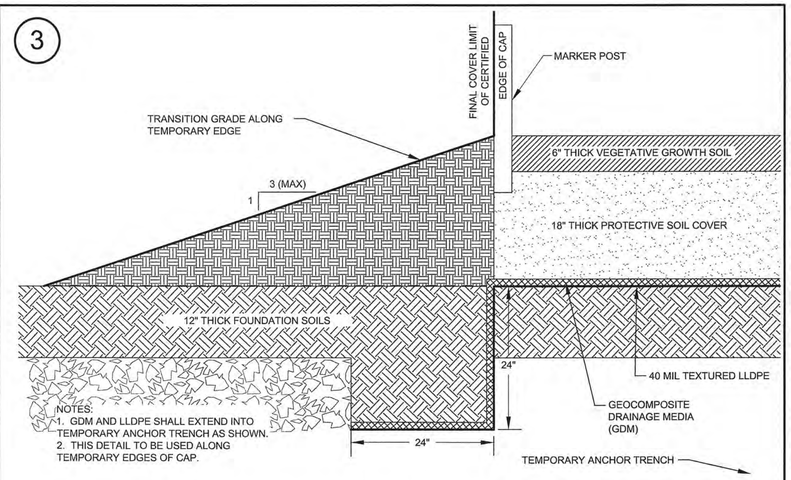
2



NOTES:
1. 4" DIAMETER CPP SHALL BE INSTALLED AS SHOWN IN THIS DETAIL ALONG THE BASE OF THE FINAL CAP TO PROVIDE AN EXIT POINT FOR ANY WATER COLLECTED BY THE GDM.
2. CUSHION GEOTEXTILE NOT SHOWN FOR CLARITY.

CAP TIE-IN TO EXISTING BASE LINER SYSTEM (TYP.)
SCALE: 1" = 6'

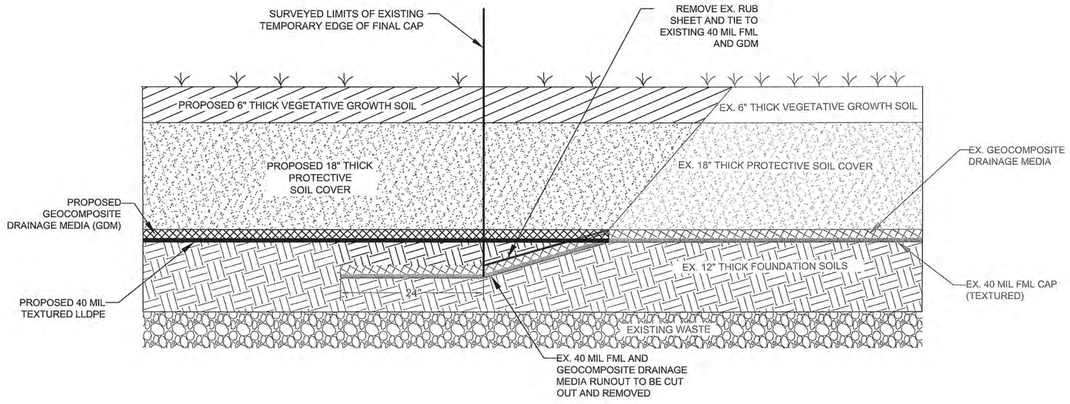
3



NOTES:
1. GDM AND LLDPE SHALL EXTEND INTO TEMPORARY ANCHOR TRENCH AS SHOWN.
2. THIS DETAIL TO BE USED ALONG TEMPORARY EDGES OF CAP.

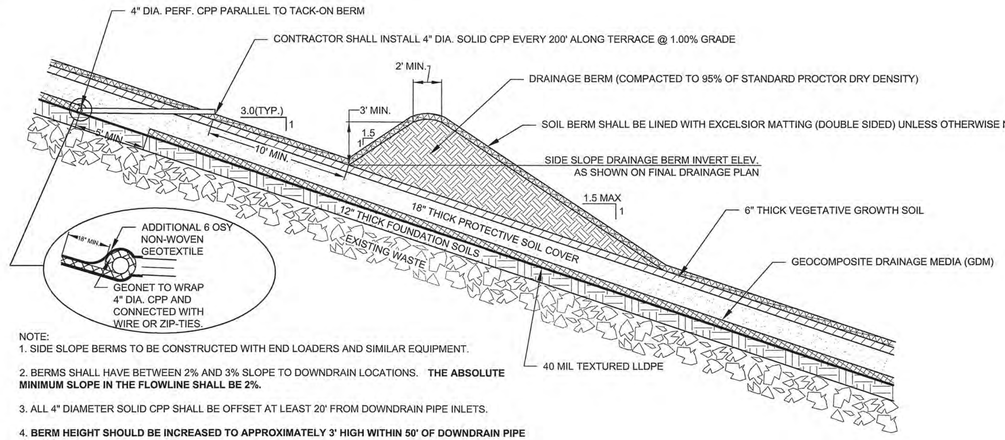
PROPOSED TEMPORARY ANCHOR TRENCH FOR FINAL CAP (ON SIDE SLOPES > 5%)
SCALE: 1" = 1'

4



PROPOSED CAP SYSTEM TIE-IN TO EXISTING CAP TRENCH
SCALE: 1" = 1'

5



NOTE:
1. SIDE SLOPE BERMS TO BE CONSTRUCTED WITH END LOADERS AND SIMILAR EQUIPMENT.

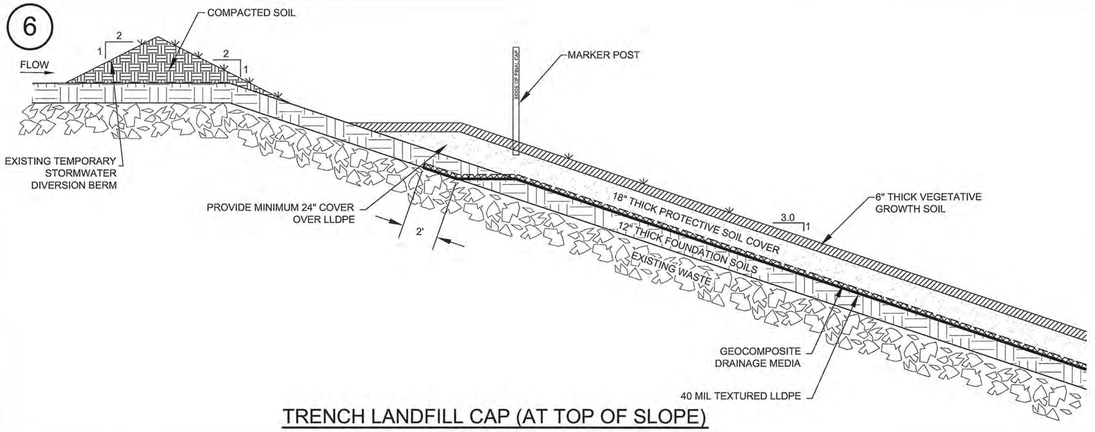
2. BERMS SHALL HAVE BETWEEN 2% AND 3% SLOPE TO DOWNDRAIN LOCATIONS. **THE ABSOLUTE MINIMUM SLOPE IN THE FLOWLINE SHALL BE 2%.**

3. ALL 4" DIAMETER SOLID CPP SHALL BE OFFSET AT LEAST 20' FROM DOWNDRAIN PIPE INLETS.

4. **BERM HEIGHT SHOULD BE INCREASED TO APPROXIMATELY 3' HIGH WITHIN 50' OF DOWNDRAIN PIPE INLETS.**

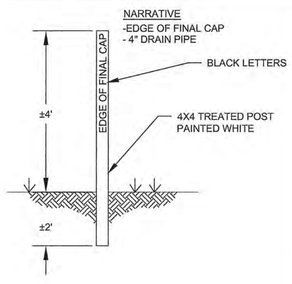
SIDE SLOPE TACK-ON DRAINAGE BERM
SCALE: 1" = 5'

6



TRENCH LANDFILL CAP (AT TOP OF SLOPE)
SCALE: 1" = 4'

7



NOTE:
1. OTHER MARKER DESIGNS MAY BE UTILIZED AT THE OWNER'S DISCRETION.
2. MARKERS SHALL BE PLACED ON 200' CENTERS AND AT ALL BENDS OR CORNERS ALONG EDGE OF FINAL CAP

MARKER POST
SCALE: 1" = 2'

REPUBLIC SERVICES

NORTH CAROLINA PROFESSIONAL SEAL 15142 ENGINEER H. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 32249 ENGINEER K. MATTHEW CHEEK

REVISED: AUGUST, 2015 - DETAIL NO. 3

MISCELLANEOUS DETAILS

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
CABARRUS COUNTY, NORTH CAROLINA

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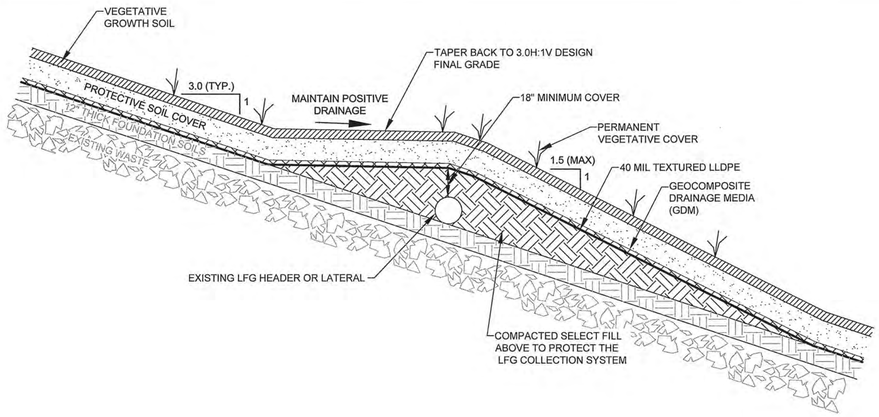
PROJ. NO.	6703-631-01	DWG. CMS-2015CL-8-D1	EDIT 8-21-15
SCALE	AS SHOWN	SHEET 8 OF 11	
DATE	MAY 2015		

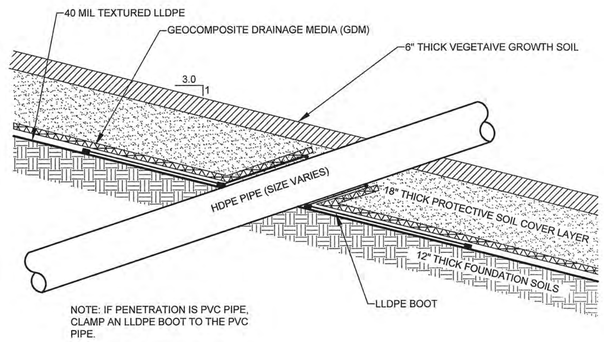
8



FINAL COVER SYSTEM OVER LFG PIPING

SCALE: 1" = 4'

9



NOTE: IF PENETRATION IS PVC PIPE, CLAMP AN LLDPE BOOT TO THE PVC PIPE.

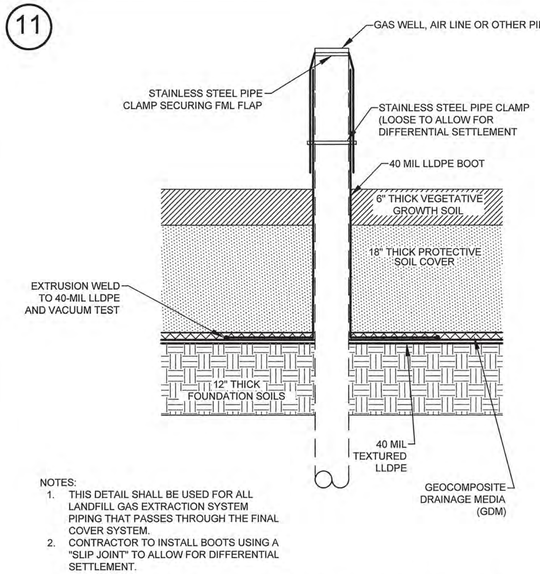
PROPOSED TYPICAL CAP PENETRATION

SCALE: 1" = 2'

10

NO DETAIL

11

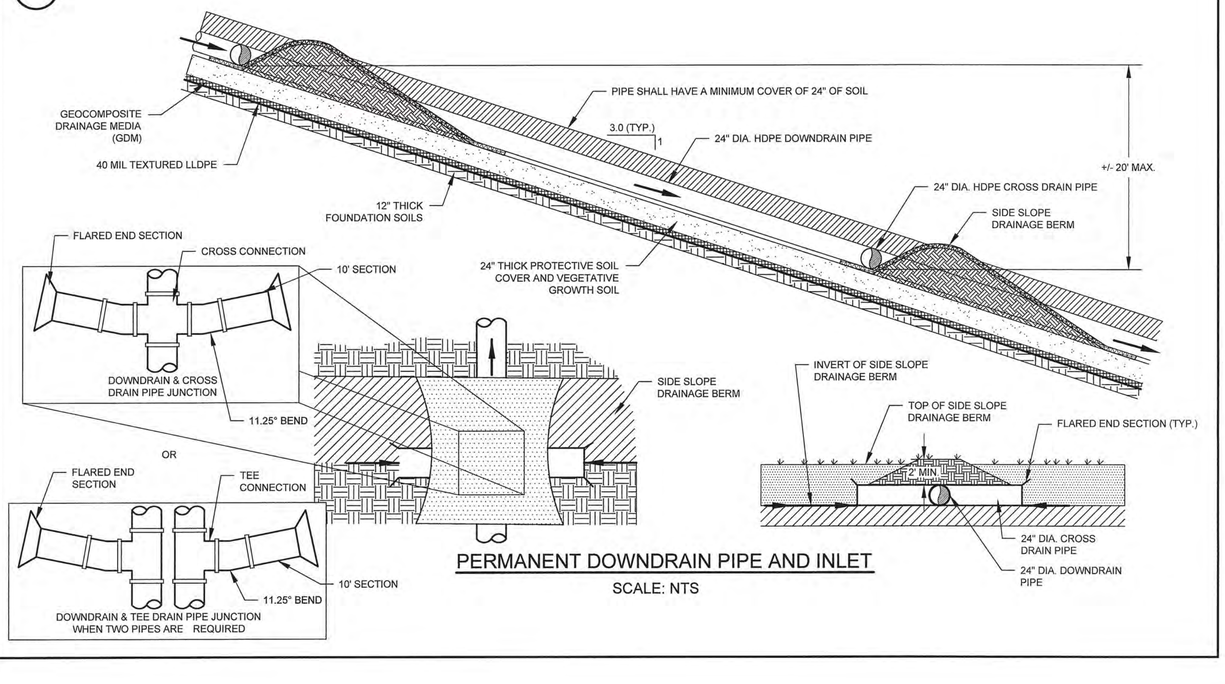


NOTES:
1. THIS DETAIL SHALL BE USED FOR ALL LANDFILL GAS EXTRACTION SYSTEM PIPING THAT PASSES THROUGH THE FINAL COVER SYSTEM.
2. CONTRACTOR TO INSTALL BOOTS USING A "SLIP JOINT" TO ALLOW FOR DIFFERENTIAL SETTLEMENT.

PROPOSED LANDFILL GAS EXTRACTION WELL CONNECTION DETAIL

SCALE: 1" = 1'

12



PERMANENT DOWNDRAIN PIPE AND INLET

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 032470 ENGINEER H. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 32249 ENGINEER K. MATTHEW CHEEK

REPUBLIC SERVICES

MISCELLANEOUS DETAILS

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

FOR

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SCALE	AS SHOWN	SHEET 9 OF 11	
DATE	MAY 2015		

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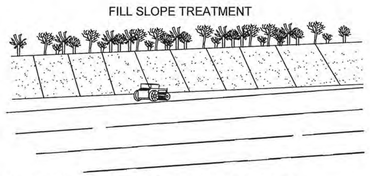
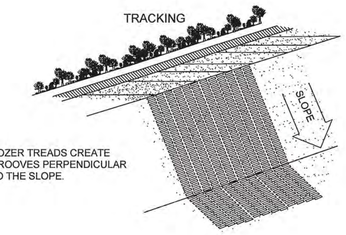


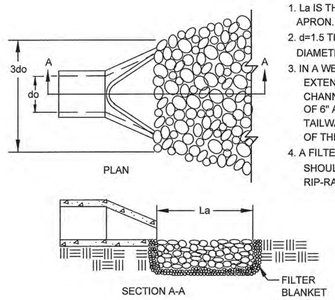
EACH LIFT OF THE FILL IS COMPACTED, BUT THE OUTER FACE OF THE SLOPE IS ALLOWED TO REMAIN LOOSE SO THAT THE ROCKS, CLODS, ETC. REACH THE NATURAL ANGLE OF REPOSE.



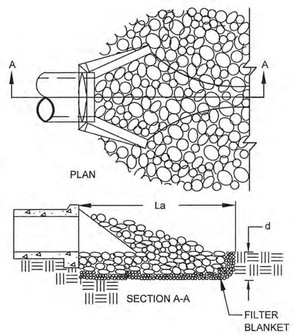
DOZER TREADS CREATE GROOVES PERPENDICULAR TO THE SLOPE.

SURFACE ROUGHENING

14

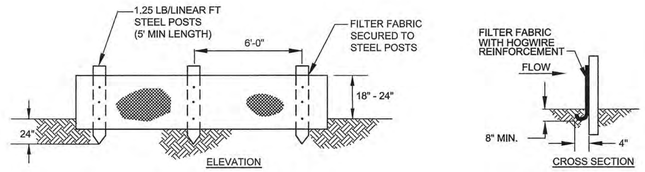


NOTES:
1. La IS THE LENGTH OF THE RIPRAP APRON.
2. d=1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 6".
3. IN A WELL-DEFINED CHANNEL, EXTEND THE APRON UP IN THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIP-RAP AND SOIL FOUNDATION.



OUTLET PROTECTION

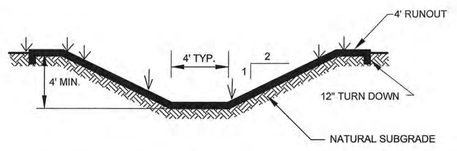
15



NOTES:
1. FLOWS MAY NECESSITATE THE PLACEMENT OF HAY BALES IN FRONT OF FILTER FABRIC.
2. FABRIC SHALL BE ATTACHED IN ACCORDANCE WITH THE NORTH CAROLINA "EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL."
3. USE 36" D.O.T. APPROVED FABRIC.
4. USE STEEL POSTS ONLY.

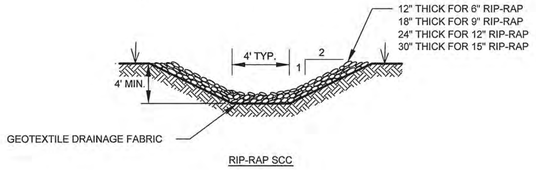
SILT FENCE (AS NEEDED)

16



ROLL OUT EROSION CONTROL PERMANENT FABRIC PARALLEL TO DIRECTION OF FLOW AND OVER PROTECTIVE MULCH IN SCC'S.

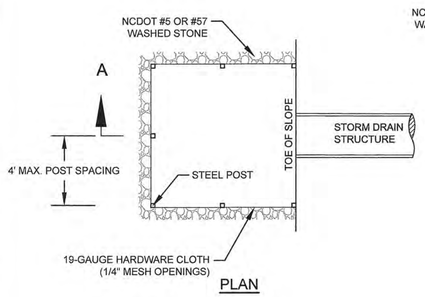
GEOTEXTILE FABRIC LINED SCC

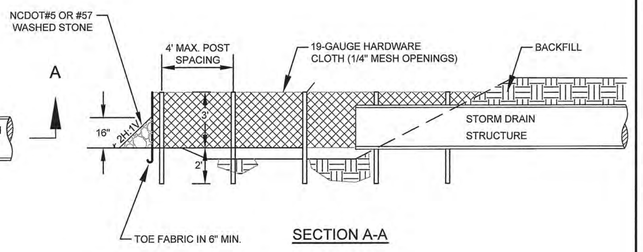


RIP-RAP SCC

STORMWATER CONVEYANCE CHANNEL SECTIONS

17





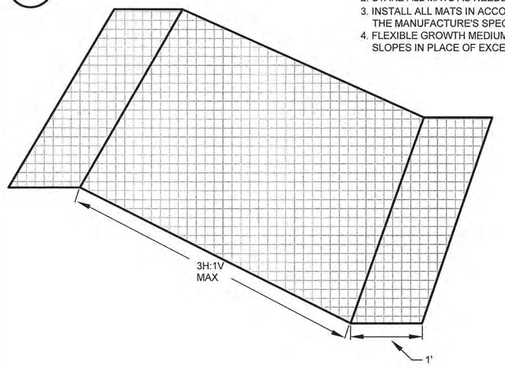
NOTES:
1. CONTRACTOR SHALL UNIFORMLY GRADE A SHALLOW DEPRESSION APPROACHING THE INLET.
2. WIRE MESH SHALL BE SECURED AT TOP, MIDDLE AND BOTTOM OF STEEL POSTS.

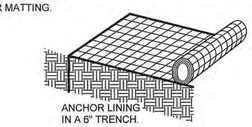
PIPE INLET PROTECTION (AS NEEDED)

SCALE: 1" = 1'

18

NOTES:
1. INSTALL SEED PRIOR TO PLACEMENT OF MATTING
2. STAKE ALL MATS AS NEEDED TO PREVENT SHIFTING
3. INSTALL ALL MATS IN ACCORDANCE WITH THE MANUFACTURE'S SPECIFICATIONS.
4. FLEXIBLE GROWTH MEDIUM MAY BE USED ON SLOPES IN PLACE OF EXCELSIOR MATTING.



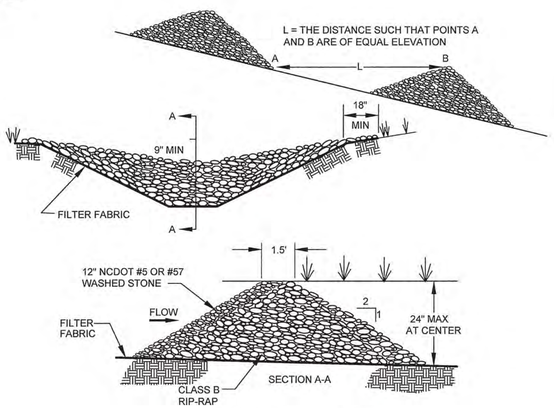


JOIN STRIPS BY ANCHORING WITH UNTREATED WOODEN STAKES OR APPROVED WIRE STAPLES AND OVERLAPPING 18"

EXCELSIOR (WOOD FIBER) MATTING (SLOPES) (AS DIRECTED)

SCALE: 1" = 1'

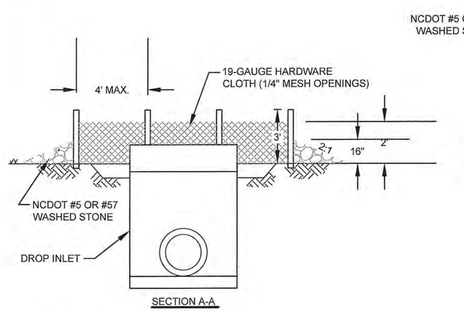
19

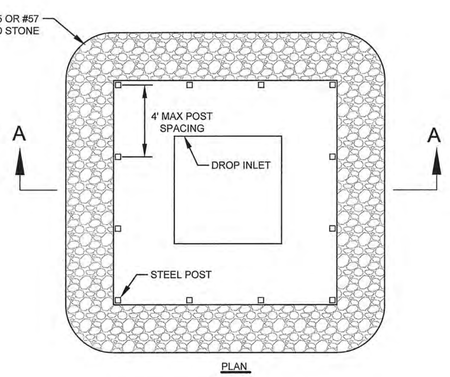


STONE CHECK DAM

NOT TO SCALE

20





NOTES:
1. CONTRACTOR SHALL UNIFORMLY GRADE A SHALLOW DEPRESSION APPROACHING THE INLET.
2. WIRE MESH SHALL BE SECURED AT TOP, MIDDLE AND BOTTOM OF STEEL POSTS.

DROP INLET PROTECTION (AS NEEDED)

SCALE: 1"=4'

REPUBLIC SERVICES

NORTH CAROLINA PROFESSIONAL SEAL 15722 ENGINEER H. LOWRY TRIBBLE, JR. 5/22/15

NORTH CAROLINA PROFESSIONAL SEAL 032249 ENGINEER K. MATTHEW CHEEK 5-22-15

MISCELLANEOUS DETAILS

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

FOR

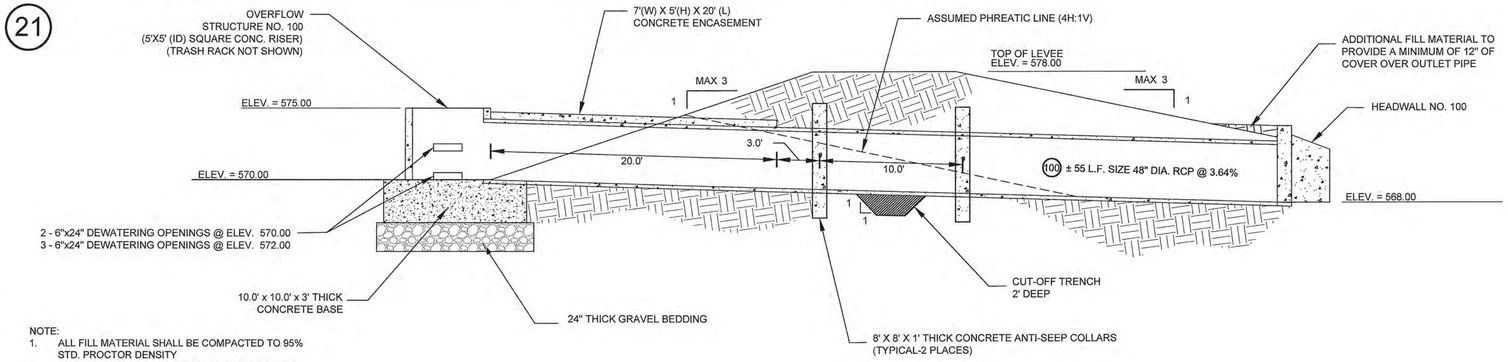
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

CABARRUS COUNTY, NORTH CAROLINA

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers
N.C.Corp. License # C-0813
3920 ARKWRIGHT RD. SUITE 101
MACON, GEORGIA 31210
(478) 743-7175
(478) 743-7175 (FAX)

PROJ. NO.	6703-631-01	DWG. CMS-2015CL-10-D3	EDIT 5-22-15
SCALE	AS SHOWN	SHEET 10 OF 11	
DATE	MAY 2015		

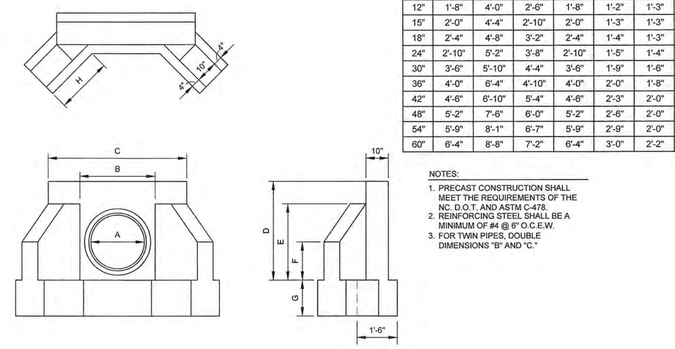
21



NOTE:
1. ALL FILL MATERIAL SHALL BE COMPACTED TO 95% STD. PROCTOR DENSITY
2. CONSTRUCTION SHALL BE IN ACCORDANCE WITH NORTH CAROLINA MANUAL FOR EROSION AND SEDIMENT CONTROL.
3. SEE SEDIMENT BASIN DATA CHARTS ON EROSION CONTROL PLAN FOR ADDITIONAL INFORMATION.

SEDIMENT BASIN NO. 1

22

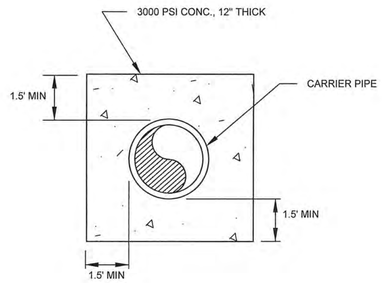


"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"
12"	1'-8"	4'-0"	2'-6"	1'-8"	1'-2"	1'-3"	1'-7"
15"	2'-0"	4'-4"	2'-10"	2'-0"	1'-3"	1'-3"	1'-7"
18"	2'-4"	4'-8"	3'-2"	2'-4"	1'-4"	1'-3"	1'-7"
24"	2'-10"	5'-2"	3'-8"	2'-10"	1'-5"	1'-4"	2'-1"
30"	3'-6"	5'-10"	4'-4"	3'-6"	1'-9"	1'-6"	2'-5"
36"	4'-0"	6'-4"	4'-10"	4'-0"	2'-0"	1'-8"	2'-11"
42"	4'-6"	6'-10"	5'-4"	4'-6"	2'-3"	2'-0"	3'-6"
48"	5'-2"	7'-6"	6'-0"	5'-2"	2'-6"	2'-0"	4'-0"
54"	5'-9"	8'-1"	6'-7"	5'-9"	2'-9"	2'-0"	4'-6"
60"	6'-4"	8'-8"	7'-2"	6'-4"	3'-0"	2'-2"	5'-0"

NOTES:
1. PRECAST CONSTRUCTION SHALL MEET THE REQUIREMENTS OF THE NC. D.O.T. AND ASTM C-478.
2. REINFORCING STEEL SHALL BE A MINIMUM OF #4 @ 6" O.C.E.W.
3. FOR TWIN PIPES, DOUBLE DIMENSIONS "B" AND "C."

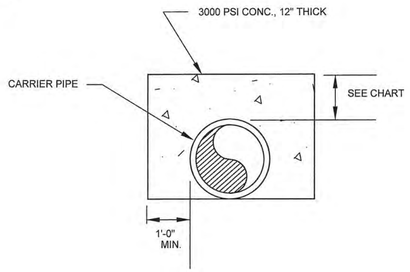
CONCRETE HEADWALL

23



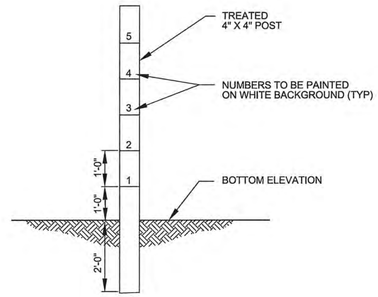
CARRIER PIPE ANTI-SEEPAGE COLLAR

24



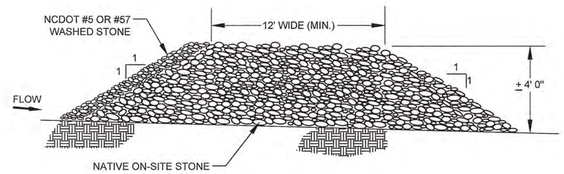
CARRIER PIPE CONCRETE ENCASEMENT

25



SILT GAGE

26



ROCK FILTER DAM CROSS SECTION

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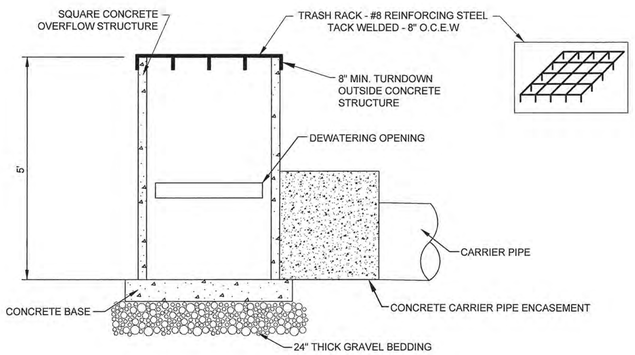

NOTES:
1. ALL FILL MATERIAL SHALL BE COMPACTED TO MIN. 95% STD. PROCTOR DENSITY.
2. OVERFLOW STRUCTURE MAY BE PRECAST CONCRETE BOX WITH MANUFACTURERS RECOMMENDED REINFORCING.

OVERFLOW STRUCTURE

SEDIMENT BASIN DATA

	SED BASIN NO. 1
DRAINAGE AREA TO BASIN (ACRES)	±156.50
BOTTOM OF BASIN AT ELEVATION (FT.)	570.00
TOP OF LEVEE (FT.)	578.00
WATER LEVEL DURING 25 YEAR STORM (FT.)	575.53
WATER LEVEL DURING 100 YEAR STORM (FT.)	577.00

SIZE (FT.)	5' x 5' BOX (ID)
INVERT ELEVATION BOTTOM OF RISER (FT.)	570.00
HEIGHT (FT.)	5.00
CONCRETE BASE DIMENSIONS LxWxH (FT.)	10' x 10' x 3'
DEWATERING ORIFICE SIZE (IN.)	2 - 6"(H) x 24"(W) 3 - 6"(H) x 24"(W)
DEWATERING ORIFICE INVERT ELEVATION (FT.)	570.00 572.00
TRASH GUARD DIAMETER (IN.)	#8 BAR - 8" OCEW

DIAMETER (IN.)	48
LENGTH (FT.)	55
SLOPE (%)	3.64
INLET INVERT ELEVATION (FT.)	570.00
OUTLET INVERT ELEVATION (FT.)	568.00
NO. & SIZE OF ANTI-SEEP COLLARS (FT.)	2 - 8' x 8'
CONCRETE ENCASEMENT OF CARRIER PIPE (FT.)	7'(W) x 5'(H) x 20'(L)

NORTH CAROLINA PROFESSIONAL SEAL 15781 ENGINEER H. LOWRY TRIBBLE, JR.

NORTH CAROLINA PROFESSIONAL SEAL 032495 ENGINEER M. MATTHEW CHEEK

REPUBLIC SERVICES

MISCELLANEOUS DETAILS

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC
CABARRUS COUNTY, NORTH CAROLINA

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers
N.C.Corp. License # C-0813
3920 ARKWRIGHT RD.
SUITE 101
MACON, GEORGIA 31210
(478) 743-7175
(478) 743-7175 (FAX)

PROJ. NO.	6703-631-01	DWG. CMS-2015CL-11-D4	EDIT 5-22-15
SCALE	AS SHOWN	SHEET 11 OF 11	
DATE	MAY 2015		

Rec'd 8/25/2015 *1304-MSWLF-1992, DIN 24899.*

SPECIFICATIONS AND CONTRACT DOCUMENTS

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
CABARRUS COUNTY, NORTH CAROLINA

FOR

REPUBLIC SERVICES

MAY 2015

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers
NC Corp. License No. C-0813

3920 Arkwright Road, Suite 101 | Macon, Georgia | Phone: (478) 743-7175 | Fax: (478) 743-1703

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I INVITATION TO BID

Bids for the **2015 Partial Closure Construction** will be received by Republic at a time and place to be determined, and then reviewed in private. No bid may be withdrawn for a period of one hundred eighty (180) calendar days after the closing time for the receipt of bids.

The work to be done consists of furnishing all materials and equipment and performing all labor necessary for the **2015 Partial Closure Construction** and all incidental work required in connection therewith (the "Project"). All work must be performed in accordance with the Contract Documents. The work will be awarded in one (1) contract (the "Contract").

Additional paper and/or electronic copies of the Bidding Documents are on file and may be obtained from Hodges, Harbin, Newberry & Tribble, Inc., 3920 Arkwright Road, Suite 101, Macon, Georgia 31210 for a cost of $200.00 NON-REFUNDABLE. For additional information, please contact Matt Cheek, P.E. at (478) 743-7175. Bidders are required to use the online or printed forms contained in or referenced in the Contract Documents.

The Bidder shall include with his Bid, a copy of his North Carolina Contractor License issued by the North Carolina Licensing Board of General Contractors. The Bidder must hold other necessary licenses and approvals issued by all applicable licensing boards and authorities in the State of North Carolina.

All Bids must be in accordance with the "Instructions to Bidders" attached, and all written amendments, if any, issued by OWNER. From the Bids received, OWNER may select one successful Bid. Alternatively, OWNER may choose to select a short list of Bidders to further discuss proposal details. Notwithstanding the foregoing, OWNER reserves the right, in its sole discretion and without qualification, to accept any Bid, to reject any or all Bids, to waive irregularities and informalities in process and Bids received, and to reject nonconforming, unresponsive, or conditional Bids, and any Bids determined not to be in the best interests of either or both of OWNER and the Project. OWNER shall not have any obligation to the successful Bidder unless and until the Contract is executed between OWNER and Bidder. Expenses associated with preparing a Bid and finalizing the Contract (if applicable) that are incurred by any party responding to this request shall be the sole responsibility of such responding party.

OWNER: BFI Waste Systems of North America, LLC

Dated: May 2015

-- END OF SECTION --

II INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS:

Terms used (but not otherwise defined) in these Instructions to Bidders that are defined in the General Conditions of the Contract Documents have the meanings assigned to them in the General Conditions. The term "Bidder" means one who submits a Proposal (each a "Bid") directly to OWNER, as distinct from a sub-bidder, who submits a bid to a Bidder. The term "Successful Bidder" means the Bidder to whom the OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Invitation to Bid, Instructions to Bidders, Bid Form, Bid Bond and the proposed Contract Documents.

2. COPIES OF BIDDING DOCUMENTS:

2.1 Complete sets of the Bidding Documents may be obtained in the number and for the sum, if any, as stated in the Invitation to Bid.

2.2 Complete sets of Bidding Documents must be used in preparing Bids. Neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3 OWNER and ENGINEER, in making copies of Bidding Documents available on the foregoing terms, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS:

To demonstrate qualifications to perform the Work, each Bidder shall submit written evidence, such as financial data, previous experience, present commitments and other such data, as may be called for in the Supplementary Conditions, or requested by OWNER. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE:

4.1 It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, or performance of the Work, (c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify ENGINEER of all conflicts, errors or discrepancies in the Contract Documents.

4.2 Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions at the site, which have been utilized by ENGINEER in preparation of the Contract Documents. Copies of these reports may be examined, upon request, at a location designated by OWNER.

4.3 Information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site are based upon information and data furnished to OWNER and ENGINEER by Owners of such Underground Facilities or others, and OWNER shall have no responsibility for the accuracy thereof.

4.4 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Facilities and other physical conditions, and possible changes in the Contract Documents due to differing conditions, appear in Paragraphs 4.2 and 4.3 of the General Conditions.

4.5 Before submitting a Bid, each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and data, which pertain to the physical conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, or performance of the Work and which Bidder deems necessary to determine its Bid for performing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.6 On request in advance, OWNER will provide each Bidder access to the site to conduct such explorations and tests, as each Bidder reasonably deems necessary for submission of a Bid. Bidder must submit any documentation generated as a result of such explorations and tests to OWNER along with its Bid. Bidder shall fill all holes, clean up, and restore the site to its former condition upon completion of such explorations and tests, and shall indemnify against, and hold OWNER harmless from, all costs and expenses to effect such restoration, regardless of whether or not such Bidder becomes the Successful Bidder. In addition, the Bidder will indemnify OWNER against and hold OWNER harmless from any damages, liabilities, losses, claims, demands, suits, actions, costs and expenses, including, without limitation, attorneys' fees, arising out of or in connection with or resulting from such explorations and tests.

4.7 The lands upon which the Work is to be performed and access thereto (which shall be provided by OWNER to Contractor) are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Any necessary easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents.

4.8 The submission of a Bid will constitute an incontrovertible representation and warranty by Bidder that Bidder has complied with every requirement of this Article 4, that, without exception, the Bid is premised upon performing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey a complete understanding of all terms and conditions for the performance of the Work.

4.9 Each Bidder must properly investigate and consider all relevant factors in the preparation of every Bid that it submits. No claims for financial adjustment to any Contract awarded for the Work will be permitted by OWNER that is based on the lack of such prior information or its effect on the cost of the Work.

5. INTERPRETATIONS AND ADDENDA:

5.1 All questions about the meaning or intent of the Contract Documents are to be directed to OWNER. Interpretations or clarifications considered necessary by OWNER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by OWNER as having received the Bidding Documents. Questions received less than seven (7) calendar days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5.2 Addenda may also be issued to modify the Bidding Documents, as deemed advisable by OWNER or ENGINEER.

6. <u>BID SECURITY</u>: (NOT APPLICABLE)

7. CONTRACT TIME:

The time within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment (the "Contract Time") are set forth in the Bid and the Contract Documents. Bidder shall submit a detailed work schedule with the Bid.

8. LIQUIDATED DAMAGES:

Provisions for liquidated damages are set forth in the Contract Documents.

9. SUBSTITUTE OR "OR EQUAL" ITEMS:

The materials and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. No substitution will be considered unless a written request for approval has been submitted by the Bidder and has been received by OWNER at least seven (7) calendar

days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute, including drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or aspects of the Work that incorporation of the substitute would require shall be included. The burden of proof of the merit of any proposed substitute is upon the Bidder. The ENGINEER's approval or disapproval of a proposed substitution shall be final. If ENGINEER approves any proposed substitution, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon any approval of a substitution made in any other manner.

10. SUBCONTRACTORS, SUPPLIERS AND OTHERS:

10.1 Upon OWNER's request, Bidder shall submit the identity of Subcontractors, Suppliers, and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be involved in the Work. Such list shall be accompanied by an experience statement, with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, and other person or organization. OWNER, before the Notice of Award is given, may request the apparent Successful Bidder to submit one or more acceptable substitutes without an increase in Bid price.

If the apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to another Bidder that proposes to use acceptable Subcontractors, Suppliers, and other persons and organizations. Declining to make such a requested substitution will not constitute grounds for sacrificing the Bid Security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom neither OWNER nor ENGINEER makes written objection prior to giving the Notice of Award will be deemed acceptable to OWNER and ENGINEER, subject to revocation of such acceptance after the Effective Date of the Contract.

10.2 No Bidder shall be required to employ any Subcontractor, Supplier, other person or organization against whom Bidder has reasonable objection.

11. BID FORM:

11.1 The Bid Form is included with the Bidding Documents; additional copies may be obtained from OWNER.

11.2 Bids shall be prepared and submitted in accordance with these instructions. Any Bid that is not prepared in accordance with these instructions will imply that the corresponding Bidder does not intend to comply with all of the proposed contract conditions. As a result, any such Bids may be rejected at the sole discretion of OWNER.

11.3 Each Bid should be carefully prepared using the Bid Form. All prices shall be stated in words and figures, except where the form provides for figures only.

11.4 All blanks on the Bid Form must be typed or completed in ink, if submitted in paper format.

11.5 Bids by sole proprietorships must be executed by the proprietor whose address must be shown below his signature.

11.6 Each Bidder shall list in the spaces provided in the Bid Form all exceptions and clarifications between its proposal and such documents. If more space is required for such exceptions and clarifications, additional pages may be added. If the Bidder takes no exceptions or has no clarifications, it shall write "None" in the spaces provided. Bids that do not comply with this requirement may be rejected at the sole discretion of OWNER. If the Bidder takes exception, then all such exceptions shall be specific in nature and carefully referenced to the applicable Contract Document and to the applicable section, article, paragraph, and page number thereof. If the Bidder proposes deletion of specific language and substitution of revised language, then such deletion and substitution shall be carefully presented by typing complete paragraphs or articles of the original specific language and incorporating the substitute language. Proposed deletions shall be set off by brackets and strike throughs, thus: [~~delete this language~~], and proposed substitute language shall be indicated by underlining, thus: substitute this language. Exceptions that are general, that make reference to the Bidder's standard terms and conditions, or that make reference to the Bidder's descriptive information as a whole, will not be acceptable. Bids that do not comply with these requirements for the presentation of exceptions may be rejected at the sole discretion of OWNER. If a Bid includes express or implied exceptions that are not listed as required, the requirements of the specifications and documents shall govern.

11.7 Bids by corporations must be executed in the official corporate name by the President or a Vice-President (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the Secretary or an Assistant Secretary. Bidding corporations shall designate the State in which they are incorporated; the address of their principal office; and the names, titles, and business addresses of the president, secretary, and treasurer.

11.8 Bids by partnerships must be executed in the partnership name and signed by a general partner, whose title must appear under the signature and the business address of the partnership must be shown below the signature.

11.9 The names of all persons signing should be typed or printed below the signature. The Bidder's name stated on the Bid shall be the exact legal name of the firm.

11.10 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which must be filled in on the Bid Form).

11.11 The address and telephone number for communications regarding the Bid must be shown.

11.12 It shall be the Bidder's responsibility to determine all taxes, permits, and licenses applicable to the Work. The Successful Bidder shall be responsible for the payment of all taxes and permit and license fees applicable to the Work.

11.13 Each Bidder shall submit with its Bid an organizational chart showing the management, supervisory, and technical organization that it proposes to use for the Project, and the names of key personnel. The Successful Bidder's organization will be subject to review and approval by OWNER.

11.14 All names must be typed or clearly imprinted below the signature.

12. SUBMISSION OF BIDS:

12.1 If requested by the Owner, a signed original of the Bid shall be submitted at the time and place indicated in the Invitation to Bid and shall be enclosed in an opaque sealed envelope, marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted) and name and address of the Bidder, and accompanied by the Bid Security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it. Bids received after the time specified for receipt of Bids will be returned unopened. All Bids shall become the property of OWNER.

13. MODIFICATION AND WITHDRAWAL OF BIDS:

13.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

13.2 If, within twenty-four hours after Bids are opened, any Bidder files a duly signed, written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

14. OPENING OF BIDS:

Bids will be opened in private.

15. BIDS TO REMAIN SUBJECT TO ACCEPTANCE:

All bids will remain subject to acceptance for 180 days after the day of the Bid opening, but OWNER may, in its sole discretion, release any Bid prior to that date.

16. AWARD OF CONTRACT:

16.1 OWNER reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time, or changes in the Work and to negotiate Contract terms with the Successful Bidder, and the right to disregard all non-conforming, non-responsive, unbalanced, or conditional Bids. Also, OWNER reserves the right to reject the Bid of any Bidder if OWNER believes that it would not be in the best interests of either or both of OWNER and the Project to make an award to that Bidder, whether because its Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criterion established by OWNER. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

In evaluating Bids, OWNER will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award. OWNER reserves the right to exercise complete and unfettered discretion in this evaluation.

16.2 OWNER may consider the qualification and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. OWNER also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data are required to be submitted prior to the Notice of Award.

16.3 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform the Work in accordance with the Contract Documents, to OWNER's satisfaction and within the prescribed time.

16.4 If the Contract is to be awarded, it will be awarded to the Bidder whose evaluation by OWNER indicates to OWNER that the award will be in the best interests of the Project.

16.5 If the Contract is to be awarded, OWNER will give the Successful Bidder a Notice of Award within 180 days after the day of the Bid opening.

17. SIGNING OF AGREEMENT:

When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement, with all other Contract Documents attached. Within ten (10) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER. Within ten (10) days thereafter OWNER shall deliver one (1) fully signed counterpart to Successful Bidder.

18. CONTRACT SECURITY:

(Not Applicable)

19. CONFIDENTIALITY:

Neither Contractor nor any other Bidder shall discuss the proposed development plans for the Project with the press or make any press releases, public statements or advertisements referring to the Project or the engagement of Contractor by OWNER in connection with the Project, or release any information with respect to the Project for any publication, advertisement or other purpose, without the prior written approval of OWNER. Discussions with a reviewing public authority or official shall be discrete and, insofar as practicable, limited to the technical issues required for performance of the Work. Neither Contractor nor any other Bidder shall release written or oral reports, drawings, calculations or any other information to any parties, other than those specifically listed in the Contract, without the prior written consent of OWNER. Breach of any of the foregoing provisions of this Section 19 shall be grounds for immediate termination of the Contract by OWNER and, in addition to OWNER'S other remedies at law and in equity, complete forfeiture of any sums otherwise payable to Contractor under the Contract. The provisions of this Section 19 shall survive the termination of the Contract and the completion of the Work.

20. CONTRACTOR LICENSE:

The Bidder shall include with his bid, a copy of his North Carolina Contractor License issued by the North Carolina Licensing Board of General Contractors.

--- END OF SECTION ---

III BID FORM

2015 Partial Closure Construction
Charlotte Motor Speedway Landfill V

Bid from _____ (hereinafter called "Bidder"), an individual doing business as a corporation.

Bidder's Address: _____
_____

Bidder's contact person for additional information:

Name: _____
Phone: _____

To: BFI Waste Systems of North America, LLC
Charlotte Motor Speedway Landfill V
5105 Morehead Road
Concord, North Carolina 28027
Attention: Mr. Mike Gurley, Environmental Manager.

The Bidder, in compliance with your Invitation for Bids, dated May 2015, having examined the Contract Documents and the site, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies and to construct the Project in accordance with the "Bidding Documents" (as such term is defined in the "Instructions to Bidders" attached to your Invitation for Bids), within the time set forth therein, and at the price stated below. This price is to cover all expense incurred in performing the "Work" (as such term is defined in the General Conditions) as required under the Contract Documents, of which this Bid is a part.

The Bidder declares that the only persons or parties interested in this proposal are those named herein. The Bidder further declares that this proposal is made according to the provisions and under the terms of the Contract Documents, as explained on separate sheets labeled "Clarifications and Exceptions," attached to this proposal, and that each deviation therefrom is itemized by number and specifically referenced to the particular Contract Document and to the particular section (or paragraph) and page thereof.

The Bidder understands and agrees that the OWNER reserves the right, in its sole discretion and without qualification, to reject any or all proposals, to waive irregularities and informalities in process and proposals received, and to reject nonconforming, nonresponsive, or conditional proposals, and any proposals determined not to be in the best interest of either or both of OWNER and the Project.

The OWNER reserves the right to enter into separate negotiations with any party for the construction of the Project. The OWNER shall not have any obligation to the Bidder unless and until an "Agreement" (as such term is defined in the Contract Documents) is executed between the OWNER and the Bidder. Expenses associated with the preparation of this Proposal and negotiating the "Contract" (as such term is defined in the Contract Documents) (if applicable) that are incurred by the Bidder shall be the sole responsibility of the Bidder. The Bidder hereby waives any and all claims against the OWNER either for rejection by the OWNER or for the failure of the OWNER to execute an Agreement with the Bidder for any reason.

The Bidder hereby agrees to commence the Work under the Contract on or before a date to be specified in a written "Notice to Proceed" of the OWNER and to fully complete the Work within 120 consecutive calendar days from the "Notice to Proceed" date, with an allowance of twenty (20) days for Geosynthetics / FML installation (by others) included in this 120 days. The detailed schedule prepared by the Bidder shall be attached.

Bidder further agrees to pay, as liquidated damages, the sum of $2,000.00 for each consecutive calendar day thereafter until the Project is completed.

Bidder acknowledges receipt of the following addenda:

_____

Bidder agrees to perform all of the Work described in the Contract Documents for the prices provided in Exhibit D of the Agreement.

The unit and lump sum prices shown in Exhibit D include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, taxes, and other costs necessary to complete the furnished work of the several kinds called for. The Bidder is solely responsible to provide sufficient materials, equipment, and effort to complete the work.

The Bidder declares that it understands (a) that the quantities shown for unit price items are approximate only and are subject to either increases or decreases, (b) that, if the quantities of any of the items or work are increased, the Bidder proposes to do the additional work at the prices stated herein; and if such quantities are decreased, the Bidder also understands that payment will be made on the basis of the actual quantities at the unit price bid and will make no claim for anticipated profits for any decreases in quantities, and (c) that actual quantities will be determined upon completion of the Work at which time adjustments will be made to the contract amount by direct increase or decrease. **The OWNER further reserves the right to increase or decrease any line item quantity by up to 25 percent without the Bidder being allowed to change the unit price for the item being changed.**

The Bidder will designate _____as onsite superintendent. This designation cannot be changed without the prior written approval of OWNER.

SEAL (if bid is by Corp.)

Bidder

By (Signature)

(Print or Type)

Title

Date

Address

EXCEPTIONS AND CLARIFICATIONS

The Bidder shall state below all exceptions and clarifications taken to the Contract Documents. The Bidder shall identify both the Contract Document and the section, article, paragraph, and page number to which such exceptions and clarifications apply. Additional pages, if required, shall be submitted. In addition, the Bidder shall attach a copy of the Contract Documents to which such exceptions and clarifications apply, with proposed deletions set off by brackets and strike throughs, thus: [~~delete this language~~], and with proposed substitute language indicated by underlining, thus: substitute this language

COMMERCIAL EXCEPTIONS:

COMMERCIAL CLARIFICATIONS:

TECHNICAL EXCEPTIONS:

TECHNICAL CLARIFICATIONS:

Bidder:

By: (Signature)

(Print or Type)

Title:

Date:

-- END OF SECTION --

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

BID FORM

May-15

Description	Unit	Quantity	Unit Price	Total Price
CAPPING CONSTRUCTION				
1. Mobilization				
a. Mobilization ($50,000.00 Max. allowable)	L.S.	1	$	$
2. Surveying				
a. Construction Staking	L.S.	1	$	$
b. Marker post , Complete	Ea.	36		
3. Surface Grade Preparation				
a. Intermediate Cover Preparation including removal of all Vegetation & Matting, removal of existing Drainage Berms, re-compact and proofroll for a prepared 12" thick foundation layer surface	Ac	19.4	$	$
4. Minimum 12" Thick Foundation Layer Placement				
a. Foundation layer soil including material, hauling, placement and fine grading for a smooth surface free of rock on 3H:1V permanent slopes.	C.Y.	5,500	$	$
5. Geosynthetic Cap				
a. 40 mil LLDPE Flexible Membrane Liner (Textured) including welding to existing 40 mil LLDPE Liner Approximately 511 L.F. And welding to existing 60 mil HDPE Base Liner approximately 2,455 L.F. (Material and Installation by others)	S.F.	968,759	$ N/A	$ N/A
b. Temporary Anchor Trench including open and backfill along all temporary edges	L.F.	2,750	$	$
c. Cap Liner Penetration Boots for Existing Gas Extraction Wells and lateral piping (Material and Installation by others)	Ea.	36	$ N/A	$ N/A
d. Locate, uncover, and clean existing 40 mil liner along temporary anchor trench.	L.F.	511	$	$
e. Locate, uncover, and clean existing 60 mil base liner along permanent edge of Cell	L.F.	2,455	$	$
6. Vegetative Cover				
a. 18” Thick Protective Soil Cover including Material, Haul, and Installation on Permanent Slopes. **Note: At drainage berms, slope varies**	S.F.	880,690	$	$
b. 6” Thick Vegetative Growth Soil (Topsoil) including smoothing of surface and removal of rocks or other contaminants. **Note: At drainage berms, slope varies**	S.F.	880,690	$	$
7. Drainage Layer				
a. Double sided Geocomposite Drainage Media (GDM) with 6 osy Nonwoven Geotextile heat bonded to both sides of Geonet on the Permanent Slopes Only	S.F.	968,759	$ N/A	$ N/A

Description	Unit	Quantity	Unit Price	Total Price
b. 4” Diameter Corrugated Polyethylene Pipe (Perforated) – To be located above the flow line of all storm water drainage berms and along the eastern tie in with the existing cap liner. This includes wrapping the GDM around the piping, securing with wire ties/zip ties, and additional piece of 6osy non-woven geotextile fabric.	L.F.	14,561	$	$
c. 4” Diameter Corrugated Polyethylene Pipe (Solid) to provide outlets for perforated piping – includes all fittings and connections to perforated pipes and screen cover over end of pipe	L.F.	728	$	$
8. Closure Cap Storm Water Control				
a. Construct Permanent Storm Water Drainage Berms including Material, Haul and Compaction, Double-sided Excelsior Matting, Complete	L.F.	14,561	$	$
b. Removal of Existing Corrugated Plastic Down Drain Piping including all fittings and inlets	L.F.	672	$	$
c. Install Permanent 24” Diameter Corrugated Plastic Down Drain Pipe including All Pipe Fittings, Connections and Piping (New Materials)	L.F.	1,036	$	$
d. Install Temporary 18” Diameter Corrugated Plastic Down Drain Pipe including All Pipe Fittings, Connections and Piping (Using salvaged materials on-site)	L.F.	340	$	$
e. Install 24” Diameter Corrugated Plastic Flared End Sections and inlet pipe to Downdrains	Ea.	42	$	$
LANDFILL UOC INFRASTRUCTURE				
9. Excavation				
a. Contracted excavation (unclassified), including hauling to stockpiles or placing in fill areas and maintaining access roads & stockpiles	C.Y.	36,500	$	$
b. Unsuitable material (Remove and Replace)	C.Y.	5,000	$	$
c. Solid rock excavation inside borrow area, inlcuding all drilling and blasting	C.Y.	5,500	$	$
d. Remove and relocate rock material from borrow area to existing rock stockpile	C.Y.	550	$	$
12. Storm Water Handling				
a. Remove and replace Overflow Structure No. 1- including riser, trash rack, concrete base, concrete encasement, anti-seep collars, dewatering orifices and all connections, as shown on plans	Ea.	1	$	$
b. 48" Dia Reinforced Concrete Pipe	L.F.	55	$	$
c. 48" Dia Concrete Headwall	Ea.	1	$	$
d. 30" Dia. HDPE Stormwater Pipe, including saw cut pavement, bedding, backfill, compaction and pavement replacement	L.F.	150	$	$
e. 36" Dia. HDPE Stormwater Pipe, including saw cut pavement, bedding, backfill, compaction and pavement replacement	L.F.	100	$	$

Description	Unit	Quantity	Unit Price	Total Price
f. 54" Dia. HDPE Stormwater Pipe, including saw cut pavement, bedding, backfill, compaction and pavement replacement	L.F.	90	$	$
g. Stone Forebay Berm	Ea.	2	$	$
h. Silt Gage	Ea.	1	$	$
i. Existing Storm Water Channel to be cleaned and lined with double sided excelsior matting	L.F.	1,250	$	$
j. Existing Storm Water Channel to be cleaned and lined with 6" Rip-Rap	L.F.	1,145	$	$
13. Miscellaneous				
a. Silt Fence – Type C (includes extra to be installed per the engineer)	L.F.	950	$	$
b. Stone Check Dams – New	Ea.	6	$	$
c. 6” Rip-Rap Outlet Protection (Including Stone & Fabric)	S.Y.	30	$	$
d. 9” Rip-Rap Outlet Protection (Including Stone & Fabric)	S.Y.	60	$	$
e. 12” Rip-Rap Outlet Protection (Including Stone & Fabric)	S.Y.	140	$	$
f. 15” Rip-Rap Outlet Protection (Including Stone & Fabric)	S.Y.	290	$	$
g. Single-sided Excelsior Slope Matting including material and installation (not including matting on drainage berms)	S.Y.	58,500	$	$
h. Pipe Inlet Protection Complete	Ea.	3	$	$
i. Permanent Grassing	Ac	23.5	$	$
			TOTAL BASE BID	$

IV AGREEMENT

AGREEMENT for Professional Contracting Services between:

Republic Legal Entity ("Company"): REPUBLIC LEGAL ENTITY

d/b/a: Name of Landfill/Facility: LANDFILL/FACILITY

and

Name of Contractor ("Contractor"): CONTRACTOR

Dated: May 22, 2015

Vendor Number: ##############

Agreement Number: ##############

RECITALS

A. Company requires the performance of certain contracting services (provisions of labor), as described in this Agreement, relating to its solid waste disposal business and operations (collectively, the "Services"); and

B. Contractor is prepared and able to perform the professional contracting Services required by Company.

AGREEMENT

In consideration of the premises and the mutual agreements set forth in this Agreement, the parties agree as follows:

1. SERVICES

1.1 Scope of Work. Contractor shall, in accordance with the requirements of this Agreement, perform and provide the contracting Services described in the Scope of Work attached as Exhibit A. Contractor shall complete the performance and provision of the Services on or before ---------- or as specified on Exhibit B (the "Completion Date").

1.2 Conduct of Services. Contractor represents and warrants to Company that Contractor, and each of its affiliates, employees, officers, agents, representatives, and subcontractors (collectively "Contractor Parties"): (a) are competent to perform, provide and complete the Services by the Completion Date, and Contractor Parties shall have all necessary permits, approvals, licenses and other authorizations to perform such Services pursuant to this Agreement (b) shall exercise skill, care and diligence in the performing, providing and completing the Services, and shall perform the Services promptly and in full conformity with all requirements of this Agreement, and shall carry out its obligations under this Agreement in accordance with customarily accepted practices; (c) shall perform all Services and supply all materials (i) in strict accordance with all applicable statutes, rules, regulations and orders of any jurisdiction ("Applicable Laws") and this Agreement, (ii) in strict conformance with all of the Company's current standard operating procedures and best management practices, (iii) free from defects, (iv) in compliance with all requirements of any and all third-party warranties and/or guarantees

(including any manufactures' warranties), all of which will be assigned to Company as part of Services; and (v) fit for Company's intended use. Any inconsistency among or between any of these representations, warranties or requirements, or among or between any of the provisions in this Agreement or Applicable Law, shall be an interpretation that results in the best quality of Services and/or performance. If Contractor fails to comply with any of the foregoing requirements or standards, Contractor shall perform at its own cost and without reimbursement from Company, the Services necessary to correct deficiencies in the Services or work which are so caused.

Contractor further agrees that within twenty (20) days of written notice from Company, it will correct and remedy (the "Remedial Services"), at Contractor's expense, all defects in the Services that are discovered at any time within two (2) years after the Completion Date or completion of all the Services, whichever is later. Contractor will properly restore, at Contractor's sole cost and expense, any of the Services or other property that is damaged by reason of the Remedial Services, to Company's satisfaction. All Remedial Services will have an extended warranty equal to one(1) year after completion of the Remedial Services. If Contractor fails to correct any defects in accordance with this Section 1.2, then Company may correct the defects and Contractor shall promptly reimburse Company for all expenses incurred by Company. The express warranty set forth in this Section 1.2 is given in addition to any other right or remedy Company may have under this Agreement or Applicable Law and excludes remedies for damage or defect caused by abuse, modifications not executed by Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear usage.

1.3 Changes. If during the term of this Agreement, the Scope of Work for the Services are revised or other changes are made, Contractor shall make the necessary changes only after receiving a written order from Company. The Agreement amount and Agreement schedule may only be changed by the proper execution of a Change Order, which must be signed by authorized representatives of Company and Contractor. The change order should be substantially similar in format to that shown in Exhibit C.

1.4 Authorization. Company will not accept any responsibility whatsoever for work or Services performed for which there is no specific proper written authorization. For the purposes of this Agreement the only representatives of the parties who are authorized to make revisions to and to grant any prior written authorization required by this Agreement or enter into any amendments to this Agreement pursuant to Section 8.4 are:

Company:	Contractor:
Joseph J. Benco Vice President, Engineering and Environmental Management	Contractor One
Company Two	Contractor Two
Company Three	Contractor Three

2. PRICE AND PAYMENT

2.1 Payment. The parties estimate that the total price for the Services to be performed and provided by Contractor pursuant to this Agreement (including all expenses, fees and reimbursables) shall be the sum of $---- (the "Limitation of Expenditure"). Subject to the terms and provisions of this Agreement and in consideration of the performance of the Services to the satisfaction of Company, the total amount Company shall pay to Contractor under this Agreement shall be the Total Construction Cost (defined below). The "Total Construction Cost" is the sum of the Subtotal Costs for each "Area of Work" contained within the Bid Worksheet attached to the Agreement as Exhibit D (the "Bid Worksheet"). The "Subtotal Cost for each Area of Work" shall be determined by multiplying the Actual Quantity (defined below) by the "Unit Cost for such Area of Work" as set forth in the Bid Worksheet. For each non-lump sum Area of Work, the "Actual Quantity" will be determined by a physical survey performed by the independent construction quality assurance ("CQA") consultant retained by Company. If the parties dispute the actual quantities determined by the CQA consultant, the parties will mutually retain an independent consultant agreed to by both parties who will determine the Actual Quantity to be used in the calculation of the payment. The Actual Quantity determined by the independent consultant shall be final and binding on the parties.

Payment for work or materials for which no price is contained in this Agreement shall be the estimated cost of direct labor shown on Exhibit E (the "Schedule of Unit Prices"), materials (shown on invoice), and the use of equipment shown on the Schedule of Unit Prices.

Company's obligation to Contractor for the Services performed and provided under this Agreement shall not exceed the Limitation of Expenditure unless otherwise authorized in writing by Company. Contractor shall not be obliged to perform or provide any work or Services which would cause the Limitation of Expenditure to be exceeded, unless Company authorizes an increase in the Limitation of Expenditure. If at any time Contractor considers that the Limitation of Expenditure may be exceeded, it shall promptly notify Company so that Company may, in its sole discretion, authorize an increase.

2.2 Reduction of Limitation of Expenditure for Late Completion: Contractor acknowledges that time is of the essence to Company in completing the Services, and therefore agrees that if Contractor fails to complete the Services by the Completion Date, the Limitation of Expenditure will be reduced by $5,000 per day for every day the schedule is not met other than for an Excusable Delay (defined below). Contractor and Company agree that the per day reduction constitute liquidated damages as a reasonable approximation of the additional costs or loss of use to Company due to the delay, and is not a penalty or fine. If any delay is due to an event that qualifies as "Excusable Delay" under Section 6.4 of

this Agreement, Contractor shall provide written notice as provided in Section 6.4, and provided Company does not dispute it, the Completion Date shall be extended for each day for which an Excusable Delay condition exists.

2.3 Invoices. Contractor shall submit invoices to Company on a monthly basis. The monthly invoices shall include itemized hours and task descriptions and costs with back up documentation in support of the amounts completed to date. Company shall pay Contractor within seventy (70) days of the invoice date. An invoice will not be deemed "validated" until Company's Project Manager has determined that: (a) the Services included in the invoice have been completed; (b) such Services conform to the requirements of this Agreement and that the quality of such Services is consistent with Contractor's representations and warranties therein; (c) the quantity of hours and costs provided is consistent with the quantity invoiced; (d) the amount invoiced, together with prior invoices, does not exceed any agreed upon limitation of expenditure or not-to-exceed amount; and (e) the prices charged are consistent with this Agreement and Exhibit D. Company shall have no obligation to pay Contractor for the Services upon completion of the project until Contractor delivers to Company a final waiver of lien, general release and indemnity agreement in the form of Exhibit F (which delivery Company may waive in its sole discretion).

2.4 Taxes. The rates or prices stated in this Agreement have been prepared by Contractor and make provision for an amount relating to taxes or duties payable with respect to this Agreement. Accordingly, any taxes, duties or other similar amounts eligible shall be payable by and are the sole responsibility of Contractor.

3. JOBSITE, SAFETY AND HAZARDOUS MATERIALS

3.1 Job-Site Safety/Control of Work. Contractor shall be responsible for the activities of the Contractor Parties; provided, however, that Contractor will not direct, supervise or control the work of other consultants and contractors directly employed or retained by Company. Contractor is responsible for the health and safety of the Contractor Parties. The Contractor Parties shall at all times comply with all Applicable Laws and all job site safety and other procedures established by Company from time to time.

3.2 Right of Entry. Company will provide for the right of entry for the Contractor Parties and all necessary equipment at Company's facilities ("Facility") to complete the Services under this Agreement. While the Contractor Parties will take all reasonable precautions to minimize any damage to the property, Company understands that in the normal course of work some limited incidental damage such as localized disturbance of soil and vegetation may occur, the correction of which is not part of this Agreement. The following provisions shall apply to such entry:

(1) Without the prior written consent of Company, which Company may grant or withhold in its sole discretion, Contractor shall make no contact whatsoever with employees, customers (including municipal customers and municipalities that have granted franchises to Company or its affiliates), landlords or affiliates of Company or with regulatory authorities with jurisdiction over the Facility.

(2) Contractor shall not take any action or make any requests that would disrupt the normal day-to-day operations of the Facility.

(3) Prior to conducting any subsurface exploration, Contractor shall make all reasonable inquiries of available information pertaining to subsurface obstructions or structures such as utility lines or wires, cables, piping, tanks, vaults, etc. Such reasonable inquiry shall be made to Company and to the appropriate public or private companies to review documents, plans, as-builts or other records indicating underground structure that could be damaged or destroyed if Contractor penetrated the surface.

(4) Contractor recognizes that hazardous conditions, whether obvious or latent, disclosed or undisclosed, may exist at the Facility and assumes the risk of and waives all claims with respect to such conditions while conducting any of its activities at the Facility property. Contractor shall indemnify and save harmless Company, its affiliates, employees, officers, agents, successors and assigns (collectively, the "Company Indemnified Parties") from and against all liabilities, claims, actions, proceedings, losses, damages, penalties, costs and expenses whatsoever (including court costs, reasonable attorneys' fees and expenses of investigation) ("Losses") made, sustained, brought, prosecuted, threatened to be brought or prosecuted, in any manner based upon, occasioned by or attributable to (i) any injury to or death of a person or damage to or loss of property arising out of or in any way related to the presence of any Contractor Party on the Facility property, regardless of whether liability is sought to be imposed upon Company, (ii) a Contractor Party causing, contributing, or exacerbating any environmental condition at the Facility and/or (iii) the violation by a Contractor Party of any Environmental Law or other Applicable Law, rule, regulation or ordinance . For purposes of this paragraph, the term Environmental Law shall include, but not be limited to. the Comprehensive Environmental Response Compensation and Liability Act of 1980, the Resource Conservation and Recovery Act, the Clean Water Act, the Clean Air Act, the Oil Pollution Act, the Emergency Planning and Community Right to Know Act and each of their state or local counterparts, all as may be amended from time to time and all rules, regulations and guidance promulgated thereunder. Contractor's liability to indemnify or reimburse Company under this Section 3.2(4) shall survive termination of this Agreement.

(5) Contractor shall, and shall cause the Contractor Parties to, keep the Facility free from any mechanics' or materialmen's liens caused by Contractor's conducting its activities pursuant to this Section 3.2, and shall deliver to Company, upon Company's request, a partial receipt, waiver and release of lien rights substantially in the form attached as Exhibit G signed by Contractor or any of its subcontractors. Contractor shall indemnify and hold the Company Indemnified Parties harmless from any and all Losses arising out of or in any way related to a breach by Contractor of this Section 3.2(5).

3.3 Disposal of Hazardous Samples/Materials and Contaminated Equipment. All samples and materials produced in the course of Contractor's Services pursuant to this Agreement containing or potentially containing hazardous constituents are the property and responsibility of Company and shall be returned to Company for proper disposal. All

laboratory and field equipment that cannot readily and adequately be cleansed of its hazardous contaminants shall become the property and responsibility of Company. All such equipment shall be charged and turned over to Company for proper disposal. Alternate arrangements to turn such equipment, materials and/or samples directly over to a licensed hazardous waste disposal facility may be made at Company's direction and expense. The parties acknowledge and agree that Contractor is not, and has no responsibility as, a handler, generator, operator, treater, storer, transporter, or disposer or hazardous or toxic substances, waste or materials found or identified at the site.

3.4 Unusual Conditions. If the conditions at the Facility are (a) subsurface or other physical conditions that are materially different from those indicated in this Agreement, or (b) unusual or unknown physical conditions which are materially different from the conditions ordinarily encountered and generally recognized as inherent in the Services provided pursuant to this Agreement, Contractor shall give immediate written notice of the condition to Company. Contractor shall not be required to perform any Services relating to the unknown condition after providing written notice to Company without the written mutual agreement of the parties. Any change in the Limitation of Expenditures and/or the Completion Date as a result of the unknown condition shall be determined as provided in Section 1.3 of this Agreement.

4. INDEMNIFICATION & INSURANCE

4.1 Indemnification.

(1) Indemnification by Contractor. Contractor shall indemnify and save harmless the Company Indemnified Parties from and against all Losses made, sustained, brought, prosecuted, threatened to be brought or prosecuted, in any manner based upon, occasioned by or attributable to any injury to or death of a person or damage to or loss of property arising out of or in any way related to the breach by Contractor of its obligations under this Agreement or any accepted Proposal or from any negligent act, omission or delay or willful misconduct on the part of Contractor or the Contractor Parties in performing the Services or as a result of the Services, regardless of whether liability is sought to be imposed on Company (provided, however, that Contractor shall have no obligation to indemnify the Company Indemnified Parties from Losses resulting from the sole or gross negligence of the Company Indemnified Parties). Contractor shall further indemnify the Company Indemnified Parties from all Losses that Company sustains or incurs in connection with claims, actions, suits and proceedings for the use of an invention claimed in a patent or infringement or alleged infringement of any patent or any registered industrial design or any copyright resulting from the performance of the obligations under the Agreement or any accepted Proposal and in respect of the use of or disposal by Company of anything furnished pursuant to the Agreement or any accepted Proposal.

(2) Indemnification by Company. Company shall indemnify and hold harmless Contractor, and its officers, directors, agents, employees, partners, associates, stockholders, parent corporations and subsidiaries, and the successors and assigns of the foregoing, from and against all Losses arising out of, or related to the sole negligent conduct of Company and its employees.

(3) Survival. The parties' respective obligations to indemnify each other pursuant to this Section 4.1 shall survive termination of this Agreement, and shall not preclude a party from exercising any other rights or remedies available to it.

4.2 Insurance. Contractor agrees at all times during this Agreement to maintain in full-force and effect at least the following insurance coverages:

Workers' Compensation

Coverage A	Statutory ($1,000,000 minimum)
Coverage B - Employers Liability	$1,000,000 each Bodily Injury by Accident $1,000,000 policy limit Bodily Injury by Disease $1,000,000 each occurrence Bodily Injury by Disease

Automobile Liability

Bodily Injury/Property Damage	$2,000,000
Combined - Single Limit	Coverage is to apply to all owned, non-owned, hired and leased vehicles (including trailers).

Commercial General Liability

Bodily Injury/Property Damage	$5,000,000 each occurrence
Combined - Single Limit	$10,000,000 general aggregate

All such insurance policies will be primary without the right of contribution from any other insurance coverage maintained by Company. The fact that insurance is obtained by Contractor shall not release or diminish the liability of Contractor, including liability under the indemnity provisions of this Agreement. Contractor agrees to waive any and all rights of subrogation it may have against Company by virtue of any claims that may arise as a result of the Services, and all policies of insurance herein, except for Errors and Omissions Insurance, shall be so endorsed. All policies required herein shall be written by insurance carriers with a rating of A.M. Bests of at least "A-" and a financial size category of at least VIII. Insurance certificates evidencing the requirements in this Section 4.2 shall be furnished by Contractor to Company before commencing Services and attached as Exhibit H, and provide for not less than thirty (30) days prior notice to Company of any cancellation or non-renewal of the policies. In addition, the following requirements apply:

(1) Company and its affiliates shall be shown as an additional insured on all policies except the Workers' Compensation policy.

(2) The insurance carrier shall provide a waiver of subrogation in favor of Company, with the sole exception being the Errors and Omissions Policy.

(3) The Commercial General Liability policy must include Contractual Liability coverage specifically covering Contractor's Indemnification of Company pursuant to Sections 3.2(4) and 4.1(1).

(4) Coverage must be provided for Products/Completed Operations.

(5) Any combination of primary and excess/umbrella policies may be utilized to satisfy the required limits of liability.

4.3 Performance Bond. In the sole discretion of Company, Contractor shall provide Company with a performance bond substantially in the form of Exhibit I.

5. INTELLECTUAL PROPERTY RIGHTS, RECORDS & CONFIDENTIALITY

5.1 Ownership of Intellectual Property. Any technical documentation, reports, drawings and prototypes produced by Contractor in the performance of the Services shall vest in and remain the property of Company, and Contractor shall account fully to Company in respect of the foregoing in such manner as Company shall direct. Technical documentation, reports and drawings shall contain the following copyright notice:

© ENTITY ENTITY (2011)

Technical information and inventions conceived or developed or first actually reduced to practice in performing the Services shall be the property of Company, and Contractor shall have no rights in and to the same.

5.2 Records. Contractor shall keep proper accounts and records of its hours worked and of all expenditures or commitments made by Contractor, including the invoices, receipts and vouchers. All such accounts and records shall at reasonable times be open to audit and inspection by Company's authorized representatives, who may make copies and take extracts therefrom.

5.3 Confidentiality. Contractor acknowledges that in its consultative capacity it will be making use of, acquiring and adding to confidential information of Company and its affiliates that is of special and unique value to Company and its affiliates (including the results of the Services and any related reports and test results, together with any and all information provided by Company to Contractor). Accordingly, Contractor agrees that that none of the Contractor Parties will (except with the prior written authorization of Company), during or after the term of this Agreement, disclose any of such confidential information (whether or not instructed as to the confidential nature of such information) to any person, firm or corporation for any purpose whatsoever or use such information for any purpose other than in connection with providing the Services to Company pursuant to this Agreement. In the event that Contractor shall be required by subpoena, court or administrative order (collectively "Order") to disclose any Confidential Information as that term is defined below, Contractor shall provide written notice to Company within twenty four (24) hours of receiving the Order and shall cooperate to provide Company with the opportunity to interpose all objections Company may have to the disclosure of the information requested in the Order. The term "Confidential Information" includes, but is not limited to, all information pertaining to the Services provided by Contractor Parties or created by such Parties pursuant to this Agreement, except for information obtained by Contractor from public sources.

5.4 Injunctive Relief. If Contractor breaches or threatens to breach any term or provision of this Section 5, Company shall be entitled to the right of both temporary and injunctive relief. The right of Company to such relief shall not be construed to prevent Company

from pursuing, either consecutively or concurrently, any and all other legal or equitable remedies available to Company for such breach or threatened breach, specifically including the recovery of monetary damages and reasonable attorneys' fees and litigation costs.

5.5 Return of Records and Confidential Information. Upon Company's request or if the Services are terminated, Contractor shall return all records, Confidential Information acquired under this Agreement and any copies of all or part of such Confidential Information to Company and shall destroy any materials prepared by Contractor based in whole or in part on such records or Confidential Information. All records and confidential information shall remain the property of Company.

5.6 Survival. Contractor's obligations under this Section 5 shall survive termination of this Agreement.

6. TERMINATION; EXCUSABLE DELAY

6.1 Default. Notwithstanding the provisions of Section 6.3, Company may, by notice to Contractor, immediately terminate the whole or any part of the Services if:

(1) Contractor becomes bankrupt or insolvent, or a receiving order is made against Contractor, or an assignment is made for the benefit of creditors, or if an order is made or resolution passed for the winding up of Contractor, or if Contractor takes the benefit of any statute for the time being in force relating to bankrupt or insolvent debtors; or

(2) Contractor fails to perform any of its obligations under the Agreement, or, in Company's view, so fails to make progress as to endanger performance of the Agreement in accordance with its terms; or

(3) Consultant assigns this Agreement in whole or in part in contravention of Section 7.4 below.

6.2 Responsibility for Additional Costs. If Company terminates the Services in whole or in part pursuant to Section 6.1, Company may, without prejudice to its other rights and remedies, arrange for the Services to be completed by Company or by any third party upon such terms and conditions and in such manner as Company deems appropriate, and Contractor shall be liable to and promptly pay Company for any additional costs relating to the completion of the Services by Company or by any third party.

6.3 Termination or Suspension. Company may, for its sole convenience and by giving notice to Contractor, terminate or suspend the work with respect to all or any part or parts of the Services not completed. All Services completed by Contractor to the satisfaction of Company before the giving of such notice shall be paid for by Company based on hours actually worked and the Schedule of Billing Rates. Company shall have no obligation to pay Contractor for any Services not completed before the giving of such notice. In addition, Contractor shall be reimbursed for its costs of and incidental to the cancellation of obligations incurred by Contractor pursuant to such notice and obligations incurred by or to which Contractor is subject with respect to the Services. Payment and reimbursement shall be made only to the extent that Contractor establishes to Company's

satisfaction that Contractor actually incurred such costs and that they are fair, reasonable and properly attributable to the termination or suspension of the Services or the part thereof so terminated or suspended. Contractor shall not be entitled to be reimbursed any amount which, taken together with any amounts paid or becoming due to Contractor under the Agreement, exceeds the price applicable to the Services or the particular part thereof. This Section 6.3 is without prejudice to Company's rights pursuant to Section 6.1.

6.4 Excusable Delay. Time is of the essence of the Agreement. Any delay by Contractor in performing its obligations under the Agreement that is caused by an event beyond Contractor's control and that Contractor could not have avoided without incurring unreasonable cost through the use of work around plans, including alternative sources or other means, constitutes an "Excusable Delay." Such events may include: acts of God, acts of local, provincial or federal governments, fires, floods, epidemics, quarantine restrictions, embargoes and unusually severe weather. Contractor shall give notice to Company immediately after the occurrence of the event that causes the Excusable Delay. The notice shall state the cause and circumstances of the delay and indicate the portion of the work affected by the delay. Unless Contractor complies with the notice requirements set forth above, any delay that would otherwise constitute an Excusable Delay shall be deemed not to be an Excusable Delay.

7. RELATIONSHIP OF THE PARTIES

7.1 No Agency. In its capacity as a contractor to Company, Contractor shall be an independent contractor and nothing in this Agreement shall be construed to constitute Contractor as an agent or employee of Company or any of its affiliates. Contractor shall have no right, power or authority (and shall not hold itself out as having any such right, power or authority) to bind Company or any of its affiliates in any manner or to any agreement or undertaking with any third party. Contractor shall not have (and shall not hold itself out as having) any control or authority whatsoever concerning the corporate decisions and operations of Company or any of its affiliates.

7.2 Independent Contractors. The relationship of the parties shall be that of independent contractors. Contractor acknowledges and agrees on behalf of itself and the other Contractor Parties that because Contractor is an independent contractor to Company, Company will make no federal, state, or local tax or social security withholdings from the payments to Contractor under this Agreement. Contractor agrees to report and pay any contributions for taxes, unemployment insurance, social security and other benefits (collectively, "Taxes") for itself and the other Contractor Parties. Contractor acknowledges and agrees on behalf of itself and the other Contractor Parties that no such person shall participate in, qualify for or in any way be entitled to any Company benefits available to employees of Company, including vacation benefits, 401(k) plan, or insurance, or pension program. Contractor shall indemnify and hold the Company Indemnified Parties harmless from and against any and all Losses resulting from or in any way related to Contractor's failure to pay any Taxes (including the employer's share of employment taxes should Contractor or any of the other Contractor Parties ever be found to be an employee of Company notwithstanding the contrary provisions of this Agreement).

7.3 Unauthorized Acts. None of the Contractor Parties shall make any disbursement or other payment of any kind or character out of the compensation paid to it hereunder or with any other fund, or take or authorize the taking of any other action, which contravenes any Applicable Law. Contractor shall indemnify and hold the Company Indemnified Parties harmless from and against any and all Losses resulting from or in any way related to any unauthorized or unlawful acts of any of the Contractor Parties (or from any violations by any of the Contractor Parties of any Applicable Law, whether willful or not).

7.4 Successors and Assigns. Contractor may not assign or subcontract its obligations or rights under this Agreement without Company's prior written authorization, which it may grant or withhold in its sole discretion. This Agreement will be binding upon and enforceable against Company's successors and assigns. Company may direct that Contractor's Services be performed for and the compensation of Contractor hereunder be paid by, and Company may assign this Agreement in its entirety to, one or more of Company's affiliates or to a third-party to whom the project is assigned; provided, however, that in the case of any such assignment, Company shall cause the assignee to assume Company's obligations under this Agreement, whereupon Company shall be released and shall have no further liabilities or obligations under this Agreement.

8. MISCELLANEOUS PROVISIONS

8.1 Entire Agreement. This Agreement, including any Exhibits and amendments, contains the complete agreement between Company and Contractor with respect to the matters contained in this Agreement and supersedes all other agreements, whether written or oral, with respect to the matters contained in this Agreement.

8.2 Construction. The headings in this Agreement are inserted for convenience only, and shall not constitute a part of this Agreement or be used to construe or interpret any of its provisions. If a question of interpretation arises, this Agreement shall be construed as if drafted jointly by the parties, and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of the authorship of any provision of this Agreement. The term "include" or "including" means include or including, without limitation.

8.3 Severability and Enforceability. If any court determines that any provision of this Agreement, or any part hereof, is invalid or unenforceable, the remainder of this Agreement shall not thereby be affected and shall be given full effect, without regard to the invalid portions. If any court determines that any provision of this Agreement, or any part thereof, is unenforceable for any reason, the parties agree that such court shall have the power to modify such provision to the extent necessary to make this Agreement enforceable and valid, and the parties agree to request the court to exercise such power, and, in its modified form, such provision shall then be enforceable and shall be enforced.

8.4 Amendments. No amendment, change or modification of the Agreement or waiver of any of its terms and conditions shall be deemed valid and binding on the parties unless affected by a written amendment signed by the parties.

8.5 Counterparts. This Agreement may be executed in one or more original or facsimile counterparts, each of which shall be deemed an original and all of which shall be deemed one and the same agreement.

8.6 Waiver. The waiver by either party of any failure on the part of the other party to perform in accordance with any of the terms or conditions of this Agreement shall not be construed as a waiver of any future or continuing failure, whether similar or dissimilar thereto. Except as otherwise expressly provided herein, no waiver of any right shall be implied by any delay by a party in enforcing or acting under such right. Waivers shall be effective only if specifically set forth in writing signed by the party to be charged with such waiver.

8.7 Governing Law. This Agreement shall be governed by and construed in accordance with the internal laws of the State of Arizona, without giving effect to any choice or conflict of law provision or rule (whether of the State of Arizona or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than the State of Arizona.

8.8 Jurisdiction, Venue, Waiver of Jury Trial. The parties consent and agree to the exclusive jurisdiction of the federal and state courts located in Maricopa County, Arizona, and agree that such courts shall be a proper place for venue in connection with any litigation initiated under this Agreement. Each of Contractor and Company knowingly, voluntarily and irrevocably: (a) waives any right to trial by jury; (b) agrees that any dispute arising out of this Agreement shall be decided by court trial without a jury; and (c) agrees that the other party to this Agreement may file an original counterpart or a copy of this Agreement with any court as written evidence of the consents, waivers and agreements of the parties.

8.9 Attorneys' Fees. Should any litigation be commenced under this Agreement, the successful party in such litigation shall be entitled to recover, in addition to such other relief as the court may award, its reasonable attorneys' fees, expert witness fees, litigation related expenses, and court or other costs incurred in such litigation. For purposes of this clause, the term "successful party" means the net winner of the dispute, taking into account the claims pursued, the claims on which the pursuing party was successful, the amount of money sought, the amount of money awarded, and offsets or counterclaims pursued (successfully or unsuccessfully) by the other party. If a written settlement offer is rejected and the judgment or award finally obtained is equal to or more favorable to the offeror than an offer made in writing to settle, the offeror is deemed to be the successful party from the date of the offer forward.

8.10 Notices. Any notices required under this Agreement shall be deemed sufficient if provided to the other party by certified or registered mail, return receipt requested, addressed as follows:

If to Company:	**If to Consultant:**
Republic Legal Entity Attention: Vice President, Engineering and Environmental Management	[Legal Name of Contractor] Attention: [Contact Name] [Title]

18500 North Allied Way
Phoenix, AZ 85054

[Contractor Address]
[City, State ZIP]

With a copy to:
Republic Services, Inc.
Attention: General Counsel
18500 North Allied Way
Phoenix, AZ 85054

8.11 Survival. The provisions of this Section 8 shall survive termination of this Agreement.

[Signatures on following page]

IN WITNESS WHEREOF the parties hereto have, by and through their duly authorized officers in that regard, made and executed this Agreement as of the date first written above.

SIGNED and DELIVERED

REPUBLIC LEGAL ENTITY

By: Joseph J. Benco
Title: Vice President, Engineering and Environmental Management

CONTRACTOR

By: _____
Title: _____

EXHIBIT LIST

Exhibit A **Scope of Work**

Exhibit B **Completion Date**

Exhibit C **Change Order**

Exhibit D **Bid Worksheet**

Exhibit E **Schedule of Unit Prices**

Exhibit F **Final Payment, General Release and Indemnity Agreement**

Exhibit G **Partial Receipt, Waiver and Release of Lien Rights**

Exhibit H **Insurance**

Exhibit I **Form of Performance Bond**

EXHIBIT A
Scope of Work

EXHIBIT B
Completion Date

EXHIBIT C
Change Order

[See Attached]

CHANGE ORDER # _____

Project Name_____

Agreement No: _____ Agreement Date:_____

CONTRACTOR:_____

The following **CHANGES** are hereby made to the Agreement documents (attach separate explanation sheet if necessary):

JUSTIFICATION for Change to Agreement Documents:

_____
_____
_____
_____

CHANGE TO AGREEMENT PRICE (Attach Detailed Calculation Sheets)

Original Agreement Price: $

Current Agreement Price (as adjusted by previous change orders: $

Increase or Decrease in Agreement Price by this Change Order: $

New Agreement Price due to this Change Order: $

CHANGE TO AGREEMENT TIME (attach revised schedule)

Increase or Decrease in Agreement Time (calendar days):

New Project completion date will be:

APPROVALS REQUIRED- To be effective, Change Order must be approved by COMPANY.

Requested by: _____ Dated:
(Contractor)

Recommended by: _____ Dated:
(Company)

Ordered by: _____ Dated:
(Company)

Accepted by: _____ Dated:
(Contractor)

EXHIBIT D
Bid Worksheet

EXHIBIT E
Schedule of Unit Prices

EXHIBIT F
Final Payment, General Release and Indemnity Agreement

KNOWN ALL MEN BY THESE PRESENTS:

That CONTRACTOR (Contractor), in consideration of the payment of $ representing the final payment under the Agreement for Professional Services dated May 22, 2015, between the undersigned and REPUBLIC LEGAL ENTITY (Company) covering the (the "Agreement") hereby certifies and warrants that it has been fully paid on account of the Agreement and further certifies and warrants that it has fully paid and satisfied all claims for work, labor, materials, and supplies, equipment and all other items used or furnished by the undersigned or its subcontractor(s) or suppliers in the performance of the Agreement.

The undersigned, in consideration of the final payment being made to Contractor pursuant to the Agreement, hereby releases and forever discharges Company and its subsidiaries and affiliates, subcontractor(s), agents, etc. from any right of lien Contractor may have against the real property known as LANDFILL/FACILITY under the Agreement and the undersigned hereby agrees to defend, indemnify, and hold harmless Company from and against all claims, demands and liabilities arising out of labor performed or material and equipment supplied by the undersigned or by its subcontractors or suppliers in connection with the performance of the Agreement.

In addition, the undersigned agrees to reimburse Company for any excess payments made by it to the undersigned, which may be discovered as a result of subsequent audit of the Agreement.

IN WITNESS WHEREOF, the undersigned has caused this Final Payment, General Release and Indemnity Agreement to be executed by its duly authorized officer on _____, 201___.

By:_____
Name:_____
Title:_____

ATTEST:

_____

County of:

Before me, _____ a Notary Public in and for said county, personally appeared and acknowledged that he/she did sign and execute the above Final Payment, General Release and Indemnity Agreement.

EXHIBIT G
Partial Receipt, Waiver and Release of Lien Rights

The undersigned hereby acknowledges receipt, payment, and satisfaction in full for all labor, services, and materials furnished or supplied up to and including the date _____, hereof relating to the use, to be used, or contributing to the construction, addition, or development of the work of improvements concerning that certain real property, commonly known as LANDFILL/FACILITY.

The undersigned hereby expressly waives, releases, and discharges the real property described above, Company, the interim lender, and the permanent lender, of and from any and all claims for mechanics' liens and rights to any such claim which the undersigned has or may have for labor, services, or materials or otherwise in connection with said work of improvements and every part thereof up to and including the date hereof and does hereby waive and release all rights that the undersigned now has or may have to levy or place any attachment lien, or execution lien on or against the real property described above for any existing indebtedness of the owner of said real property to the undersigned.

In the event the undersigned does not receive actual payment for the labor, materials, or services that is the subject hereof, the signing of this waiver shall not constitute a release of any lien rights for said labor, materials, or services.

Date:

Amount: By:

Invoice No. Title:

EXHIBIT H
Certificate of Insurance

V GENERAL CONDITIONS

TABLE OF CONTENTS OF GENERAL CONDITIONS

V GENERAL CONDITIONS

ARTICLE 1 DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents, the following terms shall have the meanings indicated, which are applicable to both the singular and plural thereof:

Addenda - Written or graphic instruments issued prior to the opening of Bids that clarify, correct or change the bidding documents or the Contract Documents.

Agreement - The written agreement between and executed by OWNER and CONTRACTOR covering the Work; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

Application for Payment - The form accepted by OWNER that is to be used by CONTRACTOR in requesting progress or final payments and that is to include such supporting documentation as is required by the Contract Documents.

Bid - The offer or proposal of a bidder, submitted on the prescribed form, setting forth the prices for the Work to be performed by such bidder.

Bonds - Bid, performance and payment bonds and other instruments of security.

Change Order - A document that is signed by CONTRACTOR and OWNER that authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date.

Contract - Together, the contract formed by the Contract Documents.

Contract Documents - The Agreement, Addenda (which pertain to the Contract Documents), Bid Form (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications including the Drawings, as the same are more specifically identified in the Agreement, together with all change orders.

Contract Price - The monies payable by OWNER to CONTRACTOR under the Contract Documents as stated in the Agreement.

Contract Time - The number of days or the date stated in the Agreement for the completion of the Work.

CONTRACTOR - The person, firm or corporation named as such in the Agreement.

Defective - An adjective that, when modifying the word "Work," refers to Work that is unsatisfactory, faulty or deficient, or that does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or that has been damaged prior to final payment.

Drawings - The drawings that show the character and scope of the Work to be performed and that have been prepared or approved by ENGINEER and are referred to in the Contract Documents.

Effective Date - The date so described in the Agreement, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver it.

ENGINEER - The person, firm or corporation designated as such by the OWNER. The ENGINEER is responsible for the technical aspects of the work.

Field Order - A written order issued by PROJECT MANAGER that orders minor changes in the Work, but that does not involve a change in the Contract Price or the Contract Time.

Laws and Regulations: – All applicable federal, state and local laws, rules, regulations, ordinances, codes and orders.

Notice of Award - The written notice by OWNER to the apparent successful bidder stating that, upon satisfaction by the apparent successful bidder of the conditions precedent enumerated therein, within the time specified therein, CONTRACTOR will execute and deliver the Agreement to OWNER.

Notice to Proceed - A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

OWNER - The Corporation, with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.

Partial Utilization - Placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work.

Project - The total construction of which the Work may be the whole, or a part, as indicated elsewhere in the Contract Documents.

PROJECT MANAGER - The authorized representative of OWNER who is assigned to the site or any part thereof.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data that are specifically prepared by or for CONTRACTOR to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by CONTRACTOR to illustrate material or equipment for some portion of the Work.

Specifications - Those portions of the Contract Documents consisting of drawings and written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor - An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion - The Work (or a specified part thereof) has progressed to the point where, in the opinion of PROJECT MANAGER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contact Documents, so that the Work (or specified part thereof) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when final payment is due in accordance with paragraph 14.13, and, in any event, shall include the issuance of all necessary certificates of occupancy and other governmental permits and approvals necessary for the utilization and, where appropriate, occupancy of the Work. The terms "substantially complete" and "substantially completed" as applied to any Work refer to Substantial Completion thereof.

Supplementary Conditions - The portion of the Contract Documents that amends or supplements these General Conditions.

Supplier - A manufacturer, fabricator, supplier, distributor, material man or vendor.

Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities that have been installed underground to furnish any of the following services or materials: electricity, gas, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work - Work to be paid for on the basis of unit prices.

Work - The entire completed construction, or the various separately identifiable parts thereof, required to be performed under the Contact Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

Work Directive Change - A written directive to CONTRACTOR, issued on or after the Effective Date and signed by PROJECT MANAGER and recommended by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed. A Work Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time.

Written Amendment - A written amendment to the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date and normally dealing with the non-engineering or nontechnical, rather than strictly Work – related, aspects of the Contract Documents.

ARTICLE 2 PRELIMINARY MATTERS

Delivery Bonds:

2.1 When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR also shall deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2 OWNER shall furnish to CONTRACTOR up to six copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Time: Notice to Proceed:

2.3 The Contract Time will commence on the date indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty days after the Effective Date.

Starting the Project:

2.4 CONTRACTOR shall start to perform the Work on the date when the Contract Time commences, but no Work shall be done at the site prior to the date on which the Contract Time commences.

Before Starting Construction:

2.5 Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to PROJECT MANAGER any conflict, error or discrepancy that CONTRACTOR may discover and shall obtain a written interpretation or clarification from PROJECT MANAGER before proceeding with any Work affected thereby; provided, that CONTRACTOR shall not be liable to OWNER for failure to report any conflict, error or discrepancy in the Contract Documents, unless CONTRACTOR had actual knowledge, or should reasonably have known, thereof.

2.6 Within ten (10) days after the Effective Date (unless otherwise specified in the General Requirements), and before beginning the work, CONTRACTOR shall submit to PROJECT MANAGER for review:

2.6.1 An estimated progress schedule indicating the starting and completion dates of the various stages of the Work;

2.6.2 A preliminary schedule of Shop Drawing submissions.

2.6.3 A project specific health and safety plan.

2.7 Before any Work at the site is started, CONTRACTOR shall deliver to PROJECT MANAGER certificates (and other evidence of insurance requested by OWNER) that CONTRACTOR is required to purchase and maintain in accordance with paragraphs 5.3 and 5.4.

Preconstruction Conference:

2.8 Within twenty days after the Effective Date, but before CONTRACTOR starts the Work; a conference among PROJECT MANAGER, CONTRACTOR, ENGINEER and others, as appropriate, will be held to discuss the schedules referred to in paragraph 2.6, to discuss procedures for handling Shop Drawings and other submissions and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work.

Finalizing Schedules:

2.9 At least ten (10) days before submission of the first Application for Payment, CONTRACTOR, PROJECT MANAGER and others, as appropriate, will finalize the schedules submitted in accordance with paragraph 2.6. The finalized progress schedule will be acceptable to PROJECT MANAGER if it provides for an orderly progression of the Work to Completion within the Contract Time, but such acceptance will not impose on PROJECT MANAGER responsibility therefor. The finalized schedule of Shop Drawing submissions will be acceptable to PROJECT MANAGER if it provides a workable arrangement for processing such submissions.

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDMENT, REUSE

Intent:

3.1 The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2 It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents, as being required to produce the intended result will be supplied whether or not specifically called for. When words that have a well-known technical or trade meaning are used to describe Work, materials or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference is specific or implied, shall mean the latest standard specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date if there were no Bids), except as may specifically be stated otherwise. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their consultants, agents or employees, from those set forth in the Contract Documents

3.3 If, during the performance of the Work, CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, CONTRACTOR shall report it to PROJECT MANAGER in writing at once and before proceeding with the Work affected thereby, and shall obtain a written interpretation or clarification from PROJECT MANAGER; provided, that CONTRACTOR shall not be liable to OWNER for failure to report any conflict, error or discrepancy in the Contract Documents unless CONTRACTOR had actual knowledge, or reasonably should have known, thereof.

Amending and Supplementing Contract Documents:

3.4 The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.4.1 a Written Amendment,

3.4.2 a Change Order

3.4.3 a Work Directive Change

Contract Price and Contract Time may only be changed by a Change Order or a Written Amendment.

3.5 In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.5.1 a Field Order

3.5.2 ENGINEER's review of shop drawings or samples, or

3.5.3 ENGINEER's written interpretation or clarification.

Reuse of Documents:

3.6 Neither CONTRACTOR, nor any Subcontractor or Supplier or other person or organization performing any of the Work under a direct or indirect contract with OWNER shall have or acquire any title to or OWNERship rights in any of the Drawings, Specifications or other documents and they shall not reuse any of them on extensions of the Project or any other project without written consent of OWNER and ENGINEER.

ARTICLE 4 ACCESS: PHYSICAL CONDITIONS: REFERENCE POINTS

Availability of Lands:

4.1 OWNER shall furnish CONTRACTOR with access, as indicated in the Contract Documents, to the land upon which the Work is to be performed. Any necessary easements for permanent structures or permanent changes in existing facilities

will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

Physical Conditions:

4.2 Reports, Review and Adjustments:

4.2.1 Explorations and Reports: Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions utilized in preparation of the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such reports, but not upon nontechnical data, interpretations or opinions contained therein or on the completeness thereof for CONTRACTOR's purposes. CONTRACTOR shall have full responsibility for subsurface conditions at the site.

4.2.2 Existing Structures: Reference is made to the Supplementary Conditions for identification of those drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities referred to in paragraph 4.3) which are at or contiguous to the site that have been utilized in preparing the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such drawings, but not on the completeness thereof for CONTRACTOR's purposes. CONTRACTOR shall have full responsibility for physical conditions in or relating to such structures.

4.2.3 Report of Differing Conditions: If CONTRACTOR believes that:

4.2.3.1 any technical data on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is inaccurate in any material respect, or

4.2.3.2 any physical condition uncovered or revealed at the site differs materially from that indicated, reflected or referred to in the Contract Documents and that could not reasonably have been anticipated by CONTRACTOR, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.22), notify OWNER in writing within five (5) days about the inaccuracy or difference.

4.2.4 PROJECT MANAGER's Review: Upon receipt of such notice from CONTRACTOR, PROJECT MANAGER will promptly review with ENGINEER the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise CONTRACTOR in writing of any findings and conclusions.

4.2.5 Possible Document Change: If PROJECT MANAGER concludes that, because of any such material inaccuracy or because of any such newly discovered conditions that differ materially from that indicated, reflected or referred to in the Contract Documents and that could not reasonably have been anticipated by CONTRACTOR, a change in the Contract Documents is required, a Work Directive Change or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such inaccuracy or differing conditions.

4.2.6 Possible Price and Time Adjustments: In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that these are attributable to any such material inaccuracy or difference.

Physical Conditions - Underground Facilities:

4.3 Underground Facilities:

4.3.1 Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site are based on information and data furnished to OWNER or ENGINEER by the OWNER of such Underground Facilities or by others. Unless it is expressly provided otherwise in the Supplementary Conditions:

4.3.1.1 OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and,

4.3.1.2 CONTRACTOR shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the

OWNERs of such Underground Facilities during construction, for the safety and protection thereof as provided in paragraph 6.20 and for the repair of any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price.

4.3.2 Not Shown or Indicated: If any Underground Facility is uncovered or revealed at or contiguous to the site that was not shown or indicated in the Contract Documents and that CONTRACTOR could not reasonably have suspected, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby identify the OWNER of such Underground Facility and give written notice thereof to that OWNER and to PROJECT MANAGER. PROJECT MANAGER will promptly review such Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences for the Work of such Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that CONTRACTOR could not reasonably have suspected.

Reference Points:

4.4 OWNER shall provide engineering surveys to establish reference points for construction that, in ENGINEER's judgment, are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and reserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to OWNER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

ARTICLE 5 BONDS AND INSURANCE

Performance and Other Bonds:

5.1 CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect until at least one year after the date when final payment becomes due, except as otherwise provided by any Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the forms prescribed by any Laws or Regulations or by the Contract Documents and be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of its authority to act.

5.2 If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent, or its right to do business is terminated in any state where any part of the Project is located, or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall, within five days thereafter, substitute another Bond and Surety, both of which must be acceptable to OWNER.

CONTRACTOR's Liability Insurance:

5.3 CONTRACTOR shall purchase and maintain such comprehensive general liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below that may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, by any subcontractor, by anyone directly or indirectly employed to perform any of the Work, or by anyone for whose acts any of them may be liable:

5.3.1 Claims under workers' or workmen's compensation, disability benefits and other similar employee benefit acts;

5.3.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR' employees;

5.3.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

5.3.4 Claims for damages insured by personal injury liability coverage that are sustained (a) by any person as a result of an occurrence directly or indirectly related to the employment of such person by CONTRACTOR, or (b) by any other person for any other reason;

5.3.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom;

5.3.6 Claims arising out of operation of Laws or Regulations for damages because of bodily injury or death of any person or for damage to property; and

5.3.7 Claims for damages because of bodily injury or death of any person or property damage arising out of the OWNERship, maintenance or use of any motor vehicle. The insurance required by this paragraph 5.3 shall include the coverage specified herein and shall be written for not less than the limits of liability and coverage provided in paragraph 5.3.8, or required by law, whichever is greater. The comprehensive general liability insurance shall include completed operations insurance. All of the policies of insurance so required to be purchased and maintained (or the certificates or other evidence thereof) shall contain a provision or endorsement that the coverage afforded thereunder will not lapse or be canceled, materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and ENGINEER by certified mail. All such insurance shall remain in effect until final payment and at all times thereafter when CONTRACTOR is correcting, removing or replacing defective WORK in accordance with paragraph 13.12. In addition, CONTRACTOR shall maintain such completed operations insurance for at least two years after final payment and furnish OWNER with evidence of continuation of such insurance at final payment and one year thereafter.

5.3.8 While performing the Work under this Agreement and until the CONTRACTOR has performed all Work to the satisfaction of the OWNER, the CONTRACTOR shall provide and maintain, with forms and insurers acceptable to the OWNER, the following insurance coverages:

a. Workers' Compensation Insurance to cover all obligations imposed by federal and state statutes and regulations having jurisdiction over any employees of the Consultant that are engaged in the performance of the Services and Employer's Liability Insurance with a policy coverage amount no less than minimum Statutory requirements for Workers' Compensation and no less than $1,000,000 for Employer's Liability Insurance;

b. Broad Form Commercial General Liability Insurance. The policy shall include coverage for bodily injury liability, including death, property damage liability, personal injury liability (including coverage for contractual and employee acts), and blanket contractual liability with a policy coverage amount no less than $2,000,000 combined single limits for each occurrence or in the aggregate. Said policy shall contain a severability of interest provision, but shall not be subject to any type of pollution or owned property exclusions; and

c. Comprehensive Automobile Liability Insurance with a policy coverage amount no less than $2,000,000, combined single limits for each occurrence or in the aggregate.

Before commencement of any of the Work hereunder, the CONTRACTOR agrees to furnish to the OWNER, on an annual renewal basis, certificates of insurance or other evidence satisfactory to the OWNER to the effect that such insurance has been procured and is in force. The certificates shall accurately reflect the required insurance coverages, including, any and all limitations, exclusions and restrictions, and (i) name the OWNER and all of its subsidiaries and affiliates as additional insureds (except for coverage b. above), (ii) waive any rights of subrogation that the insurer could or may have against the OWNER and all of its parent corporations, subsidiaries, and affiliates, and (iii) provide, in the event of cancellation or material change in a policy affecting the certificate holder, thirty (30) days prior written notice shall be given to the OWNER.

Contractual Liability Insurance:

5.4 The comprehensive general liability insurance required by paragraph 5.3 will include contractual liability insurance applicable to CONTRACTOR's obligations under paragraphs 6.30 and 6.31. Notwithstanding any of the provisions of the Contracxt documents with respect to insurance, the liability of the CONTRACTOR shall not be limited to the insurance coverage stipulated in this paragraph or in paragraph 5.3.

OWNER's Liability Insurance:

5.5 OWNER shall be responsible for purchasing and maintaining OWNER's own liability insurance and, at OWNER's option, may purchase and maintain such insurance as will protect OWNER against claims that may arise from operations under the Contract Documents.

Waiver of Rights:

5.6 All Risk Insurance:

5.6.1 OWNER and CONTRACTOR waive all rights against each other for all losses and damages caused by any of the perils covered by the policies of insurance required hereunder, and any other property insurance applicable to the Work, and also waive all such rights against the Subcontractors, ENGINEER, ENGINEEER's consultants and all other parties named as insureds in such policies for losses and damages so caused. As required by paragraph 6.11, each subcontract between CONTRACTOR and a Subcontractor will contain similar waivers by the Subcontractor in favor of OWNER, CONTRACTOR, ENGINEER, ENGINEEER's consultants and all other parties named as insureds.

5.6.2 OWNER and CONTRACTOR intend that any such policies shall protect all of the parties insured and provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that, in the event of payment of any loss or damage, the insurer will have no rights of recovery against any of the parties named as insureds. If the insurers require separate waiver forms to be signed by ENGINEER or ENGINEER's consultant, OWNER will obtain the same, and if such waiver forms are required of any Subcontractor, CONTRACTOR will obtain the same.

Receipt and Application of Proceeds:

5.7 Any insured loss under the policies of insurance required hereunder will be adjusted with OWNER and made payable to OWNER, subject to the requirements of any applicable mortgage clause and of paragraph 5.8. OWNER shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

5.8 OWNER shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing, within fifteen days after the occurrence of loss, to OWNER's exercise of this power. If any such objection is made, OWNER shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach.

Acceptance of Insurance:

5.9 If OWNER has any objection to the coverage afforded by, or other provisions of, the insurance required to be purchased and maintained by CONTRACTOR in accordance with paragraphs 5.3 and 5.4 because it does not comply with the requirements of the Contract Documents, OWNER shall notify CONTRACTOR thereof in writing within twenty days after delivery of such certificates to OWNER in accordance with paragraph 2.7. Failure by OWNER to give any such notice of objection within such time shall constitute acceptance of such insurance as complying with the Contract Documents.

Partial Utilization - Property Insurance:

5.10 If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all of the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use

or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected the changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or lapse on account of any such partial use or occupancy.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1 CONTRACTOR shall supervise and direct the Work competently, diligently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. CONTRACTOR shall be responsible for ensuring that the finished Work complies fully with the Contact Documents.

6.2 CONTRACTOR shall keep on the Work, at all times until completion thereof, a competent resident superintendent, who shall not be replaced without prior written notice to OWNER, except under extraordinary circumstances. Such superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3 CONTRACTOR shall provide competent, suitable qualified personnel to survey and lay out the Work and to perform construction as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site.

6.4 Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the performance, testing, start-up and completion of the Work. CONTRACTOR shall provide adequate sanitary facilities for the use of those employed on the Work, and the use thereof shall be strictly enforced. Such facilities shall be made available when the first employees arrive on the site and shall be removed after the departure of the last employees from the job.

6.5 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by OWNER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of all materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents.

Adjusting Progress Schedule:

6.6 CONTRACTOR shall submit to PROJECT MANAGER for acceptance (to the extent indicated in paragraph 2.9) adjustments in the progress schedule to reflect the impact thereon of any new developments; these adjustments will conform federally to the progress schedule then in effect and, in addition, will comply with any provisions of the General Requirements applicable thereto.

Substitutes or "Or-Equal" Items:

6.7 Substituted Items:

6.7.1 Whenever material or equipment are specified or described in the Contract Documents using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by ENGINEER if sufficient information is submitted to PROJECT MANAGER by

CONTRACTOR to allow ENGINEER to determine that the material or equipment proposed is at least equal to that named. The procedure for review by ENGINEER will include the following provisions as supplemented in the General Requirements. Requests for review of substitute items of material and equipment will not be accepted by PROJECT MANAGER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall make written application to PROJECT MANAGER for acceptance thereof, certifying that the proposed substitute will perform fully the functions and achieve the results called for by the general design, be of at least equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all cost that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other Contractors affected by the resulting change, all of which shall be considered by ENGINEER in evaluating the proposed substitute. PROJECT MANAGER may require CONTRACTOR to furnish, at CONTRACTOR's expense, additional data about the proposed substitute.

6.7.2 If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to ENGINEER. CONTRACTOR must first submit sufficient information to PROJECT MANAGER to allow ENGINEER to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in paragraph 6.7.1 as applied by ENGINEER and as may be supplemented in the General Requirements.

6.7.3 ENGINEER will be allowed a reasonable time within which to evaluate each proposed substitute. ENGINEER will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance, which will be evidenced by either a Change Order or a reviewed Shop Drawing. OWNER may require CONTRACTOR to furnish, at CONTRACTOR's expense, a special performance guarantee or other surety with respect to any substitute. ENGINEER will record time required in evaluating substitutions proposed by CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not ENGINEER accepts any proposed substitute, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER for evaluating each proposed substitute.

Concerning Subcontractors, Suppliers and Others:

6.8 Subcontractors and Suppliers:

6.8.1 CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization against whom OWNER or ENGINEER may have any reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to perform any of the Work against whom CONTRACTOR has any reasonable objection.

6.8.2 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials and equipment) to be submitted to OWNER in advance of a specified date prior to the Effective Date for acceptance by OWNER and ENGINEER and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in cost, if any, occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

6.9 CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or ENGINEER to pay, or to ensure the payment of, any moneys due any such Subcontractor, Supplier or other person or organization, except as may otherwise be required by Laws and Regulations.

6.10 The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

6.11 All Work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor that specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and contains waiver provisions as required by paragraph 5.8. CONTRACTOR shall pay each Subcontractor a just share of any insurance moneys received by CONTRACTOR on account of losses under policies issued pursuant to paragraphs 5.4 and 5.5.

Patent Fees and Royalties:

6.12 CONTRACTOR shall pay all license fees and royalties, and shall assume all costs, incident to the use in the performance of the Work, or the incorporation in the Work, of any invention, design, process, product or device that is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of OWNER, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. CONTRACTOR shall indemnify and hold harmless OWNER and anyone directly or indirectly employed by either of them, from and against all claims, demands, damages, losses, liabilities, suits, actions, causes of action, costs and expenses (including, without limitation, attorneys' fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work, or resulting from the incorporation in the Work, of any invention, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

Permits:

6.13 Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses in connection with the Work. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work that are applicable at the time of opening Bids or, if there are no Bids, on the Effective Date. CONTRACTOR shall pay all charges of utility OWNERs for connections to the Work, and OWNER shall pay all charges of such utility OWNERs for capital costs related thereto.

Laws and Regulations:

6.14 Compliance:

6.14.1 CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

6.14.2 If CONTRACTOR observes that the Specifications or Drawings are at variance with any Laws or Regulations, CONTRACTOR shall give PROJECT MANAGER prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 3.4. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, and without such notice to PROJECT MANAGER, CONTRACTOR shall bear all

costs arising therefrom; provided that it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations.

6.14.3 CONTRACTOR shall keep itself fully informed of all Laws and Regulations in any manner affecting those engaged or employed in the Work, or the materials used in the Work, or in any way affecting the conduct of the Work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in the Contract, or in the drawings or specifications therein referred to, in relation to any such law, ordinance, regulation, order, or decree, CONTRACTOR shall forthwith report the same in writing to OWNER and ENGINEER. CONTRACTOR shall at all times observe and comply with all such existing and future Laws and Regulations and shall protect and indemnify OWNER and its agents against any claim, demand, loss, liability, cost or expense, including, without limitation, attorneys' fees, arising from or based on the violation of any such Law or Regulation.

Taxes:

6.15 CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with Laws and Regulations of the place of the Project that are applicable during the performance of the Work.

Uses of Premises:

6.16 CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-ways, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the OWNER or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work. If any claim is made against OWNER by any such OWNER or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER and anyone directly or indirectly employed by the OWNER harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action or suit, legal or equitable, brought by any such other party against OWNER and anyone directly or indirectly employed by the OWNER to the extent based on a claim arising out of CONTRACTOR's performance of the Work.

6.17 During the progress of the Work, CONTRACTOR shall keep the premises free from waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

6.18 CONTRACTOR shall not load any structure, or permit any part of any structure to be loaded, in any manner that will endanger such structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

Record Documents:

6.19 CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents, together with all approved samples and a counterpart of all reviewed Shop Drawings, will be available to PROJECT MANAGER for reference. Upon completion of the Work, these record documents, samples and Shop Drawings will be delivered to PROJECT MANAGER.

Safety and Protection:

6.20 CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall develop a health and safety plan and shall submit such plan to PROJECT MANAGER. Such plan must, at a minimum, meet requirements as described in the OWNER's Safety Manual, a copy of which is available from the PROJECT MANAGER upon request, and must be acceptable to PROJECT MANAGER and must satisfy all laws and regulations that govern the Work. CONTRACTOR must sign a "Contractor's Safety Statement", which is available form the PROJECT MANAGER, before beginning any Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.20.1 all employees on the Work and other persons and organizations who may be affected thereby:

6.20.2 all of the Work, and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.20.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavement, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

CONTRACTOR shall comply with all Laws and Regulations for the safety of persons or property or to protect them from damage, injury or loss, and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify OWNERs of adjacent property and of Underground Facilities and utility OWNERs when prosecution of the Work might affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, any Supplier or any other person or organization directly or indirectly employed by any of the them to anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR. CONTRACTOR's duties and responsibilities for the safety and protection of the Work shall be complete when ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.21 CONTRACTOR shall designate a responsible representative at the site whose duty shall be the prevention of accidents. This person shall be CONTRACTOR's superintendent unless otherwise designated in writing by CONTRACTOR to OWNER.

Emergencies:

6.22 In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization PROJECT MANAGER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give PROJECT MANAGER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If PROJECT MANAGER determines that any such changes or variations are required because of such emergency, a Directive Change or Change Order will be issued to document them.

Shop Drawings and Samples:

6.23 After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, CONTRACTOR shall submit to PROJECT MANAGER for review in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 2.9), or for other appropriate action if so indicated in the Supplementary Conditions, three copies plus the number of copies required by CONTRACTOR (unless otherwise specified in the General Requirements) of all Shop Drawings, which will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of such submission. All submissions will be identified as PROJECT MANAGER may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable ENGINEER to review such information as required.

6.24 CONTRACTOR shall also submit to PROJECT MANAGER for review, as promptly as necessary to prevent delay in the Work, all samples required by the Contract Documents. All samples will have been checked by CONTRACTOR and

accompanied by a specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of such submission and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.

6.25 Submissions:

6.25.1 Before submission of each Shop Drawing or sample CONTRACTOR shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and shall have reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.

6.25.2 At the time of each such submission, CONTRACTOR shall give PROJECT MANAGER specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to PROJECT MANAGER for review of each such variation.

6.26 ENGINEER will review with reasonable promptness Shop Drawings and samples, but ENGINEER's review will be limited to a determination of whether such submissions conform with the design concept of the Project and with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto;. The review of a separate item, as such, will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submissions.

6.27 ENGINEER's review of Shop Drawings or samples shall not relieve CONTRACTOR of its responsibility for any variation from the requirements of the Contract Document unless CONTRACTOR, in writing, has called ENGINEER's attention to each such variation at the time of submission as required by paragraph 6.25.2, and ENGINEER has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval. Nor will any review by ENGINEER relieve CONTRACTOR of its responsibility for compliance with the provisions of paragraph 6.25.1.

6.28 Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to ENGINEER's review of the pertinent submission will be the sole responsibility, and shall be at the sole cost and expense, of CONTRACTOR.

Continuing the Work:

6.29 CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as CONTRACTOR and OWNER may otherwise agree in writing.

Indemnification:

6.30 To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER and its respective consultants, agents, officers, directors and employees from and against any and all claims, demands, damages, losses, liabilities, suits, actions, causes of action, costs and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising out of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or the injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom and (b) is caused, in whole or in part, by any act or omission of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises under or is imposed by Laws and Regulations, regardless of the negligence of any such party. Notwithstanding any provisions hereof to the

contrary, CONTRACTOR shall indemnify and hold OWNER harmless from and against all claims, demands, damages, losses, liabilities, suits, actions, causes of action, costs and expenses, direct, indirect or consequential, resulting from injury, sickness or death sustained by CONTRACTOR, CONTRACTOR's employees, Subcontractor, or any person or organization directly or indirectly employed by any of them, while performing the Work.

6.31 In any and all claims against OWNER or any of its consultants, agents, officers, directors, or employees by any employee of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.30 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6.32 The obligations of CONTRACTOR under paragraph 6.30 shall not extend to the liability of ENGINEER, ENGINEER's consultants, agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications.

ARTICLE 7 OTHER WORK

Related Work at Site:

7.1 OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other direct contracts therefor with utility OWNERs or other contractors that contain General Conditions similar or dissimilar to these.

7.2 CONTRACTOR shall afford each such utility OWNER and other contractor (or OWNER, if OWNER is performing the additional work with OWNER's employees) reasonable access to the site and a reasonable opportunity for the introduction and storage of materials and equipment thereon and the execution of such work, and shall properly connect and coordinate the Work with theirs. CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of PROJECT MANAGER and the others whose work will be affected.

7.3 If any part of the Work depends for proper execution or results upon the work of any such other contractor or utility OWNER (or OWNER), CONTRACTOR shall inspect and promptly report to ENGINEER in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution or results. CONTRACTOR's failure so to report will constitute an acceptance of the other work as fit and proper for integration with the Work, except for latent or other defects and deficiencies that are not apparent in the other work.

Coordination:

7.4 If OWNER contracts with others for the performance of other work on the Project, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified in the Supplementary Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, therein. Except as otherwise provided in the Supplementary Conditions, PROJECT MANAGER shall not have any authority or responsibility for such coordination.

ARTICLE 8 OWNER'S RESPONSIBILITIES

8.1 OWNER shall issue all communications to CONTRACTOR through PROJECT MANAGER.

8.2 OWNER shall promptly furnish the data required of OWNER under the Contract Documents and shall make payments to CONTRACTOR when due as provided in paragraphs 14.4 and 14.13.

ARTICLE 9 PROJECT MANAGER'S AND ENGINEER'S STATUS DURING CONSTRUCTION

OWNER's Representative:

9.1 PROJECT MANAGER will be OWNER's representative during the construction period.

Visits to Site:

9.2 PROJECT MANAGER will make or direct ENGINEER to make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. PROJECT MANAGER or ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work, except as directed by OWNER. PROJECT MANAGER's and ENGINEEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform to the Contract Documents. On the basis of such visits and on-site observations, ENGINEER and PROJECT MANAGER will keep OWNER informed of the progress of the WORK and will endeavor to guard OWNER against defects and deficiencies in the WORK.

Clarifications and Interpretations:

9.3 ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as PROJECT MANAGER determines is necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

Authorization of Variations in Work:

9.4 PROJECT MANAGER may authorize minor variations in the Work from the requirements of the Contract Documents that do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and CONTRACTOR, who shall perform the corresponding Work promptly.

Rejecting Defective Work:

9.5 PROJECT MANAGER will have the authority to disapprove or reject Work that ENGINEER believes to be defective, and will also have the authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Determinations for Unit Prices:

9.6 PROJECT MANAGER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. PROJECT MANAGER will review with CONTRACTOR the PROJECT MANAGER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). PROJECT MANAGER's written decisions thereon will be final and binding upon OWNER and CONTRACTOR unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other party, and to PROJECT MANAGER, written notice of intention to appeal such decision.

Decisions on Disputes:

9.7 PROJECT MANAGER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Time, will be referred initially to PROJECT MANAGER in writing with a request for a formal decision in accordance with this paragraph, which PROJECT MANAGER will render in writing within a reasonable time.

Limitations on PROJECT MANAGER's and ENGINEEER's Responsibilities:

9.8 Neither PROJECT MANAGER nor ENGINEER shall supervise or direct the performance of the Work- contrary to the provisions of paragraphs 9.9 or 9.10.

9.9 Neither PROJECT MANAGER nor ENGINEER will be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

9.10 Neither PROJECT MANAGER nor ENGINEER will be responsible for the acts or omissions of CONTRACTOR, or of any Subcontractor, any Supplier, or of any other person or organization performing any of the Work.

ARTICLE 10 CHANGES IN THE WORK

10.1 Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work; which will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work (as affected thereby), which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided therein).

10.2 If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price or an extension or shortening of the Contract Time that should be allowed as a result of a Work Directive Change, a claim may be made therefor as provided in Article 11 or Article 12.

10.3 CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents, as amended, modified and supplemented as provided in paragraph 6.22.

10.4 OWNER and CONTRACTOR shall execute appropriate Change Orders (or Written Amendments) covering:

10.4.1 changes in the Work that are ordered by OWNER pursuant to paragraph 10.1, are required because of acceptance of defective Work under paragraph 13.14, or are agreed to by the parties;

10.4.2 changes in the Contract Price or Contract Time that are agreed to by the parties and

10.4.3 changes in the Contract Price or Contract time that embody the substance of any written decision rendered by PROJECT MANAGER pursuant to paragraph 9.7.

10.5 If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, the Contract Price or the Contract Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 CHANGE OF CONTRACT PRICE

11.1 The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR in connection with the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at its expense, without any change in the Contract Price.

11.2 The Contract Price may only be changed by a Change Order or by a Written Amendment. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the claimant to the other party and to PROJECT MANAGER promptly (but in no event later than five [5] days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Written supporting data will be submitted by the claimant to PROJECT MANAGER and the other party within ten (10) days after such occurrence (unless PROJECT MANAGER allows an additional period of time to obtain more accurate data as to such claim) and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of such event. All claims for adjustment in the Contract Price shall be determined by PROJECT MANAGER, if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph.

11.3 The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved.

11.3.2 By mutual acceptance of a lump sum.

11.4 Unit Price Work:

11.4.1 Where the Contract Documents provide that all or part of the WORK is to be Unit Price Work, the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item as indicated in the Proposal. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by PROJECT MANAGER.

11.4.2 Each such unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

ARTICLE 12 CHANGE OF CONTRACT TIME

12.1 The Contract Time may be changed only by a Change Order or a Written Amendment. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the claim to the other party and to PROJECT MANAGER promptly (but in no event later than five [5] days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim, with supporting data, shall be delivered within ten (10) days after such occurrence (unless PROJECT MANAGER allows an additional period of time to obtain more accurate data as to such claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of such event. All claims for adjustment in the Contract Time shall be determined by PROJECT MANAGER if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the CONTRACT Time will be valid if not submitted in accordance with the requirements of this paragraph.

12.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR (or a subcontractor or supplier) if a claim is made therefor as provided in paragraph 12.1. Such delays shall include, but not be limited to, acts of neglect by OWNER or others performing additional work as contemplated by Article 7, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.

12.3 All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 12 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) for delay by either party.

ARTICLE 13 WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

Warranty and Guarantee:

13.1 CONTRACTOR warrants and guarantees to OWNER that all Work will be in accordance with the Contract Documents and will not be defective. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2 PROJECT MANAGER's representatives, other representatives of OWNER, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for observation, inspection and testing. CONTRACTOR shall provide proper and safe conditions for such access.

Tests and Inspections:

13.3 CONTRACTOR shall give PROJECT MANAGER timely notice when the Work is ready for all required inspections, tests and approvals.

13.4 If Laws or Regulations require any Work (or part thereof) to be inspected, tested or approved, CONTRACTOR shall assume full responsibility therefor, pay all costs in connection therewith and furnish PROJECT MANAGER with the required certificates of inspection, testing or approval. CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with OWNER's or PROJECT MANAGER's acceptance of materials or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. The costs of all inspections, tests and approvals in addition to the above which are required by the Contract Documents shall be paid by OWNER (unless otherwise specified).

13.5 No inspections, tests or approvals by others shall relieve CONTRACTOR of its obligations to perform the Work in accordance with the Contract Documents.

Uncovering Work:

13.6 If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of PROJECT MANAGER, it must, if requested by PROJECT MANAGER, be uncovered for observation. Such uncovering shall be at CONTRACTOR's expense.

13.7 If any Work is covered contrary to the written request of PROJECT MANAGER, it must, if requested by PROJECT MANAGER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

OWNER May Stop the Work:

13.8 If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents. OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; provided that such right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise such right for the benefit of CONTRACTOR or any other party.

Correction or Removal of Defective Work:

13.9 If required by PROJECT MANAGER, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with non-defective Work. CONTRACTOR shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

One-Year Correction Period:

13.10 If, within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provisions of the Contract Documents, any Work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions, either correct such defective Work or, if it has been rejected by OWNER, remove it from the site and replace it with non-defective Work. If CONTRACTOR does not promptly comply with the terms of such instruction, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such correction, removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by CONTRACTOR. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all Work, the correction period for the item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

Acceptance of Defective Work:

13.11 If, instead of requiring correction or removal and replacement of defective Work, OWNER prefers to accept it, OWNER may do so. CONTRACTOR shall bear all direct, indirect and consequential costs attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by PROJECT MANAGER as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals). If any such acceptance occurs prior to PROJECT MANAGER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.12 If CONTRACTOR fails within a reasonable time after written notice from PROJECT MANAGER to correct defective Work or to remove and replace rejected Work as required by PROJECT MANAGER in accordance with paragraph 13.11, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days' written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees such access to the site as may be necessary to enable OWNER to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of OWNER in exercising such rights and remedies under this paragraph will be charged against CONTRACTOR in an amount approved as to reasonableness by PROJECT MANAGER, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's defective Work. CONTRACTOR shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

Protection of the Work:

13.13 CONTRACTOR shall take all necessary precautions to ensure the safety of, and shall provide such protection as is necessary to prevent damage, injury or loss to, (a) the WORK and all equipment and materials to be incorporated therein, including any materials and equipment stored on or off site, and (b) the property at the site or adjacent thereto, including trees, bushes, shrubs, lawns, walkways, roadways, paved areas, and structures not designated for relocation, replacement or removal in the course of construction.

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1 The schedule of values established as part of the Agreement will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to PROJECT MANAGER. Progress payments on account of Unit Price Work will be based on the number of units completed, as measured by the PROJECT MANAGER.

Application for Progress Payment:

14.2 At least sixty (60) days before each progress payment is scheduled (but not more often than once a month and no later than the 25 day of any month), CONTRACTOR shall submit to PROJECT MANAGER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is required on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER.

14.3 OWNER shall pay CONTRACTOR an amount equal to ninety percent (90%) of the proportional amount of the Work that, to OWNER’s knowledge, information and belief has been completed in accordance with the Contract Documents, the remaining ten percent (10%) of such proportional amount constituting retainage. CONTRACTOR shall promptly pay each subcontractor, and shall require each subcontractor to make payments to its subcontractors in a similar manner. Upon Substantial Completion of the Work, all amounts retained shall be paid to CONTRACTOR, except for an amount equal to 150% of the cost estimated by ENGINEER to fully complete the Work.

14.4 With each Application for Payment, CONTRACTOR shall submit a certification by an officer of CONTRACTOR stating that:

There are no known mechanic's, materialmen's or laborer's liens or claims or any other liens or claims, legal or equitable, contractual, statutory or constitutional, outstanding or known to exist at the date of this Application; all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current Application and there is no known basis for the filing of any mechanic's, materialmen's or laborer's lien or claim or any other lien or claim, legal or equitable, contractual, statutory or constitutional, with respect to the Work; and waivers and releases from all Subcontractors, laborers and materialmen for Work done and materials furnished have been obtained in such form as to constitute an effective waiver and release of all such liens and claims under the laws of the state in which the Project is located and shall be delivered to ENGINEER together with CONTRACTOR's waiver and release of liens and claims at the time of submission of the Application for Payment. In conjunction with each Application for Payment, CONTRACTOR also shall submit such Lien waivers and related documents as OWNER’s, or its lender’s, title insurer may require.

CONTRACTOR's Warranty of Title:

14.5 CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by an Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

Review of Application for Progress Payment:

14.6 PROJECT MANAGER will either indicate in writing a recommendation of payment and present the Application to OWNER, or return the Application to CONTRACTOR indicating in writing PROJECT MANAGER’s reasons for refusing to recommend payment. In the latter case, CONTRACTOR shall make the necessary corrections and resubmit the Application. Sixty (60) days after presentation of the Application for Payment with PROJECT MANAGER’s recommendation of payment, the amount recommended will become due and payable by OWNER to CONTRACTOR.

14.7 PROJECT MANAGER's recommendation of any payment requested in an Application for Payment will constitute a representation by PROJECT MANAGER to OWNER, based on PROJECT MANAGER's onsite observations of the Work in progress and on PROJECT MANAGER's review of such Application for Payment and the accompanying, documents, data and schedules that the Work has progressed to the point indicated; that, to the best of PROJECT MANAGER's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.6, and to any other qualifications stated in PROJECT MANAGER's recommendation); and that CONTRACTOR is entitled to payment of the amount recommended. However, by recommending any such payment, PROJECT MANAGER will not thereby be deemed to have represented that exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to PROJECT MANAGER in the Contract Documents or that there may not be other matters or issues between the parties that might entitle (a) CONTRACTOR to additional payment by OWNER or (b) OWNER to withhold payment to CONTRACTOR.

14.8 PROJECT MANAGER's recommendation of final payment will constitute an additional representation by PROJECT MANAGER to OWNER that the conditions precedent to final payment have been satisfied.

14.9 PROJECT MANAGER may refuse to recommend the whole or any part of any payment if, in PROJECT MANAGER's opinion, it would be incorrect to make such representations to OWNER. PROJECT MANAGER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary, in PROJECT MANAGER's opinion, to protect OWNER from loss because:

14.9.1 the Work is defective, or completed Work has been damaged requiring correction or replacement,

14.9.2 the Contract Price has been reduced by Written Amendment or Change Order.

14.9.3 OWNER has corrected defective Work or completed Work in accordance with paragraph 13.12, or

14.9.4 Of ENGINEEER's actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.9 inclusive.

OWNER may refuse to make payment of the full amount recommended by PROJECT MANAGER because claims have been made against OWNER on account of CONTRACTOR's performance of the Work or Liens have been filed in connection with the Work or there are other items entitling OWNER to a set-off against the amount recommended, but OWNER must give CONTRACTOR prompt written notice stating the reasons for such refusal.

Substantial Completion:

14.10 When CONTRACTOR considers the entire Work ready for its intended use, CONTRACTOR shall notify OWNER and PROJECT MANAGER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that PROJECT MANAGER issue a certificate of Substantial Completion. Within a reasonable time thereafter, PROJECT MANAGER, OWNER, CONTRACTOR and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, PROJECT MANAGER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work Substantially complete, ENGINEER will prepare and deliver to PROJECT MANAGER a tentative certificate of Substantial Completion, which shall specify the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. PROJECT MANAGER shall have fourteen (14) days after receipt of such tentative certificate during which to object to ENGINEER in writing as to any provisions of such certificate or attached list. If, after considering such objections, ENGINEER does not consider the Work substantially complete, PROJECT MANAGER will notify CONTRACTOR thereof in writing, stating the reasons therefor. If, after considering such objections, ENGINEER considers the Work substantially complete, ENGINEER will, within such fourteen day period, execute and deliver to PROJECT MANAGER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified, after consideration of any objections by PROJECT MANAGER. At the time of delivery of the tentative certificate of Substantial Completion, ENGINEER will deliver to PROJECT

MANAGER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties. Unless PROJECT MANAGER and CONTRACTOR agree otherwise in writing and so inform ENGINEER prior to the issuance of the definitive certificate of Substantial Completion, ENGINEER's recommendation as aforesaid will be binding on OWNER and CONTRACTOR until final payment.

14.11 OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.12 Use by OWNER of any finished part of the Work, which has specifically been identified in the Contract Documents, or which PROJECT MANAGER, ENGINEER and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work, subject to the following:

14.12.1 OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER and that OWNER may use such part of the Work. CONTRACTOR at any time may notify OWNER, PROJECT MANAGER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete. Within a reasonable time after either such request, PROJECT MANAGER, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify PROJECT MANAGER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraphs 14.10 and 14.11 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.12.2 OWNER may at any time request in writing that CONTRACTOR permit OWNER to take over operation of any such part of the Work although it is not substantially complete. A copy of such request will be sent to PROJECT MANAGER, and, within a reasonable time thereafter, PROJECT MANAGER, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If CONTRACTOR does not object in writing to PROJECT MANAGER and ENGINEER that such part of the Work is not ready for separate operation by OWNER, ENGINEER will finalize the list of items to be completed or corrected and will deliver such list to PROJECT MANAGER and CONTRACTOR, together with a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work which will become binding upon OWNER and CONTRACTOR at the time that OWNER takes over such operation (unless they shall have otherwise agreed in writing and so informed ENGINEER). During such operation and prior to Substantial Completion of such part of the Work, OWNER shall allow CONTRACTOR reasonable access to complete or correct items on such list and to complete other related Work.

14.12.3 No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.8 in respect of property insurance.

Final Inspection:

14.13 Upon written notice from CONTRACTOR that the entire Work, or an agreed portion thereof, is complete, PROJECT MANAGER and ENGINEER will make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which such inspection revealed that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

Final Application for Payment:

14.14 After CONTRACTOR has remedied all such deficiencies to the satisfaction of PROJECT MANAGER and ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents and other documents - all as required by the Contract Documents, and after PROJECT MANAGER has indicated that the Work is acceptable (subject to the provisions of paragraph 14.17), CONTRACTOR may apply for final payment following the same procedure as is used for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to OWNER and its title insurer) of all Liens arising out of or filed in connection with the Work (in accordance with paragraph 14.4). In lieu thereof, but subject to approval by OWNER and its title insurer, in their discretion, CONTRACTOR may furnish, receipts or releases in full; an affidavit of CONTRACTOR that the releases and receipts include all labor, services, materials and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible, have been paid or otherwise satisfied; and consent of the surety, if any Subcontractor or Supplier fails to furnish a release or receipt in full.

Final Payment and Acceptance:

14.15 If, on the basis of PROJECT MANAGER's and ENGINEER's observation of the Work during construction and final inspection, and PROJECT MANAGER's review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents, PROJECT MANAGER and ENGINEER are satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been satisfied, PROJECT MANAGER will, within ten (10) days after receipt of the final Application for Payment, indicate in writing PROJECT MANAGER's recommendation of payment and present such Application to OWNER for payment. Thereupon PROJECT MANAGER will give written notice to OWNER and CONTRACTOR that the Work is acceptable, subject to the provisions of paragraph 14.17. Otherwise, PROJECT MANAGER will return such Application to CONTRACTOR, indicating in writing the reasons for its refusal to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. Thirty (30) days after presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance, and with PROJECT MANAGER's recommendation of payment and notice of acceptability, the amount recommended by PROJECT MANAGER will become due and payable by OWNER to CONTRACTOR.

CONTRACTOR's Continuing Obligation:

14.16 CONTRACTOR's obligations to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by PROJECT MANAGER, nor the issuance of any certificate of Substantial Completion, whether tentative, definitive or otherwise, nor any payments by OWNER to CONTRACTOR under the Contract Documents, nor any use or occupancy of the Work by OWNER nor any failure to do so, nor any review of Shop Drawings or sample submissions, nor any correction of defective Work by OWNER will constitute an acceptance of Work not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents.

Waiver of Claims:

14.17 The making and acceptance of final payment will constitute:

14.17.1 a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from defective Work or from failure to comply with the Contract Documents or the terms of any warranties or special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights in respect of CONTRACTOR's continuing obligations under the Contract Documents; and

14.17.2 a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1 OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to CONTRACTOR, which notice will fix the date on which the Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed.

OWNER May Terminate:

15.2 Upon the occurrence of any one or more of the following events:

15.2.1 if CONTRACTOR commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if CONTRACTOR takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to bankruptcy or insolvency;

15.2.2 if a petition is filed against CONTRACTOR under any chapter of the Bankruptcy Code, as now or hereafter in effect, or if a petition is filed seeking any such equivalent or similar relief against CONTRACTOR under any other federal or state law in effect at such time relating to bankruptcy or insolvency;

15.2.3 if CONTRACTOR makes a general assignment for the benefit of creditors;

15.2.4 if a trustee, receiver, custodian or agent of CONTRACTOR is appointed under applicable law or under contract, whose appointment or authority to take charge of property of CONTRACTOR is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of CONTRACTOR's creditors;

15.2.5 If CONTRACTOR admits in writing its inability to pay its debts generally as they become due;

15.2.6 if CONTRACTOR fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9, as revised from time to time);

15.2.7 if CONTRACTOR fails to comply with Laws and Regulations of any public body having jurisdiction; or

15.2.8 if CONTRACTOR disregards the authority of, or fails to comply with the directions or orders of, PROJECT MANAGER; OWNER may, after giving CONTRACTOR (and the surety, if any) written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site (or which are stored elsewhere), and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and consequential costs of completing the Work (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) such excess will not be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER will be approved as to reasonableness by PROJECT MANAGER and incorporated in a Change Order, but when exercising any rights or remedies under this paragraph, OWNER shall not be required to obtain the lowest price for the Work performed.

15.3 Where CONTRACTOR's services have been so terminated by OWNER, such termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.4 Upon seven days' written notice to CONTRACTOR, OWNER may, without cause and without prejudice to any other right or remedy that it may have, elect to abandon the Work and terminate the Agreement. In such case, CONTRACTOR shall be paid for all Work executed and any expense sustained in connection therewith, plus reasonable termination expenses, as determined by PROJECT MANAGER.

CONTRACTOR May Stop Work or Terminate:

15.5 If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, then CONTRACTOR may, upon seven days' written notice to OWNER terminate the Agreement and recover from OWNER payment for all Work executed and any expense sustained in connection therewith, plus reasonable termination expenses, as determined by PROJECT MANAGER. The provisions of this paragraph shall not relieve CONTRACTOR of the obligations to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with OWNER.

ARTICLE 16 MISCELLANEOUS

Giving Notice:

16.1 [INTENTIONALLY OMITTED]

Computation of Time:

16.2 Time:

16.2.1 When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of such period falls on a Saturday or Sunday or on a day that is a legal holiday under the law of the applicable jurisdiction, such day will be omitted from the computation.

16.2.2 A calendar day of twenty-four hours measured from midnight to the midnight shall constitute a day.

General:

16.3 If OWNER or CONTRACTOR suffers injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, a claim therefor will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, any applicable statute of limitations or repose.

16.4 The duties and obligations imposed by these General Conditions, and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.30, 13.1, 13.11, 13.12, 14.5 and 15.2 and all of the rights and remedies available to OWNER and ENGINEER thereunder, are in addition to, and are not to be construed as a limitation of, any rights and remedies available to any or all of them which are otherwise available at law or in equity, or are provided by special warranty or guarantee or by other provisions of the Contract Documents. All representations, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of the Agreement.

16.5 CONTRACTOR shall conduct all operations in connection with the Work so as to minimize, to the greatest extent possible, adverse environmental impact.

a. Noise: All equipment and machinery shall have exhaust mufflers maintained in good working order so as to reduce operating noise to minimum levels.

b. Dust/Smoke: All equipment movement shall be accompanied by a minimum of dust. Traveled surfaces and earthwork shall be maintained in a moist condition to avoid the generation of dust or the airborne movement of particulate matter under all prevailing atmospheric conditions. Burning operations will be conducted only with written permission of the OWNER and with all applicable governmental and quasi-governmental licenses, permits and approvals. CONTRACTOR shall be responsible for obtaining all such licenses, permits and approvals and shall comply with all statutes, laws, codes, ordinances and regulations pertaining to such burning.

c. Traffic: Trucks shall be routed over roads so as to result in the least effect on traffic and nuisance to the public. All material shall be loaded in a manner that will preclude the loss of any portion of the load in transit, including covering, if necessary.

d. Sedimentation: All points of concentrated rainfall runoff shall be monitored to ensure that no eroded material from the construction site is deposited off-site. CONTRACTOR shall take all measures necessary to promptly eliminate any off-site deposit of eroded material, including, without limitation, the installation of sedimentation basins.

e. Fuel and Lubricant Spills: All fuel, lubricant and other spills shall be removed from the site immediately by CONTRACTOR. No residue from any such spill shall remain on site.

16.6 CONTRACTOR shall protect from injury or damage and maintain in service all utility facilities, including, without limitation, sewer, water and electric lines, encountered in the performance of the Work until moved or replaced as required under the Contract Documents, or abandoned as may be necessary for the proper construction and use of the Work.

16.7 CONTRACTOR shall maintain the Work from the beginning of construction operations until final acceptance. This maintenance shall constitute continuous and effective Work prosecuted daily with adequate equipment and forces so that the site and structures thereon are kept in satisfactory condition at all times.

16.8 CONTRACTOR shall provide, erect, and maintain all necessary barricades, suitable and sufficient lights, danger signals, signs and other traffic control devices, and shall take all necessary precautions for the protection of the Work and the safety of the public. CONTRACTOR shall provide suitable warning signs to properly control and direct traffic. CONTRACTOR shall furnish, install, and maintain all necessary barricades, warning signs, and other protection devices in accordance with the requirements of the state in which the Project is located. Temporary signs may be reused, provided that they are in good condition and legible. All protective devices shall be kept by CONTRACTOR in good, legible condition. The cost of furnishing, erecting, maintaining, and removing protective devices will be paid by CONTRACTOR. Where CONTRACTOR is required to perform any of these functions, the cost thereof shall be included in the overall Bid submitted. OWNERship of such temporary warning devices shall remain with CONTRACTOR.

16.9 CONTRACTOR shall provide access for inspection by representatives of all applicable federal, state and local authorities.

16.10 All chemicals used by CONTRACTOR during the Work or furnished by CONTRACTOR for Project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or other classification, must have been approved for such use by either EPA or USDA, as applicable. Use of all such chemicals, and disposal of residues thereof, by CONTRACTOR shall be in conformance with Laws and Regulations and applicable instructions.

16.11 All materials delivered to the Project must be unloaded, stockpiled, and maintained by CONTRACTOR until used.

16.12 CONTRACTOR shall remove from the site, and from all neighboring public and private property, at its own expense, all temporary structures, signs, rubbish, and waste material, including, without limitation, excess excavated materials, resulting from its operations.

16.13 Each of the OWNER and the CONTRACTOR irrevocably waives any right to a trial by jury in any legal proceedings, or to have a jury participate in resolving any disputes or claims, whether any such proceedings, disputes or claims relate to or arise in contract, tort or otherwise, whether with respect to the Contract or any other documents or instruments delivered in connection with the Contract or the transactions contemplated thereby. If any word, phrase, sentence, clause, section, subsection or provision of the Contract as applied to any party or circumstance is adjudged by a court to be invalid or unenforceable, the same will in no way affect any other circumstance or the validity or enforceability of any other word, phrase, sentence, clause, section, subsection or provision of the Contract.

16.14 The Contract contains the entire understanding of the parties in respect of its subject matter and supersedes all prior agreements and understandings (oral or written) between or among the parties with respect to such subject matter. The Contract is not intended to, nor shall it, confer upon any third party, other than OWNER and CONTRACTOR, any rights or remedies hereunder.

16.15 No failure to exercise, and no delay in exercising, any right, power or privilege under the Contract shall operate as a waiver, nor shall any single or partial exercise of any right, power or privilege thereunder preclude the exercise of any other right, power or privilege. No waiver of any breach of any provision shall be deemed to be a waiver of any preceding or succeeding breach of the same or any other provision, nor shall any waiver be implied from any course of dealing between the

parties. No extension of any time for performance of any obligations or other acts thereunder or under any other agreement shall be deemed to be an extension of the time for performance of any other obligations or any other acts. The rights and remedies of the OWNER and the CONTRACTOR under the Contract are in addition to all other rights and remedies, at law or in equity, that they may have against each other.

16.16 The rights and obligations under the Contract shall bind and inure to the benefit of the OWNER and the CONTRACTOR and their respective successors and assigns. Nothing expressed or implied herein shall be construed to give any other person any legal or equitable rights hereunder. As the OWNER has entered into the Contract in order to receive the services and expertise of the CONTRACTOR, the CONTRACTOR cannot assign or delegate all or any portion of its rights and obligations under the Contract (by operation of law or otherwise) without the prior written consent of the OWNER, in its sole and absolute discretion.

16.17 The parties have jointly participated in the negotiation and drafting of the Contract. If any ambiguity or question of intent or interpretation arises, the Contract shall be construed as if drafted jointly by the parties, and no presumptions or burdens of proof shall arise favoring any party by virtue of the authorship of any of the provisions of the Contract. Any reference to any federal, state, local, or foreign statute or law shall be deemed also to refer to all rules and regulations promulgated thereunder, unless the context requires otherwise.

VI SUPPLEMENTARY CONDITIONS

CAPITALIZED TERMS USED, BUT NOT OTHERWISE DEFINED, HEREIN SHALL HAVE THE MEANINGS GIVEN TO SUCH TERMS IN THE GENERAL CONDITIONS.

1. THE GENERAL CONDITIONS: The General Conditions shall apply to all Work as set forth in the Contract Documents, except as otherwise specified in these Supplementary Conditions. Requirements of these Supplementary Conditions supersede those of the General Conditions.

2. CONSTRUCTION DRAWINGS: The Work shall conform to the following construction drawings:

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V

Sheet No.	Description
-	Title Sheet
1	Overall Site Plan
2	Existing Topographic Survey
3	Existing Landfill Gas System
4	Final Drainage Plan
5	Borrow Area Grading Plan
6	Erosion Control Plan
7	Cross Section
8-11	Miscellaneous Details

3. REPORTS AND DRAWINGS USED BY ENGINEER: In the preparation of Drawings and Specifications, ENGINEER has relied upon:

   A. The following reports of explorations and tests of subsurface conditions at the site of the Work:
   (1): Report of Soil Borrow Exploration – Morehead Road Tract, prepared by BLE, Inc. and dated 12-16-11

   B. The following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are contiguous to the site of the Work:
   (1): Project Plans

4. EXTENSION OF TIME AND PROJECT SCHEDULE: Any and all extensions of time shall be in accordance with the General Conditions, except as otherwise hereinafter provided. **A project schedule shall be supplied at notice-to-proceed and shall be updated monthly throughout construction.**

5. LIQUIDATED DAMAGES: If the Project is not completed on or before the Scheduled Completion Date, the CONTRACTOR shall pay to the OWNER, as liquidated damages, the sum of $2,000.00 per day until the Project is complete. As OWNER'S actual damages if the Project is not completed on or before the Scheduled Completion Date would be difficult, if not impossible, to determine, such liquidated damage amount represents the parties' best estimate of the amount of the damages that the OWNER would suffer in such a circumstance. The OWNER shall have the right to deduct and withhold the amount of any and all such damages from any monies owing by it to the CONTRACTOR or the OWNER may recover such amount from the CONTRACTOR and the sureties on its bond; all of such remedies shall be cumulative, and the OWNER shall not be required to elect any one remedy nor be deemed to have made an election by proceeding to enforce any one remedy.

6. IDENTITY OF SUBCONTRACTORS: Specify here whether CONTRACTOR must identify the Subcontractors, Suppliers, and other persons and organizations that it will use in the performance of the Work, and, if so, the date by which such identification must be submitted to OWNER

_____

_____

_____

_____

7. SANITARY CONVENIENCES: The CONTRACTOR shall provide adequate sanitary conveniences for use of those employed on the work and their use shall be strictly enforced. Such conveniences shall be made available when the first employees arrive on the site and shall be removed after the departure of the last employees from the job.

8. UTILITY SERVICE: The CONTRACTOR will arrange for temporary electrical service through the local agency at his own expense if CONTRACTOR desires electrical power on-site.

9. ENVIRONMENTAL IMPACT: The CONTRACTOR shall conduct all operations so as to minimize, to the greatest extent possible, adverse environmental impact.

   a. Noise: All equipment and machinery shall be provided with exhaust mufflers maintained in good working order so as to reduce operating noise to minimum levels.

   b. Dust/Smoke: All equipment movements shall be accompanied by a minimum of dust. Traveled surfaces and earthwork shall be maintained in a moist condition to avoid the generation of dust or the airborne movement of particulate matter under all prevailing atmospheric conditions.

Burning operations will be conducted only with written permission of the OWNER and/or appropriate regulatory agencies. The CONTRACTOR shall be responsible for obtaining all permits and comply with all codes, ordinances and regulations pertaining to the burning. Approval from the North Carolina Department of Environment and Natural Resources or Cabarrus County may be required.

c. Traffic: Trucks shall be routed over roads which will result in the least effect on traffic and nuisance to the public. All material shall be loaded in a manner which will preclude the loss of any portion of the load in transit, including covering, if necessary.

d. Sedimentation: All points of concentrated runoff from rainfall shall be visually monitored to determine that no eroded material from the construction site is being deposited off-site. Measures shall be taken to promptly eliminate such a deposition if occurring, including the installation of sedimentation basins.

e. Fuel and Lubricant Spills: All spills shall be removed from the site immediately by the CONTRACTOR. No residue from the spill shall remain on site.

10. ADJUSTMENT OF DISCREPANCIES: In all cases of discrepancies between the various dimensions and details shown on drawings, or between the drawings and these specifications, the more expensive construction shall be estimated before construction is started, the matter shall be submitted to the ENGINEER for clarification. Without such a decision, discrepancies shall be adjusted by the CONTRACTOR at his own risk and in settlement of any complications arising from such adjustment, the CONTRACTOR shall bear all of the extra expense involved.

11. MAINTENANCE DURING CONSTRUCTION: The CONTRACTOR shall maintain the Work from the beginning of construction operations until final acceptance. This maintenance shall constitute continuous and effective work prosecuted day by day with adequate equipment and forces to the end that the site and structures thereon are kept in satisfactory condition at all times, including satisfactory signing or marking as appropriate and control of traffic where required by use of traffic control devices as required by the State in which this project is located.

Upon completion of the Work, the CONTRACTOR shall remove all construction signs and barriers before final acceptance.

While undergoing improvements, the roads shall be kept open to all traffic by the CONTRACTOR. The CONTRACTOR shall keep the portion of the site being used by public traffic, whether it be through or local traffic, in such condition that traffic will be adequately accommodated. The CONTRACTOR shall bear all cost of signs and markings as required and other maintenance work during construction and before the Work is accepted and of constructing and maintaining such approaches, crossings, intersections, and other features as may be necessary without direct compensation. The Contractor shall provide all drainage protection at adjacent cell edges. This is to be installed and maintained at the Contractor's expense.

12. ACCESS FOR INSPECTION: Access for inspection shall be provided for representatives of the North Carolina Department of Environment and Natural Resources and other regulatory agencies.

13. RETAINAGE OF CONTRACTOR'S PAYMENT: The retainage shall be an amount equal to 10% of Contractor's partial pay estimate until 50% of the work has been completed. At 50% completion, further partial payments shall be made in full to the CONTRACTOR and no additional amounts may be retained unless the ENGINEER certifies that the job is not proceeding satisfactorily, but amounts previously retained shall not be paid to the CONTRACTOR. At 50% completion or any time thereafter when the progress of the WORK is not satisfactory, additional amounts may be retained but in no event shall the total retainage be more than 20% of the value of the work completed. Upon substantial completion of the work, the amount retained may be paid to the CONTRACTOR. When the WORK has been substantially completed except for WORK which cannot be completed because of weather conditions, lack of materials, or other reasons which in the judgement of the OWNER are valid reasons for non-completion, the OWNER may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the WORK still to be completed.

    Partial pay estimates may include stored materials. Contractor must submit invoices and all materials must be located at the site of the work. Retainage will not be held on stored materials.

14. USE OF CHEMICALS: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in conformance with instructions.

15. CLEANING UP: The contractor shall remove from the Owner's property and from all public and private property, at his own expense, all temporary structures, signs, rubbish, and waste. Also, any sediment deposited in the sediment pond by these activities shall be removed by the Contractor at his expense. All pond cleanings will be completed at the end of the project at no additional cost to the Owner.

16. GUARANTEE: Notwithstanding anything to the contrary in this contract, the contractor shall guarantee the work, including the equipment installed under this contract, to be free of defects or faulty workmanship or materials for a period of one (1) year from the date of final acceptance. The Contractor shall be required to repair at his own expense all such defects which may develop during the specified time.

17. CONFIRMATION SURVEYS: The Owner will provide the services of a Registered Land Surveyor in accordance with Section 01050 - Confirmation Surveys to perform confirmation surveys. The Owner will order the Surveyor to the site when notified by the Contractor. For each Confirmation Survey, the Owner will pay the Surveyor for two trips to the site. Additional trips required to complete the confirmation surveys will be back-charged to the Contractor. The Surveyor will perform one complete confirmation survey on each trip and shall not be held on-

site by the Contractor for corrective measures. Surveys required beyond what is specified due to defective or incomplete work shall be backcharged to the Contractor.

18. ACCESS ROAD DAMAGE: Any damage to the site access roads caused by the Contractor shall be repaired by the Contractor.

19. LINER TIE-IN: The Contractor shall be responsible for exposure of the existing temporary liner edges at all existing closure areas and base liners for tie-in by the liner subcontractor. Additionally, the contractor will be responsible for all storm water / erosion control at the tie-in.

20. BORROW AREA: Cap soil materials are available in the borrow area shown on the Plans. Slopes shall be left free draining, neat and uniform at the completion of work by Contractor in the borrow area. At conclusion of the project, Contractor shall restore the borrow area to it's pre-construction condition at no additional cost to the Owner. This includes ensuring positive drainage, re-establishing permanent vegetation, and re-establishing roadways.

21. MOBILIZATION: Mobilization will be paid as follows; Pay Estimate No. 1 - 50%, Pay Estimate No. 2 - 25%, and Pay Estimate No. 3 - 25%.

22. QUANTITIES: The quantities on the bid form are an estimate and they may vary up to 25% without the Contractor being allowed to request changes to the unit rates.

23. ENGINEER / DESIGN ENGINEER: The "DESIGN ENGINEER" identified in the technical specifications and CQA Plan is the "ENGINEER" identified in the Contract Documents.

24. CONTRACTOR: The CONTRACTOR shall unload all geosynthetics at no costs to the OWNER and store them in an area designated by the OWNER. The CONTRACTOR shall divert stormwater away from this location and avoid damage to the geosynthetics. Any damage to the geosynthetics caused by the CONTRACTOR shall be the responsibility of the CONTRACTOR at no cost to the OWNER.

25. CONSTRUCTION WATER: Water may be obtained by the contractor from on-site basins at his expense with his own equipment.

26. GEOSYNTHETICS INSTALLATION: The time allowed for construction of this project shall include 20 days for the geosynthetic liner installer (by others) to install the LLDPE Cap and GDM. The Contractor shall maintain the soil surface of the foundation soils layer during the installation of the LLDPE.

27. EXISTING LANDFILL GAS SYSTEM: The landfill has an existing landfill gas system that must be protected during construction of the closure cap. Any damage to the gas system during closure construction will be repaired by the CONTRACTOR at the CONTRACTOR'S expense. The CONTRACTOR shall confirm adequate cover exists over the gas system components. If necessary, additional cover for haul and crossings over the gas system must be provided by the

CONTRACTOR. The CONTRACTOR shall not sequence construction so to require the gas system to shut down. The gas system must remain operational at all times.

28. MAINTENANCE OF STOCKPILES: The Contractor shall be responsible for maintaining construction stockpiles of all materials from the time he mobilizes to the site. The Contractor shall have appropriate equipment available to push-up the stockpiles as materials are received.

29. EXPLOSION PROOF MOTORS AND SPARKLESS EQUIPMENT: Due to the high potential for methane gas in and around the project work area, all hand tools and other hand held equiptment used by the Contractor that has the potential to generate a spark shall be sparkless with explosion proof motors.

30. PERIODIC INSPECTIONS BY NCDENR FOR CQA: Representatives of NCDENR may inspect the project at various states of construction.

31. SEDIMENT POND CLEANUP: Any sediment deposited to the facilities sediment ponds by the work performed under this contract shall be removed by the Contractor before completion of the work.

32. HOURLY WORK: Hourly work (if any) must be specifically authorized by the OWNER in writing prior to any portion of the hourly work beginning. Time sheets for each day's work must be approved by the GENERAL MANAGER within two business days (M-F) of the occurrence of the work. A copy of the approved time sheet must be faxed to the PROJECT MANAGER at (866) 527-9544 within one business day of being approved by the GENERAL MANAGER. Time sheets must contain sufficient detail to document specific types of equipment and labor. Each time sheet must also include the total cost for that specific day. Payment for hourly work not approved as noted above will be at the discretion of the OWNER. Payment (if any) for hourly work not approved within the time frames detailed above will be reduced by 25% to cover administrative costs if payment for the work is approved by the OWNER.

-- END OF SECTION --

VII CONTRACTORS SAFETY STATEMENT

VIII TECHNICAL SPECIFICATIONS

SECTION 01000 PRE-CONSTRUCTION CONFERENCE

1.01 PRE-CONSTRUCTION CONFERENCE

Prior to beginning excavation activities, a pre-construction conference will be held with representatives of:

Contractor
Facility General Manager (Operator)
Design Engineer
CQA Engineer
Solid Waste Section

The purpose of the meeting will be to discuss issues relating to the proper prosecution of the work effort. The contractor shall have a schedule of work effort on either a CPM or Gannt format which defines all major work events, target dates, time of completion, and the interrelationship of work effort.

Special attention shall be given to who can make field changes, approve change orders, stop the work, or otherwise make changes in either the project design or the construction sequence. Attention shall also be given to the relationship with the State Regulatory Agency.

An agenda should be prepared for the meeting which specifically lists each item in the Rules for discussion.

The pre-construction conference will be the first of several project conferences or meetings. A schedule for meetings after the pre-construction conference will be established at the pre-construction conference.

Detailed Minutes of this meeting shall be kept and copies distributed to all parties in attendance.

-- END OF SECTION --

01025 MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 DESCRIPTION

The items listed in this section refer to and represent pay items listed on the Bid Worksheet. The items found in the Bid Worksheet represent all of the lump sum and unit price pay items for the completion of the Work. No direct or separate payment will be made for providing miscellaneous temporary or incidental work, plant, or services, CONTRACTOR'S field office(s), job signs, sanitary requirements, testing and safety devices, submittals, record drawings, water supplies, power, maintaining traffic, removal of contractor-generated waste, watchmen, security, bonds, insurance, warrantees, or any other similar items not specifically specified, but necessary to complete the work. Compensation for all such labor, materials, and services shall be included in the bid price stipulated for the lump sum, unit price, and contingency pay items and Total Base Bid.

1.2 RELATED ITEMS

Bid Worksheet

1.3 BID WORKSHEET

Work required under this project is represented by the items on the Bid Worksheet and includes furnishing all labor, equipment, tools and materials and performing all operations required to complete the Work satisfactorily, and provide a fully functional and operational system as intended, as specified and as indicated on the Drawings.

A. The Bid Worksheet lists each item of work for which payment will be made. No payment will be made for any items other than those listed on the Bid. Those items listed on the Bid represent the total Work required to provide a complete, functional and operational project as explicitly shown, implied or intended.

B. Essential, unlisted components of the Work for the satisfactory completion of the Work that are not specifically included on the Bid, and that are not specified in this section to be measured or paid for or included in one of the items listed on the Bid, shall be considered incidental to the Work. The cost of all items that are incidental to the Work shall be included in the Total Base Bid as it appears on the Bid.

C. All costs including the CONTRACTOR’S overhead costs and profit shall be considered as included in the lump sum or unit price bid for the Item to which it is related, is associated, or to which it pertains. The CONTRACTOR shall prepare the Bid Worksheet accordingly.

D. Each pay item bid price will include an amount considered by the CONTRACTOR to be adequate compensation to cover the CONTRACTOR'S overhead and profit for each of the separately identified pay items.

E. The Total Base Bid shown on the Bid Worksheet will be determined in part by multiplying each bid unit price by the estimated quantity. The product of these when placed in the Bid Price column and summed with other Bid Prices in the same column, equal the Total Base Bid.

1.4 DEFINITIONS

A. This Section specifies administrative and procedural requirements for Lump Sum and Unit Prices.

1. A Lump Sum price is an amount proposed by Bidders and stated on the Bid Worksheet as a price where measurement will not be made for payment for materials, services and/or work identified in the Drawings and Specifications for a particular pay item. The CONTRACTOR will not be entitled to any adjustment in a Lump Sum bid price as a result of any change caused by a variation in quantities as a result of more accurate measurements. The CONTRACTOR agrees to accept the aforesaid Lump Sum bid price as complete and total compensation for all work to be performed under a Lump Sum pay item.
2. Lump sum prices include all material, labor, equipment, overhead, profit and applicable taxes.
3. A Unit Price is an amount proposed and stated on the Bid Form as a price per unit of measurement based on the measured quantities for materials and/or services.
4. Additional work may be required during the progress of the project primarily due to changing conditions. A Change Order will be issued to the CONTRACTOR by the ENGINEER for additional work which the OWNER considers necessary. It will be the responsibility of the CONTRACTOR to request additional time to be added to the Contract Time Period for any work added to the project by Change Order.
5. The OWNER reserves the right to reject the CONTRACTOR's measurement of work in place that involves use of established unit cost bid prices, and to have this work measured by an independent surveyor at the OWNER'S expense.

1.5 MEASUREMENT AND PAYMENT

A. Measurement of an item of the Work will be by the unit as indicated on the Bid. Payment of an item of the Work will be made by the Unit Price times the number of units or quantities as indicated on the Bid.

B. Measurement and payment for an item will include all necessary and incidental work not specifically described or specified as a part of the bid item on the Bid Form to which it is related.

C. Unless otherwise stated in individual sections of the Specifications or in the Bid, no separate payment will be made for any item of the Work, materials, parts, equipment, supplies or related items that are required to perform and complete the Work. The costs for all items required shall be included in the Bid Price item in the Bid of which it is a part.

D. The Total Base Bid shall constitute full compensation to the CONTRACTOR for furnishing all plant, labor, equipment, tools and materials, and for performing all tasks to complete all the Work. The Work shall be complete in place, functional as intended, as specified and as indicated on the Drawings.

E. The CONTRACTOR'S mobilization, demobilization, General Conditions and Supplementary Conditions shall be included in the Total Base Bid and the line item to which it is related.

F. CONTRACTOR shall locate all utilities prior to excavation. Utility location shall not be paid for separately and shall be included in the unit price(s) to which it pertains.

G. All CONTRACTOR Health and Safety provisions to perform the work will not be paid for separately and shall be included in the bid prices stipulated for the lump sum and unit price pay items.

H. Monthly Payment Applications for lump sum or unit price items in progress shall be based on the percent complete of the item at the end of each month as determined by the ENGINEER and the OWNER. By the 20th of each month, the CONTRACTOR is responsible for providing the ENGINEER and OWNER with records of construction that has occurred during the month. The ENGINEER and OWNER will consider the information provided by the CONTRACTOR and other information as necessary before making a determination on the percent complete of each item for the month. The CONTRACTOR'S monthly payment application is due by the 25th of each month and should reflect the percent complete for each item as determined by the ENGINEER and OWNER minus any retainage.

1.6 VALUES OF UNIT PRICES

A. The number of units or estimated quantities on the Bid is approximate only, and final payment will be made for the actual number of units and quantities incorporated in the Work or made necessary to complete the project.

B. In the event that Work and materials or equipment are required to be furnished to a greater or lesser extent than is indicated on the bid, such work and materials or equipment shall be furnished in greater or lesser quantities at the bid unit price on the bid.

1.7 CHANGES AND EXTRA WORK

Changes and extra work will be measured and paid for in accordance with the requirements of this Section. It will be the responsibility of the CONTRACTOR to request additional time to be added to the Contract Time Period for any work added to the project by changes.

1.8 REJECTED MATERIALS

Quantities of material wasted or disposed in a manner not called for in the Specifications; rejected loads of material, including material rejected after it has been placed by reasons of the failure of CONTRACTOR to conform to the provisions of the Specifications; material not unloaded from transporting vehicles; material placed outside the limits indicated by the Drawings or established by OWNER; or material remaining on hand after completion of the Work, will not be paid for, and such quantities will not be included in the final total quantities. No compensation will be made for loading, hauling, and disposing of rejected material.

1.9 SPECIAL REQUIREMENTS

N/A

1.10 MEASUREMENT AND PAYMENT DESCRIPTIONS

The following descriptions are a summary of the work required to complete the project. The tabulation does not name every item and incidental, but does include descriptions of the major work items needed to complete the project. Providing this list of items does not relieve the CONTRACTOR of his duty to complete the Work as intended and provide a fully functional project.

The measurement and payment items listed below correspond to the Bid Items on the Bid Worksheet.

CAPPING CONSTRUCTION

1. Mobilization

    a. Mobilization ($50,000 max. allowable)

    Measurement - Measurement of this item will not be made for payment. All work related to this item shall be included in the Unit Price found on the Bid.

    Payment - Payment for Mobilization shall be made at the Unit Price found on the Bid Worksheet. Payment shall be full compensation for the preparatory work and operations in mobilizing for the commencement of the Work including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, and for any other pre-

construction expenses necessary for the start of the Work, regardless of how many times such moves are made. The item shall also include all costs to clean the site and demobilize.

Mobilization shall also include providing insurance; permits; permit compliance; utility services; time and materials for meetings; sanitary facilities; CONTRACTOR's temporary field office(s); security; construction photographs; licensures; taxes; site clean-up and demobilization, unless otherwise specified.

The CONTRACTOR will be paid one half of the lump sum price at the initiation of mobilization and as soon as the 1st payment is processed. The remainder of the lump sum price may be paid as a part of Payment Request No 2 at 25% of the lump sum price and Payment Request No. 3 at 25% of the lump sum price. The amount of the Mobilization cannot exceed $50,000.

2. Surveying

   a. Construction Staking

      Measurement- Measurement of this item will not be made for payment. All work related to the item shall be included in the Unit Price found on the Bid.

      Payment-Payment will be made to CONTRACTOR for the Bid Price found on the Bid and will include all costs to perform pre-construction surveys, stake-outs, surveys to complete quantities, intermediate surveys, surveys for grade, surveys to document as-built conditions, and the preparation of Record Drawings.

   b. Marker Posts

      Measurement- Measurement shall be by the actual quantity installed.

      Payment-Payment shall be at the Bid Unit Price shown on the Bid.

3. Surface Grade Preparation

   a. Intermediate Cover Preparation

      Measurement – Measurement will be by the area in which vegetation, matting, and drainage berms are removed and made horizontally by the acre of the area prepared.

      Payment – Payment will be at the Unit Price per acre in the Bid Worksheet and shall include all labor, materials, and proper disposal of debris.

4. Minimum 12 Inch Thick, Foundation Layer Placement

   a. 12-Inch Foundation Layer

Measurement - Measurement shall be made using quantity or as-built surveys and shall represent the in-place quantity after placement, compaction, fine grading and not the amount of material taken out of the borrow area. Measurement shall be in square feet of surface for layers that are 12 inches or thicker.

Payment - Payment shall be at the per cubic yard Unit Price in the bid form and shall include all equipment, labor, tools, and incidentals to load, haul, place, compact and fine grade soils placed for the foundation layer.

5. Geosynthetic Cap

   a. 40 mil LLDPE Flexible Membrane Liner

      N/A

   b. Temporary Anchor Trench

      Measurement – Measurement shall be made horizontally by the linear foot along the centerline of the anchor trench at the edges of the installed textured LLDPE geomembrane cap.

      Payment – Payment shall be at the Unit Price in the Bid Worksheet and includes opening and backfilling of the temporary anchor trench.

   c. Cap Liner Penetration Boots

      Measurement - Measurement shall be made by the actual quantity installed.

      Payment - Payment will be made at the Unit Price shown on the Bid.

   d. Clean 40 mil Liner

      Measurement - Measurement shall be by the linear foot measured along the centerline of the temporary anchor trench.

      Payment - Payment shall be made at the per linear foot Unit Price on the Bid after locating, uncovering and cleaning the liner is completed.

   e. Clean 60 mil Liner

      Measurement - Measurement shall be by the linear foot measured along the centerline of the temporary anchor trench.

      Payment - Payment will be made at the per linear foot Unit Price on the Bid after locating, uncovering and cleaning the liner is complete.

6. Vegetative Cover

   a. 18-inch Thick Protective Soil Cover

      Measurement – Measurement shall be equal to the 3D horizontal square footage area of the installed textured LLDPE geomembrane cap. The transition slope beyond the cap certification limit is not included in the measurement.

      Payment – Payment shall be at the Unit Price in the Bid Worksheet and includes all described items as well as the transition slopes beyond the cap certification limit.

   b. 6-inch Thick Vegetative Growth Soil

      Measurement - Measurement shall be equal to the 3D horizontal square footage area of the installed textured LLDPE geomembrane cap. The transition slope beyond the cap certification limit is not included in the measurement.

      Payment – Payment shall be at the Unit Price in the Bid Worksheet and includes all items described as well as the transition slopes beyond the cap certification limit.

7. Drainage Layer

   a. Double-sided Geocomposite Drainage Media (GDM)

      N/A

   b. 4” Diameter Corrugated Polyethylene Pipe (Perforated)

      Measurement – Measurement shall be made by the linear foot measured along the centerline of the pipe.

      Payment – Payment shall be at the Unit Price in the Bid Worksheet and includes geotextile over leistered seams after wrapping pipe and fittings.

   c. Corrugated Polyethylene Pipe (Solid)

      Measurement – Measurement shall be made by the linear foot measured along the centerline of the pipe

      Payment – Payment shall be at the Unit Price in the Bid Worksheet and includes geotextile over leistered seams after wrapping pipe and fittings.

8. Closure Cap Stormwater Control

   a. Permanent Stormwater Drainage Berms

Measurement - Measurement will be made by the linear foot along the centerline of the top of the storm water drainage berm from end-of-berm to end-of-berm. Installation shall include soil material, hauling, compaction, and double-sided Excelsior matting.

Payment - Payment shall be at the per linear foot Unit Price as shown on the Bid and shall include all labor, materials, tools and equipment.

b. Removal of Corrugated Plastic Downdrain Piping

Measurement - Measurement will be made by the linear foot along the centerline of the pipe from end-of pipe or structure to end-of-pipe or structure.

Payment - Payment will be made at the per linear foot Unit Price on the bid and will include the removal and disposal (or re-use) of corrugated plastic down drain piping, fittings, and connecting structures.

c. Permanent 24” Diameter Corrugated Plastic Downdrain Pipe

Measurement – Measurement shall be made by the linear foot measured along the centerline of the pipe.

Payment – Payment shall be at the Unit Price in the Bid Worksheet and shall include all pipe inlets, connections, fittings and all incidental materials and labor as described.

d. Temporary Corrugated Plastic Downdrain Pipe

Measurement – Measurement shall be made by the linear foot measured along the centerline of the pipe.

Payment – Payment shall be at the Unit Price in the Bid Worksheet and shall include all pipe inlets, connections, fittings, and all incidental materials and labor, as described.

e. Corrugated Plastic Flared End Sections and Inlet Pipes

Measurement - Measurement shall be quantity actually installed.

Payment – Payment shall be at the Unit Price in the Bid Worksheet and includes geotextile over leistered seams after wrapping pipe and fittings.

LANDFILL UOC INFRASTRUCTURE

9. Excavation

   a. Contracted Excavation (Unclassified)

      Measurement- Contracted Excavation shall consist of all the excavated material for (1) compacted soil subgrade, (2) road subgrade, or (3) other structural subgrade. Excavation shall also include the subsequent placement of fill of all material above the subgrades whether into embankments, disposal, or stockpiling in designated areas of all material, regardless of its nature or the manner in which it was removed from existing grade to the subgrade placement. Excavation shall include all processing and compaction required by the project specifications.

      Payment-Payment shall be for the cubic yard Unit Price stated on the Bid for "Contracted Excavation". No payment will be made for undercut excavation performed prior to approval by the CQA ENGINEER. Additionally, no payment shall be made for over excavation of unsuitable materials and no payments shall be made for excavation of unsuitable material volumes filled prior to inspection by the CQA ENGINEER.

   b. Unsuitable Material

      Measurement - Areas requiring undercutting due to being unsuitable as determined by the CQA ENGINEER shall be measured in the presence of the CQA ENGINEER. Undercut excavation shall include the subsequent placement of all suitable fill material required to replace undercut material.

      Measurement will be made as the difference in topographic conditions before the unstable material is removed and the "as constructed" conditions established according to the construction requirements of Section 02210-Grading. Measurement shall be in cubic yards.

      Payment - Payment shall be for the cubic yard Unit Price stated on the Bid Worksheet for Unsuitable Material. No payment will be made for undercut excavation performed prior to approval by the CQA ENGINEER. Additionally, no payment shall be made for over excavation of unsuitable materials and no payments shall be made for excavation of unsuitable material volumes filled prior to inspection by the CQA ENGINEER.

   c. Rock Excavation

      Measurement - Areas requiring rock excavation shall be measured in the presence of the CQA ENGINEER. Only non-rippable rock will be considered rock. Non-rippable rock is defined as rock that cannot be ripped using a single

tooth ripper mounted on a D-8 dozer, making three (3) passes in perpendicular direction and producing less than 0.5 cubic yards of loosened rock.

Payment - Payment shall be by the cubic yard Unit Price on the Bid Worksheet (as applicable).

No payment will be made for rock over-excavation or boulders. Boulders shall be defined as rock if more than 1.0 cubic yards in volume.

10. Storm Water Handling

a. Overflow Structure No. 1

Measurement - Measurement shall be by the number of overflow structures removed and replaced. Replacement shall include riser, trash rack, concrete base, concrete encasement, anti-seep collars, dewatering orifices, all connections, and other pertinent components

Payment - Payment shall be at the Unit Price shown on the Bid.

b. 48” Dia Reinforced Concrete Pipe

Measurement – Measurement shall be by the linear foot measured to and from centers of structures or ends of pipe along the centerline of the pipe, without regard to depth after installation has been completed.

Payment – Payment shall be at the Unit Price on the Bid and shall include all pipe, unloading, storing, surveying, testing, bedding, backfill, fittings, pipe accessories, pipe joint materials, and all labor, equipment, materials and incidentals.

c. Concrete Headwall

Measurement – Measurement shall be by the number of concrete headwalls actually installed.

Payment-Payment shall be by the Price on the Bid and shall include connection to pipe, bedding, unloading, and all labor materials and incidentals that are required.

d. HDPE Stormwater Pipe

Measurement - Measurement shall be made by the linear foot along the centerline of the pipe to be installed. Measurement shall be from end-of-pipe to end-of-pipe and will include saw cut pavement, bedding, backfill, compaction, and pavement replacement.

Payment - Payment shall be made at the per linear foot Unit Price on the Bid Form.

e. Stone Forebay Berm

Measurement – Measurement shall be at the quantity actually installed.

Payment –Payment shall be at the Unit Price in the Bid and shall include rip-rap fabric.

f. Silt Gage

Measurement – Measurement shall be the quantity actually installed.

Payment – Payment shall be the Unit Price in the Bid Worksheet for silt gage.

g. Stormwater Channel Clearing and Lining (Excelsior or Rip-Rap)

Measurement - Measurement shall be by the linear foot measured along the centerline of the channel from beginning to end of channel that is cleaned and lined with excelsior matting or rip-rap, as shown on the plans.

Payment - Payment shall be by the per linear foot Unit Price shown on the Bid.

11. Miscellaneous

a. Silt Fence

Measurement – Measurement shall be linearly from end-to-end along its base of each separate installation actually installed.

Payment – Payment shall be at the Unit Price on the Bid and shall include all labor, materials, tools, equipment and maintenance.

b. Stone Check Dams

Measurement – Measurement shall be of the actual quantity installed.

Payment – Payment shall be at the Unit Price on the Bid Worksheet and includes all labor and materials, stone, geotextile fabric and maintenance as detailed in the Drawings.

c. Rip Rap Outlet Protection

Measurement – Measurement shall be made by the square yard of stone and fabric placed. Stone shall be the same size shown in the Bid Form and on the Plans.

Payment – Payment shall be by the square yard at the Unit Price in the Bid Worksheet and shall include stone, geotextile fabric, installation, materials and labor.

d. Single-sided Excelsior Slope Matting

Measurement – Measurement of Excelsior Matting for side slopes shall be measured horizontally by the square yard for slope actually lined.

Payment – Payment shall be at the Unit Price on the Bid Worksheet and includes all labor, materials, and shaping.

e. Pipe Inlet Protection

Measurement – Measurement shall be by the quantity actually installed.

Payment – Payment shall be at the Unit Price on the Bid Worksheet and shall include all labor and materials as detailed in the Drawings.

f. Permanent Grassing

Measurement – Measurement shall be made horizontally by the acre.

Payment – Payment shall be by the Unit Price in the Bid Worksheet and shall include all seed, seed bed preparation, mulching, fertilizer, and all incidentals for obtaining a complete stand of permanent grass. Payment will be made only upon establishment of a complete stand of grass as defined by the specification section.

- END OF SECTION -

SECTION 01050 CONFIRMATION SURVEYS (NOT IN THIS CONTRACT)

PART 1 GENERAL

1.01 GENERAL

This section covers the confirmation surveys required for the project. Landfill confirmation surveys are required for the cap system components, underground pipelines and electrical, structures, roads and other improvements. This will require three (3) separate topographic surveys of the closure area and an overall construction site survey. Elevation data is to be provided to 0.01 feet.

The confirmation surveys shall be sealed by a registered land surveyor licensed in this State.

1.03 SHOP DRAWINGS

A. Grade Stakes Numbering System: If grade stakes are used, provide grid numbering methodology for review. Provide method to number and log individual stakes to assure no stakes remain in compacted soil or clay liner.

PART 2 PRODUCTS

Not applicable.

PART 3 EXECUTION

3.01 GRID OVERLAY (NOT APPLICABLE)

The Surveyor shall establish a grid pattern for control over the entire landfill cell area. The grid dimensions for the landfill cell shall be 50 foot by 50 foot. The grid pattern shall remain in the same location for each land survey described below. The Surveyor shall develop and utilize a numbering system for grid points. The Surveyor shall coordinate the establishment of the grid pattern with the grading Contractor and this grid pattern will be used in the construction staking.

3.02 CELL SUBGRADE SURVEY (NOT APPLICABLE)

The Surveyor shall provide a two (2) foot contour map with grid elevations shown for the landfill cell(s) subgrade. The survey shall represent as-built elevations immediately prior to

placement of the compacted soil or clay liner. The survey shall confirm the correct slopes and grades with those given on the drawings.

3.03 COMPACTED SOIL OR CLAY LINER SURVEY (NOT APPLICABLE)

The Surveyor shall provide a two (2) foot contour map with grid elevations shown for the landfill compacted soil or clay liner and subgrade. The grid elevations shall be presented to facilitate confirmation of the required thickness (see Figure 1). The survey shall represent as-built elevations immediately prior to placement of the geomembrane liner. The survey shall confirm the correct layer thickness, slopes, and grades with those given on the drawings. The survey shall include limits of the compacted soil or clay liner.

3.04 GEOSYNTHETICS SURVEY OF BASE LINER (NOT APPLICABLE)

The Surveyor shall provide a map locating the anchor trench and edge-of-liner. The survey shall represent as-built final elevations. The surface area(s) of the geosynthetics shall be shown on the survey.

3.05 PROTECTIVE COVER ON BASE LINER (NOT APPLICABLE)

The Surveyor shall provide a two (2) foot contour map with grid elevations shown for the landfill protective cover layer, compacted soil or clay liner, and subgrade. The grid elevations shall be presented to facilitate confirmation of the required thickness (see Figure 1). The survey shall represent as-built final elevations. The survey shall confirm the correct layer thickness, slopes, and grades with those given on the drawings.

3.06 PREPARED SUBGRADE ON CAP

The surveyor shall provide A two (2) foot contour map with grid elevations shown for the landfill subgrade layer. The survey shall represent as-built final elevations of the prepared subgrade prior to geosynthetics deployment.

3.07 GEOSYNTHETICS SURVEY OF CAP

The Surveyor shall provide a map locating the anchor trench and edge-of-liner. The surface area(s) of the geosynthetics shall be shown on the survey.

3.08 PROTECTIVE COVER ON CAP

The Surveyor shall provide a two (2) foot contour map with grid elevations shown for the landfill protective cover layer. The survey shall represent as-built final elevations, drainage berms and storm water control piping and features.

3.09 OVERALL CONSTRUCTION SITE SURVEY

The Surveyor shall provide a two (2) foot contour map of the entire construction site outside of the cells. This survey can be shown on one of the cap confirmation surveys or as a separate survey. This survey shall locate all improvements in this project including structures, underground pipelines and electrical lines, and roads.

3.10 GRADE STAKES

If grade stakes are used, the Surveyor shall remove all grade stakes prior to placement of subsequent layer. The Surveyor shall develop and utilize a grade stake numbering system to log and number individual stakes.

3.11 SURVEYS

The Surveyor shall provide seven (7) sealed and signed prints of each survey and an electronic data file compatible with AutoCad 2013 Software. The surveys shall include the date of surveys, vertical control utilized, and horizontal control utilized. The surveys shall be at a scale not less than 1” - 50'.

3.12 SCHEDULE

The Surveyor shall provide the confirmation surveys within two (2) days of completion of the particular portion of the work to which they pertain.

--END OF SECTION--

SECTION 01051 CONSTRUCTION SURVEYS

PART 1 GENERAL

1.01 GENERAL

This section covers construction staking and quantity surveys provided by the Contractor. Construction staking is required for horizontal and vertical location of all site improvements including grading, compacted soil liner, and protective cover. Quantity surveys are required for the purpose of determining quantities of excavation.

1.02 QUALITY ASSURANCE

Quantity surveys shall be performed under the direction of a registered land surveyor licensed in this State. Reports of quantity surveys shall be signed and sealed by a registered land surveyor licensed in this State.

1.03 SHOP DRAWING

A. Grade Stakes Numbering System

If grade stakes are used, a grid numbering methodology (in cells) shall be provided for review. This shall be coordinated with the confirmation surveying. Provide method to number and log individual stakes to assure no stakes remain within the cell(s).

B. GPS

If the cap will be constructed using GPS Equipment, no grid numbering methodology is required to be provided for review.

1.04 PAYMENT

N/A

PART 2 PRODUCTS

2.01 GENERAL

The CONTRACTOR shall furnish all such stakes, spikes, steel pins, templates, platforms, equipment, instruments, tools, and other materials as may be required for staking and quantity surveys.

PART 3 EXECUTION

3.01 CONSTRUCTION STAKING

A. General

1. The OWNER will provide benchmarks for vertical and dimensional data for horizontal location.
2. From a baseline and benchmarks, the CONTRACTOR shall complete the layout of the work and shall be responsible for all measurements that may be required for the execution of the work prescribed in the specifications or on the Drawings, subject to such modifications as may be required to meet changed conditions or as a result of necessary modifications to the work.
3. It shall be the responsibility of the CONTRACTOR to maintain and preserve all benchmarks shown on the plans and any other benchmarks provided by the OWNER.
4. All survey data shall be recorded in accordance with standard and approved methods. All field notes, sketches, records, and computations made by the CONTRACTOR in laying out the work shall be available at all times during the progress of the work for the ready examination by the DESIGN ENGINEER or CQA ENGINEER or his duly authorized representative.
5. The DESIGN ENGINEER or CQA ENGINEER may make checks as the work progresses to verify lines and grades established by the CONTRACTOR and to determine the conformance of the completed work as it progresses with the requirements of the Contract Documents and Drawings. Such checking by the DESIGN ENGINEER or CQA ENGINNER or his representative shall not relieve the CONTRACTOR of his responsibility to perform all work in accordance with the Contract Documents and Drawings and the lines and grades given therein. In the event that location marks as established by the CONTRACTOR are found to be inaccurate or inadequate, work shall be suspended until corrections have been made.

B. LANDFILL CAPPING

The CONFIRMATION SURVEYOR shall establish a grid pattern for control over the entire landfill cap area. The grid dimensions shall be 50 foot by 50 foot. The grid pattern shall remain in the same location for subgrade, compacted soil or clay liner, and protective cover construction. The CONFIRMATION SURVEYOR shall develop and utilize a numbering system for grid points. The CONFIRMATION SURVEYOR shall coordinate the establishment of the grid pattern with the CONTRACTOR so that the same grid pattern may be used for the confirmation surveys. The grid pattern shall be submitted to the DESIGN ENGINEER for approval prior to any grading activities in the cap area.

3.02 QUANTITY SURVEYS

The CONTRACTOR's surveyor shall develop topographic surveys for the purpose of determining quantities of excavation. Quantities of excavation and fill shall be calculated by the average end area method or utilizing digital terrain modeling software. The CONTRACTOR's surveyor shall develop topographic surveys after completion of clearing, grubbing and stripping topsoil and again after completion of grading. Additional cross surveys may be required depending on sequencing of construction. The OWNER may survey portions of the work for confirmation of quantities.

3.03 GRADE STAKES

If grade stakes are used, the CONTRACTOR shall remove all grade stakes prior to placement of subsequent layers during cap construction. The CONTRACTOR shall develop and utilize a grade stake numbering system to log and number individual stakes.

--END OF SECTION--

SECTION 01300 SUBMITTALS

1.1 DESCRIPTION

A. CONTRACTOR shall prepare and furnish the following submittals for this project:

1. Construction Progress Schedules
2. Shop Drawings and Product Data
   a. Silt fence and Inlet Protection
      1. filter fabric
      2. hog wire
      3. posts
      4. wire mesh
   b. Rip-Rap
      1. stone
      2. gravel
      3. filter fabric
   c. Temporary Grassing
      1. seed
      2. mulch
   d. Check Dam
      1. stone
      2. filter fabric
   e. Storm Sewer
      1. all storm pipe, downdrain, and joint materials, bends
      2. headwalls, drop inlets, flared-end sections
   f. LLDPE Geomembrane Liner Cap – **Not in this Contract**
      1. geomembrane material
   g. Geocomposite Drainage Media – **Not in this Contract**
   h. Permanent Grassing
      1. grass seed
      2. fertilizer
      3. lime
      4. mulch
      5. soil analysis and recommendation
   i. Excelsior Matting for Slopes and Channels
   j. Safety Plan
   k. HDPE Piping
3. Operation and Maintenance Data

B. Type or neatly letter the following identifying title on all submittals:

NAME OF OWNER
PROJECT NAME

1.2 CONSTRUCTION PROGRESS SCHEDULES

A. Submit construction progress schedules for the work to DESIGN ENGINEER, with subschedules of related activities which are essential to progress of the Work.

B. Prepare schedules in the form of a horizontal bar chart.

1. Provide separate horizontal bar for each sequence of construction by activity clearly referenced to the corresponding specification section number.

2. Show the chronological order, duration, and projected percentage completion of each sequence of construction.

3. Horizontal time scale: Maximum unit - one (1) month.

4. Sheet size shall be 8½" x 11" or 11” x 17”.

5. Show timeframe for submittal of shop drawings, product data, samples, operation and maintenance data, and other pertinent submittals.

6. Show dates of applications for progress payments at the bottom of the bar chart, indicate payment number, amount of payment request, and cumulative payment to date.

C. Submission Requirements

1. CONTRACTOR shall submit schedules as provided in Article 2.05 of the General Conditions.

2. Submit revised Progress Schedule with each application for payment.

1.3 SHOP DRAWINGS

A. General

1. CONTRACTOR shall submit shop drawings, product data and samples required by the Contract Documents.

2. Designate in the construction progress schedule the dates for submission and the dates that reviewed shop drawings, product data and samples will be needed to cause no delay in the construction progress.

B. Shop drawings

1. Drawings shall be presented in a clear and thorough manner.

    a. Details shall be identified by reference to sheet and detail number shown on Contract Drawings and applicable specification section(s).

    b. Minimum sheet size: 8 ½" x 11"; maximum sheet size 24" x 36".

2. Product data

    a. Clearly mark each copy to identify pertinent products or models.

    b. Show performance characteristics and capacities.

    c. Show dimensions and clearance capacities.

    d. Show wiring or piping diagrams and controls.

3. Manufacturer's standard schematic drawings and diagrams

    a. Modify drawings and diagrams to delete information which is not applicable to the work.

    b. Supplement standard information to provide information specifically applicable to the work.

4. Samples

    a. Office samples shall be of sufficient size and quantity to clearly illustrate:

        i. Functional characteristics of the product, with integrally related parts and attachment devices.

        ii. Full range of color, texture, and pattern.

C. CONTRACTOR Responsibilities

1. Review shop drawings, product data, and samples prior to submission.

2. Determine and verify:

    a. Field measurements,

    b. Field construction criteria,

    c. Catalog numbers and similar data, and

    d. Conformance with specifications.

3. Coordinate each submittal with requirements of the Work and of the Contract Drawings.

4. Notify the DESIGN ENGINEER in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.

5. Begin no fabrication or work which requires submittals until return of submittals with DESIGN ENGINEER review stamp.

D. Submission requirements

1. Make submittals for all items prior to ordering or fabrication, and in such sequence as to cause no delay in the Work or in the work of any other CONTRACTOR.

2. Number of submittals required

   a. Shop Drawings: Submit a minimum of five (5) hard copies as required by General Conditions, plus additional copies which CONTRACTOR requires.
   b. Samples: Submit the number stated in each Specification Section.

3. Submittals shall contain:

   a. The date of submission, submission number (in consecutive order), and dates of any previous submissions.
   b. Contract identification as specified in Article 1.01, paragraph B.
   c. The name of:

      i. CONTRACTOR
      ii. Supplier
      iii. Manufacturer

   d. Identification of the product with the specification section number.
   e. Field dimensions clearly identified as such.
   f. Relation to adjacent or critical features of the work or materials.
   g. Applicable standards, such as ASTM or Federal specification numbers.
   h. Identification of deviations from Contract Documents.
   i. Identification of revisions on resubmittals.
   j. CONTRACTOR's review stamp.

4. All shop drawings shall be coordinated between trades prior to submission for review and approval.

   a. Manufacturer's equipment submittals with statements such as "Field Wiring by Others", "Control Wiring by Others", or "Not by Manufacturer" (referring to related fittings, control or interlock wiring,

etc.) will be "REJECTED" unless specifically noted as having been coordinated with all related trades.

5. CONTRACTOR's stamp initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and of Contract Documents.

E. Resubmission requirements

1. CONTRACTOR shall make any corrections or changes in the submittals required by the DESIGN ENGINEER and resubmit.
2. Drawings and Product Data

   a. Revise initial drawings or data, and resubmit as specified for the initial submittal.

   b. Indicate any changes which have been made other than those requested by the DESIGN ENGINEER.

3. Samples

   Submit new samples as required for initial submittal.

F. Distribution

CONTRACTOR shall distribute reproductions of Shop Drawings which carry the DESIGN ENGINEER's review stamp to:

1. Job site file,
2. Record documents file, and
3. Others as required.

G. DESIGN ENGINEER will return three (3) reviewed and appropriately stamped copies of submittals to CONTRACTOR for distribution, or for resubmission, unless CONTRACTOR requests and submits additional copies as provided in paragraph D of this Article 1.04.

1.4 OPERATION AND MAINTENANCE DATA

A. General

1. CONTRACTOR shall compile product data and related information appropriate for OWNER's maintenance and operation of products furnished under the Contract.

   a. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of specifications.

2. Instruct OWNER's personnel in the maintenance of products and in the operation of equipment and systems as provided in paragraph E of this section and the pertinent sections of the Specifications.

B. Quality Assurance

1. Preparation of data shall be done by personnel.

   a. Trained and experienced in maintenance and operation of the described products.
   b. Completely familiar with requirements of this Section.

C. Form of Submittals

1. Prepare data in the form of an instructional manual for use by OWNER's personnel.

2. Format

   a. Size: 8½”x 11".
   b. Text: Manufacturer's printed data, or neatly typewritten.

3. Binders

   a. Commercial quality three-ring binders with durable and cleanable plastic covers.
   b. Maximum ring size: two (2") inch.

D. Content of Manual

The Manual shall contain the following information arranged in a systematic order:

1. Product data
2. Drawings
3. Written text as required to supplement product data.
4. Copy of each warranty, bond or service contract.
5. Information on materials and finishes.
6. Descriptions and operating and maintenance procedures on equipment and systems.

E. Instruction of OWNER's personnel

1. Prior to final inspection or acceptance, fully instruct OWNER's designated personnel in the operation, adjustment and maintenance of all products, equipment and systems.

2. Operating and Maintenance Data Booklet shall constitute the basis for instruction.

1.5 APPLICATION FOR PAYMENT FORMAT

A. The CONTRACTOR shall submit a sample Application for Payment for approval by the DESIGN ENGINEER prior to submittal of the first progress payment. This document should be similar to the Engineers Joint Documents Committee EJCDC No. 1910-8-E, attached.

B. Progress payments on account of unit price work will be based on the number of units completed. An application for payment worksheet, similar to the attached document, shall accompany the application for payment. The CONTRACTOR shall submit a sample worksheet for approval by the DESIGN ENGINEER prior to submittal of the first progress payment. The sample worksheet must include a lien waiver for the Engineer's review and approval.

C. Construction schedule update must be submitted as part of application for payment.

APPLICATION FOR PAYMENT NO. _____

To: _____ (Owner)
From: _____ (Contractor)
Contract: _____
Project: _____
OWNER's Contract No. _____ ENGINEER's Project No. _____
For Work accomplished through the date of: _____

1.	Original Contract Price:	$
2.	Net change by Change Orders and Written Amendments (+ or -):	$
3.	Current Contract Price (1 plus 2):	$
4.	Total completed to date:	$
5.	Retainage (per Agreement)	$
6.	Total Completed to Date Less Retainage	$
7.	Stored Materials	$
8.	Total completed to Date and Stored Materials	$
9.	Less Previous Application for Payments:	$
10.	**DUE THIS APPLICATION (6 MINUS 7)**	**$**

Accompanying Documentation:

CONTRACTOR's Certification:

The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by prior Applications for Payment numbered 1 through ____ inclusive; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not defective.

Dated _____ _____
CONTRACTOR

By: _____

State of _____
County of _____
Subscribed and sworn to before me this _____
day of _____, _____

Notary Public
My Commission expires: _____

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated _____ _____
ENGINEER

By: _____

EJCDC No. 1910-8-E (1996 Edition)
Prepared by the Engineers Joint Contract Documents Committee and endorsed by The Associated General Contractors of America and the Construction Specification Institute.

APPLICATION FOR PAYMENT WORKSHEET

TO: (Owner's Name and Address) PROJECT:

PAY REQUEST #:

FROM: (Contractor's Name and Address) PERIOD TO:

		CONTRACT			WORK COMPLETED THIS PERIOD		WORK COMPLETED TO DATE		STORED MATERIALS		
Item No.	Description of Work	Qty.	Unit Price	Total Amount	Qty.	Total Amount	Qty.	Total Amount	Qty.	Unit Price	Amount Presently Stored
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
	TOTALS										
CHANGE ORDER NO. 1 (etc.)											
1											
2											
3											
	TOTALS										

-- END OF SECTION --

SECTION 01400 QUALITY CONTROL

1.01 DESCRIPTION

A. The OWNER shall employ and pay for the services of a third party CQA firm and a geotechnical engineering firm to confirm the installation of the geomembrane and clay liners, and perform soils, concrete and other required testing. The CONTRACTOR shall coordinate his work with the third party firms. The third party CQA firm shall use the CQA Plan for this project which is included as a part of these specifications by reference.

1. Employment of the third party CQA firm and geotechnical firm shall in no way relieve CONTRACTOR's obligations to perform the work of the Contract.
2. While the OWNER will provide all materials testing, any retesting required due to failure of material installation by CONTRACTOR shall be back-charged to the CONTRACTOR.

B. Related requirements specified in other sections:

1. Certification of Products: The respective sections of Specifications.
2. Test, adjust and balance of equipment: The respective section of Specifications.
3. Laboratory tests required, and standards for testing: The respective section of the Specifications.

C. Testing laboratory inspection, sampling and testing is required for but not limited to the following:

1. Section 02210 - Grading
2. Section 02220 - Trenching, Backfilling and Compaction
3. Section 02252 - Protective Soil Cover on Landfill Cap
4. Section 02754 - Geocomposite Drainage Media (GDM)
5. Section 02755 - Geomembrane (FML) Cap
6. Section 03312 – Concrete Work

1.02 QUALIFICATION OF LABORATORY

A. Meet "Recommended Requirements for Independent Laboratory Qualifications", published by American Council of Independent Laboratories.

B. Meet basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction, as appropriate.

C. Authorized to operate in the State in which Project is located.

D. Must have established credentials and experience in CQA of geomembrane and compacted clay liners, as appropriate.

E. Testing Equipment

1. Calibrated at reasonable intervals by devices of accuracy traceable to either:

a. National Bureau of Standards
b. Accepted values of natural physical constants

1.03 LABORATORY DUTIES

A. Cooperate with DESIGN ENGINEER and CONTRACTOR: provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.
2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify DESIGN ENGINEER and CONTRACTOR of observed irregularities or deficiencies of work or products.

D. Promptly submit written report of each test and inspection; two copies each to DESIGN ENGINEER, and one copy to CONTRACTOR and record documents file. Each report shall include:

1. Date issued.
2. Project title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by DESIGN ENGINEER.

E. Perform additional tests as required by DESIGN ENGINEER or the OWNER if initial tests are not conclusive to merit acceptance.

1.04 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

F. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the work.
3. Perform any duties of the CONTRACTOR.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to work, to manufacturer's operations.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.

D. Furnish copies of product test reports as required.

E. Furnish incidental labor and facilities:

1. To provide access to work to be tested.
2. To obtain and handle samples at the Project site or at the source of the product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

--END OF SECTION--

SECTION 01560 EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 WORK INCLUDED

A. Installation of soil erosion control devices.

B. Maintenance of soil erosion devices during construction.

C. Removal of temporary soil erosion control devices after stabilization of disturbed areas.

D. Temporary grassing for soil erosion control.

1.02 QUALITY CONTROL

A. After installing the soil erosion control devices as called for on the Construction Plans, the CONTRACTOR shall assure himself that all reasonable measures possible have been taken to prevent the siltation of nearby water courses.

B. The erosion and sediment control shall conform with the rules and regulations of the Erosion Control Ordinance of the North Carolina Department of Natural Resources and Community Development.

PART 2 PRODUCTS

2.01 SILT FENCE AND INLET PROTECTION

A. Posts

Silt fence posts shall be 1.25 lb/linear foot steel posts, a minimum of five (5') feet long and spaced a maximum of six (6') feet apart.

B. Woven Wire Fence

Wire fence reinforcement shall be a minimum of 14-gauge 4" x 4" hogwire, if requred.

C. Filter Fabric

Use a synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn, which is certified by the manufacturer or supplier as conforming to the requirements shown in the table below.

Synthetic filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature of 0 to 120^{o}F.

Physical Property	Requirements
Filtering Efficiency	85% (min)
Tensile Strength at 20% (max) Elongation	Standard Strength-30 lb/lin in (min) Extra Strength-50 lb/lin in (min)
Slurry Flow Rate	0.3 gal/sq ft/min (min)

For inlet protection, a 19 gauge hardware cloth with ¼" mesh openings should be used with NCDOT #5 or #57 washed stone around the base as a filter media.

2.02 RIP-RAP FOR STORMWATER CONVEYANCE CHANNELS AND OUTLET PROTECTION

A. Stone

Stone for rip-rap shall be durable, dense, specifically selected and graded, quarried stone. The d_{50} size shall be 6, 9, 12, or 15 inches as called for on the plans.

B. Gravel

Gravel for filter blanket shall be ASTM No. 57.

C. Filter Fabric

Filter fabric for filter blanket shall be a non-woven geotextile suitable for filtration and separation. The fabric weight shall be a minimum of 6.0 ounces per square yard.

2.03 TEMPORARY GRASSING

A. Temporary seed

Temporary seed shall be annual ryegrass and pearl millet at the planting rates specified herein. Other seed mixtures that conform to the North Carolina Erosion and Sediment Control Planning and Design Manual may also be utilized.

B. Mulch

Mulch for temporary grassing shall consist of grain straw or other acceptable material, and shall have been approved by the DESIGN ENGINEER before being used. All mulch shall be reasonably free from mature seedbearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Bermuda Grass, Crotalaria, and Witchweed, and free from an excessive amount of noxious weeds at the time of use of the mulch, and also there shall be compliance with all applicable State and Federal domestic plant quarantines. Straw mulch that is matted or lumpy shall be loosened and separated before being used.

Material for holding mulch in place shall be an approved binding material. No asphalt tacking material will be allowed.

2.04 TEMPORARY STORMWATER CONVEYANCE CHANNEL LINER

A. Excelsior Matting

Excelsior matting shall be an erosion control blanket consisting of an excelsior mat with a synthetic netting on one side similar and equal to Curlex as manufactured by American Excelsior Company. Double sided netting will be used as called for in the plans.

PART 3 EXECUTION

3.01 GENERAL

Construct temporary and permanent erosion control measures as shown on the plans, as required by site conditions, regulatory agency or DESIGN ENGINEER. All permanent erosion control work shall be incorporated into the project at the earliest practicable time. Temporary erosion control measures shall be coordinated with permanent erosion control measures and all other work on the project to assure economical, effective, and continuous erosion control throughout the construction and post-construction period and to minimize siltation of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property. If active construction ceases for more than 21 days, all disturbed areas shall be seeded and mulched using the temporary seed type and planting rates specified herein.

The CONTRACTOR shall be liable for all damages to public or private property and fines as may be placed on the project by the local regulatory agencies due to soil erosion from the project site. Clear only those areas required to install the soil erosion control devices.

All erosion control devices shall be inspected by the CONTRACTOR after each rainfall, and at least weekly. Any required repairs shall be made immediately. Sediment deposits shall be removed when deposits reach approximately one-half of the capacity of the erosion control.

3.02 SILT FENCE

A. Silt fence shall be installed in accordance with the details in the plans.

B. Should the filter fabric deteriorate or become ineffective prior to the end of the construction as determined by the DESIGN ENGINEER or CQA ENGINEER, the fabric shall be replaced immediately at no additional cost to the OWNER.

3.03 RIP-RAP

A. Prepare subgrade to the required lines and grades as shown or indicated on the Construction Drawings. Place any fill required in the subgrade to a density equal to that of the surrounding area. Place filter fabric on the finished subgrade.

B. Place rip-rap by mechanical methods, augmented by hand placing where necessary to prevent damage to permanent works, provided that when the rip-rap is completed it

forms a properly graded, dense, neat layer of stone. The completed rip-rap shall have a thickness as shown on the plans.

3.04 TEMPORARY GRASSING

Temporary grassing procedures will be implemented only under the direction of the DESIGN ENGINEER, a cease of construction in excess of 21 days, or as required by the soil erosion inspector.

Seeding for temporary grassing shall be applied to all shoulders, side stormwater conveyance channels, cut slopes, fill slopes, and any other area disturbed by the CONTRACTOR and not designated for pavement or structures. Temporary seeding shall occur immediately following final land disturbing activities. Any unseeded area which erodes shall be repaired to the satisfaction of the DESIGN ENGINEER at no additional cost to the OWNER. Temporary seeding shall be applied at the following rates:

Temporary Seeding	LBS / Acre	Depth of Cover	Date of Planting
German Millet	40	¼" - ½"	5/1 - 8/15
Rye (Grain)	120	¼" - ½"	1/1 - 5/1

Areas not receiving permanent cover that will be exposed for more than three (3) months shall receive temporary grassing. Temporary grassing shall consist of rye grass. Other cereal grass (i.e., millet) may also be used. Other grassing methods which have proved effective by the operator may be substituted for these.

3.05 INLET PROTECTION

A sump shall be constructed around the drop or pipe inlet and silt fence installed in accordance with the details in the plans for Drop or Pipe Inlet Protection.

3.06 TEMPORARY STORMWATER CONVEYANCE CHANNEL LINER

A. After installation of the utilities, the stormwater conveyance channels shall be reconstructed as near as possible to the original configuration.

B. Apply lime, fertilizer, and seed to the stormwater conveyance channel and adjoining areas in accordance with the grassing specifications.

C. Place the excelsior mat in accordance with the detail and table in the erosion control plan.

D. Start laying the mat from the top of the upstream end of the channel and unroll it downgrade. Do not stretch netting.

E. Bury the upslope end and staple the mat every 12” across the top end, every three (3) feet around the edges and across the mat so that it is held closely against the soil. However, do not stretch the mat when stapling.

F. To join ends of strips, insert the new roll of mat in a trench as with upslope end and overlap it 18” with the previously laid upper roll. Turn under 6” of the 18” overlap and staple every 12” across the end.

3.07 REMOVAL OF TEMPORARY EROSION DEVICES

The CONTRACTOR shall remove all sedimentation and erosion control devices upon the approval of permanent seeding and stabilization by the DESIGN ENGINEER. All sediment deposits remaining in place after the erosion control devices are removed shall be dressed to conform with the existing grade, prepared, and seeded. The cost of removal and cleanup shall be included in the cost of the installation of the device or in the cost for maintenance.

3.08 CLEAN OUT PERMANENT EROSION CONTROL DEVICES

The CONTRACTOR shall clean out permanent sediment and erosion control devices upon approval of permanent seeding and stabilization by the DESIGN ENGINEER. The devices shall be cleaned out to the original condition. The cost of cleanup shall be included in the cost of installation or in the cost of maintenance of the device.

--END OF SECTION--

SECTION 02110 CLEARING AND GRUBBING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of site clearing is shown on Construction Drawings.

B. Site clearing work includes, but is not limited to:

1. Protection of trees outside of clearing limits.
2. Removal of trees and other vegetation within site clearing limits.
3. Grubbing within the clearing limits.
4. Stripping topsoil.
5. Removal of debris on the site.

1.02 RELATED DOCUMENTS

A. Section 02930 - Grassing

B. Construction Drawings and general provisions of Contract, including General and Supplementary Conditions, and Detailed Specification sections, apply to work of this section.

1.03 JOB CONDITIONS

A. Examine areas for conditions under which work is to be performed. Report to the DESIGN ENGINEER all conditions contrary to those shown on the Construction Drawings or specified herein and all other conditions that will affect satisfactory execution of the work. Do not proceed with work until unsatisfactory conditions have been corrected and authorization has been given by OWNER's representative.

B. Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

C. Provide protection necessary to prevent damage to existing improvements indicated to remain in place on adjoining properties and on OWNER's. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction, without additional cost to the OWNER.

D. Keep dirt, dust, noise, and other objectionable nuisances to a minimum. Use temporary enclosures, coverings, and sprinkling, or a combination thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent of causing flooding, contaminated runoff, or icing.

E. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, access foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

1. Water trees and other vegetation to remain within limits of the contract work as required to maintain their health during course of construction operations.
2. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to OWNER, without additional cost to OWNER. Employ licensed arborist to repair damages to trees and shrubs.
3. Replace trees which cannot be repaired and restored to full-growth status, as determined by arborist.

F. Property corners, iron pipe and/or monuments, shall be located and protected before beginning clearing operations.

1.04 QUALITY ASSURANCE

A. Obtain copy of Land Disturbing Permit and maintain at the site.

B. Obtain the required permits and conform to applicable codes for disposal of debris off-site and burning of debris on-site.

C. Perform all work in accordance with requirements of OSHA and the Environmental Protection Agency in addition to State and local requirement.

PART 2 PRODUCTS

2.01 TOPSOIL

A. Is defined as natural, friable soil, characteristic of representative soils that produce heavy growth of crop, grass, or other vegetation is generally that soil strata found to 24 inches depth.

B. Topsoil for placement on graded areas shall be free from roots, stones, and other materials that may hinder grading, planting, and maintenance operations, and shall be free from objectionable weed seeds and toxic substances.

PART 3 EXECUTION

3.01 CLEARING

A. Clearing shall consist of the cutting, removal, and satisfactory disposal of all trees and shrubs within the clearing limits as designated on the plans and/or within easements and right-of-ways which will require construction work during the project.

B. Clear only those areas required to install the soil erosion control devices as shown on the plans and outlined in Section 01560 - Erosion and Sediment Control of these specifications prior to starting overall clearing operations.

C. Repair and maintain erosion control devices during construction in order to always assure their efficiency.

D. Trees to remain shall be trimmed of branches which will obstruct the new construction or as directed by the DESIGN ENGINEER or CQA ENGINEER. Branches to be trimmed shall be neatly cut close to the bole of the tree or main branch. Cuts more than 1 ½" in diameter shall be painted with a tree wound paint formulated for use on damaged plant tissues.

3.02 GRUBBING

A. Grubbing shall consist of the removal and disposal of stumps, roots larger than three (3) inches in diameter and matted roots from the designated clearing limits to a depth of 18 inches below the original surface level of the ground.

B. For trees to remain, provide protection for roots over 1 ½" in diameter which are cut during grubbing. Coat cut faces with a tree wound paint formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out, cover with earth as soon as possible.

C. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground, unless further excavation is indicated.

D. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.

3.03 TOPSOIL STRIPPING, STOCKPILING AND SPREADING

A. All topsoil within the clearing limits shall be stripped and stockpiled as directed by the OWNER.

B. Topsoil shall be placed on all shoulders, slopes, stormwater conveyance channels, and other earth areas graded under this contract, unless otherwise specified on the plans. Topsoil shall be uniformly placed on these areas to a compacted depth of not less than 4 inches or more than 6 inches. Topsoil depth on landscape areas shall be no less than 6 inches. The material shall be placed, leveled, and lightly compacted with at least one pass of a cultipacker, or other approved equipment weighing 100 to 160 pounds per linear foot of roller, to required cross sections.

3.04 REMOVAL OF DEBRIS

A. Removal of debris shall consist of the satisfactory disposal of any garbage or rubble within the clearing limits, easements, right-of-way or as specifically designated on the plans.

3.05 DISPOSAL OF MATERIAL

A. All vegetation and debris within the areas to be cleared shall become the property of the CONTRACTOR upon the start of work and shall be removed from the site and properly disposed.

B. Burning of combustible materials removed by clearing and grubbing operations will be allowed providing the CONTRACTOR obtains such permits and approvals required by local authorities, if available. The CONTRACTOR will be responsible for controlling fires in compliance with all Federal, State, and Local laws and regulations. The securing of necessary burning permits shall be the responsibility of the CONTRACTOR. All burning shall be under the constant care of competent watchmen. All materials resulting from clearing and grubbing operations and disposed of by burning on the site shall be thoroughly and completely reduced to ashes.

--END OF SECTION--

SECTION 02210 GRADING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Excavation, fill, and preparation of sub-grade for landfill, roadways, embankments, building foundations, and detention basins.

B. All excavation shall conform with the lines and grades as shown on the plans or established by the DESIGN ENGINEER.

1.02 RELATED WORK

Drawings and general provisions of Contract, including General and Supplementary Conditions, and Detailed Specification sections, apply to work specified in this section.

1.03 QUALITY ASSURANCE

A. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Owner will engage soil testing and inspection service, for quality control testing during earthwork operations.

C. Test reports for the following items shall be given to the DESIGN ENGINEER and will be available for the Contractor directly responsible for earthwork being tested:

1. Field Density Test Reports
2. One (1) optimum moisture-density curve for each type of soil encountered.
3. Other field inspection reports as deemed appropriate.

1.04 APPLICABLE STANDARDS

The most recent publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

American Society for Testing and Materials (ASTM) Publications (Latest Version):

D422	Method of Particle-Size Analysis of Soils
D698	Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 5.5 lb. Rammer/12 inch drop
D1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D2922	Density of Soil in Place by the Nuclear Gage
D2937	Density of Soil in Place by the Drive Cylinder Method
D4318	Test Method For Liquid Limit, Plastic Limit and Plasticity Index of Soils

1.05 SUBMITTALS

Submittals are required for proposed technique for rock excavation.

1.06 MEASUREMENT AND PAYMENT

Not applicable.

PART 2 PRODUCTS

2.01 SUITABLE MATERIAL

A. Shall be free from construction material, debris, frozen material, organic matter or unstable material.

B. Shall be suitable for the formation of embankments, subgrades, backfill, shoulders and other places requiring structural fill as may be indicated on the contract drawings or directed by the CQA ENGINEER.

C. No rock greater than 6 inches in diameter shall be placed in any portion of the landfill embankment except as allowed in Section 3.05 C.5. Small rock less than 6 inches, if used, shall be incorporated into the embankment in such a fashion to completely avoid bridging or voids.

2.02 UNSUITABLE MATERIAL

The CQA ENGINEER will designate whether or not a material is unsuitable for the formation of embankments and subgrades. Moisture content of material alone shall not render material unsuitable. It is contractor's responsibility to raise or lower material moisture content to achieve specified compaction densities or remove and replace at Contractor's expense.

The CQA ENGINEER will determine whether soil materials in an area designated for an embankment are suitable to receive fill. If the material is unsuitable, the material shall be removed and replaced with suitable material.

2.03 BORROW EXCAVATION

Borrow material is available on site which is suitable for formation of embankment and subgrades as determined by the CQA ENGINEER, and shall be obtained from areas designated on the contract drawings.

2.04 SOIL LINER SUBGRADE

This area includes the designated thickness of compacted material to the limits indicated below the compacted soil liner.

2.05 SELECT SOILS FOR MUNICIPAL SOLID WASTE LANDFILL

The CQA ENGINEER shall classify soils suitable for compacted soil / clay liner construction, drainage blanket (protective cover) and daily waste cover during the site excavation. The Contractor shall stockpile the materials at stockpile areas designated by the CQA ENGINEER.

2.06 GRADED AGGREGATE

Graded aggregate for access road construction shall comply with State Department of Transportation specifications for graded aggregate base.

2.07 GEOTEXTILE FABRIC

The geotextile fabric for access road construction shall be a high modulus, woven geotextile suitable for road base stabilization, soil separation, and reinforcement. The fabric shall be Amoco Style 2006, Nicolon Mirafi 600X or equal.

PART 3 EXECUTION

3.01 PREPARATION OF GROUND SURFACE FOR FILL

Before embankment and roadway construction are begun, all vegetation and rubbish shall be removed from the area within the limits of the embankment and roadway.

Following stripping, those areas at grade or designated to receive fill or subsequent materials placement shall be PROOF ROLLED in the presence of the CQA ENGINEER with a loaded dump truck or similar piece of heavy equipment to identify those areas needing repair due to pumping or yielding. Any area which ruts or pumps excessively in the opinion of the CQA ENGINEER shall be UNDERCUT to firm bearing and backfilled with properly compacted soil fill.

Topsoil shall be stockpiled and utilized in areas to be seeded after completion of grading. Excess topsoil shall be hauled to designated areas.

3.02 DETERMINATION OF IN-PLACE SOIL PROPERTIES

A. Determination of Density

Testing shall be provided by the CQA ENGINEER for the OWNER. Testing shall be performed by an approved commercial testing laboratory. The number of laboratory moisture-density tests and field density tests shall be in accordance with Paragraph 3.02, C to insure the specified density is obtained. Laboratory tests for moisture-density relations shall be performed in accordance with ASTM D698. Field tests for density and moisture content shall be performed in accordance with ASTM D1556, ASTM D2937 or ASTM D2922. Copies of all tests results will be furnished to the CONTRACTOR and the DESIGN ENGINEER. All testing shall comply with minimum construction quality assurance requirements of the State.

B. Number of Density Tests:

The following tests will be performed and are considered to be the number of tests. Additional tests may be required contingent upon weather and/or soil conditions.

1. One (1) laboratory moisture-density relation test and companion classification test for each type of soil encountered.
2. A minimum of one (1) density test shall be performed per 1,000 cubic yards of fill subgrade and other embankment fills.

3.03 DRAINAGE

Satisfactory methods for dewatering and stormwater control during construction shall be installed as required. Cost of dewatering shall be included in the unit (or) lump sum price in the proposal for unclassified excavation. The disposal of water after removal shall be in keeping with the intents of the soil erosion control plan.

3.04 ROCK EXCAVATION

Rock excavation shall be in accordance with Section 02211 - Rock Excavation.

3.05 GENERAL COMPACTION/FILL REQUIREMENTS

Excavation, fill and compaction requirements for this project vary as to the respective subgrade being constructed. Any subgrade not specifically detailed herein or any subgrade requirements that reference this section shall meet the requirements of this section.

A. COMPACTION

1. When tested, embankment and fill material shall be compacted to not less than 95% Standard Proctor (ASTM D698) of the maximum dry density, or as specified in the schedule below. All subgrades will be proof-rolled prior to acceptance of subgrade by the CQA ENGINEER. Proof-rolling will be in accordance with procedures in section 3.01 of this specification. The number of tests shall be in accordance with Section 3.02, B.

DESCRIPTION	COMPACTION
Sediment Basin Embankments	95%
Roadways	95%
Shoulders & Embankments	95%
Soil Liner*	95%
Utilities Under Structures	95%
Other Areas	95%

*As Determined By Test Pad

2. If, in the opinion of the CQA ENGINEER (based upon testing reports, or inspection), subgrade or fills which have been placed are below specified density, the Contractor shall then provide additional compaction or repairs at no additional cost to Owner. Retests may be charged to the CONTRACTOR as determined by the CQA ENGINEER.

3. Subgrade materials shall be compacted at a moisture content within plus or minus 4% of optimum unless more or less moisture is allowed by the CQA ENGINEER. The CONTRACTOR shall dry or add moisture to the subgrade material when required to provide a uniformly compacted subgrade.

B. PROTECTION OF SUBGRADES

Stormwater conveyance channels and drains shall be provided and maintained when required to satisfactorily drain the subgrade. Where previously approved subgrade is damaged by natural causes, by hauling equipment, or by other traffic, the Contractor shall restore the subgrade to the required lines, grades, and typical sections and to the required density at no additional cost to the Owner.

C. EMBANKMENT FORMATION:

1. Areas to receive embankment formations or fill shall be stripped to suitable base material as required in Section 02110 - Clearing and Grubbing.

2. The material shall be deposited and spread in successive, uniform, approximately horizontal layers of not more than ten (10") inches in depth, loose measurement, for the full width of the cross section, and shall be kept approximately level by the use of effective spreading equipment. Each layer of the embankment shall be satisfactorily compacted as hereinafter specified.
3. Hauling shall be distributed over the full width of the embankment, and in no case will deep ruts be allowed to form during the construction of the embankment. The embankment shall be properly drained at all times.
4. Where embankments are to be constructed across wet sandy soil which will not support the weight of trucks or other hauling equipment due to near surface ground water, the first layer of the embankment may be constructed as a bridging lift by placing successive truck or other equipment loads in a uniform distributed layer of a thickness not greater than that necessary to support the trucks or hauling equipment while placing subsequent layers as determined by the DESIGN ENGINEER and CQA ENGINEER. The remainder of such embankments shall then be constructed in layers as above specified.
5. When embankments are being constructed principally of rock, the depth of each layer shall be no greater than 36 inches. The rock shall be carefully distributed throughout the embankment and all voids shall be filled with fine material. The rock shall have a maximum particle size of no more than two (2') feet. No rock lifts shall be placed within three (3') feet vertically of the soil liner subgrade or roadway subgrade. Rock shall only be placed in fill sections totaling greater than 6 feet in depth and not in proposed underground utility locations.

D. EMBANKMENT COMPACTION:

1. All embankment material shall be compacted to 95% Standard Proctor compaction unless otherwise provided in the Contract Documents or directed by the CQA ENGINEER. Compaction equipment used by the Contractor shall be adequate to produce the required compaction and produce a uniformly constructed embankment with all layers uniformly bound to all preceding layers.
2. Embankment materials shall be compacted at a moisture content within plus or minus four (4%) percent of optimum unless other moisture range is approved by the CQA ENGINEER. The Contractor shall dry or add moisture to the embankment material when required to provide a uniformly compacted and stable embankment.

3.06 GENERAL GRADING TOLERANCES

Grading tolerances shall be as specified below:

LANDFILL(S)	ROADWAYS AND STRUCTURES
Soil Liner Subgrade (- 0.1' - 0)	Roadway Subgrade
	A. Rough Grading (± 0.12')
Compacted Soil Liner	B. Fine Grading (± 0.04')
A. Rough Grading (+ 0 to 0.2')	
B. Fine Grading (+ 0 to 0.1')	Other
	A. Rough Grading (± 0.12')
Embankment (± 0.1')	B. Fine Grading (± 0.04')
Protective Cover Soil (+ 0.1')	

3.07 ROADWAY SUBGRADE

A. Preparation of Subgrade

The roadway subgrade shall be shaped to the lines, grades and typical sections shown on the plans. Where the CQA ENGINEER directs that areas of the subgrade are to be stabilized, the subgrade surface in such areas may be left uniformly below grade to provide for the addition of the stabilizer material.

All unsuitable material, boulders, and all vegetative matter shall be removed and replaced with suitable material. Suitable material, when not available from the subgrade work, shall be taken from general excavation or borrow sources.

Material excavated in preparing the subgrade shall be stored or stockpiled in such a manner as to not interfere with the proper drainage or any of the subsequent of placing base or pavement.

B. Compaction of Subgrade

When tested, fill material shall be compacted to not less than the following percent of the maximum dry density:

1. Under paved roads 95%.
2. Under shoulders and stoned road 95%.

The subgrade shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated. The Contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade.

C. Protection of Subgrade

Stormwater conveyance channels and drains shall be provided and maintained when required to satisfactorily drain the subgrade. Where previously approved subgrade is damaged by natural causes, by hauling equipment, or by other traffic, the Contractor

shall restore the subgrade to the required lines, grades, and typical sections and to the required density at no cost to the Owner.

D. Rough Grading

The roadway subgrade surface shall to within the specified tolerance of the grades indicated on the contract drawings. The final rough grade surface shall meet the compaction requirements and be graded and sealed to properly drain storm water prior to acceptance by the CQA ENGINEER.

E. Fine Grading

Contractor shall fine grade all roadway surfaces to within the specified tolerance of the grades indicated on the contract drawings. Compaction requirements shall be as described in Section 3.05.

3.08 LANDFILL CELL

The landfill cell shall be excavated to achieve the subgrade elevations equal to the specified liner thickness below the lines and grades indicated on the drawings as the top of clay elevation. The subgrade then shall be scarified to a depth of six (6") inches and compacted to 95% Standard Proctor before acceptance and subsequent placement of the compacted soil liner.

Fine Grading:

Contractor shall fine grade the subgrade prior to placement of the soil liner.

3.09 BUILDING FOUNDATION SUBGRADES

Foundation subgrades shall be excavated to the lines and grades indicated on the plans. Footing subgrades shall be firm, backfill shall be to 95% of Standard Proctor at ±2% of optimum moisture content.

3.10 STOCKPILE AREAS

Surplus and unsuitable excavation shall be hauled, placed and sloped to drain for each material classification.

Material stockpile areas are indicated on the contract drawings. All excavation material shall be placed or stockpiled by one of the means listed below. All material types and classifications shall be subject to the interpretation of the CQA ENGIEER and shall be stockpiled or used for fill as directed by the CQA ENGINEER. All stockpiles remaining over 14 days shall be stabilized with grass.

- Used for structural fill
- Stockpiled as topsoil

- Stockpiled as soil liner material
- Stockpiled as daily cover
- Stockpiled as drainage blanket (protective cover) material

3.11 MOISTURE CONTROL

Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compaction operations.

The Contractor shall furnish equipment for modifying the moisture content of the fill material and at times when the moisture content is not within the specified range, shall operate such equipment so as to achieve the necessary correction with minimum loss of time.

The addition of water shall be accomplished by methods which will distribute the added water evenly and in a controlled manner over the fill. Reduction in water content shall be accomplished by methods which are effective for promoting aeration of the fill material. No fill shall be placed until approved types of equipment for aeration and for addition of water are on the job and are demonstrated to be satisfactory of watering and/or dewatering operations.

During placement operations, Contractor shall keep surfaces from drying by addition of water or placement of additional materials.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.12 PROTECTION OF SUBGRADES AND FILL SURFACES

Newly graded areas shall be protected from traffic and erosion, and all settlement or washing away that may occur from all causes, prior to acceptance, shall be repaired and grades re-established to the required elevations and slopes. Embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operations and shall be protected and maintained by the Contractor in a satisfactory condition until compacted soil liner or road base materials are placed. The storage or stockpiling of materials on the finished subgrade will not be permitted.

--END OF SECTION--

SECTION 02211 ROCK EXCAVATION

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The CONTRACTOR shall furnish all labor, materials, tools, supervision, permitting, transportation, and equipment to excavate, remove and dispose of rock and to insure that lines are to grade and protected and that elevations are obtained where shown on the Drawing. CONTRACTOR may perform blasting operations to remove rock only with the ENGINEER'S approval. This Specification will govern activities pertaining to blasting operations.

B. The CONTRACTOR shall be solely responsible for the safety of his workers, landfill employees, other contractors on site and the general public as it relates to the performance of Rock Excavation.

C. The CONTRACTOR shall closely coordinate the Work under Rock Excavation with the OWNER to avoid conflicts with the daily operations of the landfill.

D. The CONTRACTOR shall be solely responsible for any damage, direct or indirect, arising from the performance of Rock Excavation. Any damage to landfill infrastructures will be repaired immediately at the sole expense of the CONTRACTOR.

1.2 RELATED WORK

Section 02210 – Grading
Section 02220 – Trenching, Backfilling, and Compaction.

1.3 SUBMITTALS

1. All forms, documents and reports required to obtain any and all permissions or permits associated with blasting.
2. The Blasting Plan that shall include the following:

    a. Certificate of Insurance meeting all requirements of the Contract Documents listing the OWNER and ENGINEER as additionally insured.
    b. Safety Plan and plan where explosives will be staged or placed prior to use.
    c. All permits and notifications as required by local jurisdictions or others for the blasting operation.
    d. A Blasting Plan to satisfy the parameters of this project including, but not limited to, the sequence of blasting, method to segregate types of rock, protection methods, vibration monitoring, methods employed for wet blasting, the drill hole depth and spacing, explosive type and charge size.
    e. Federal and state blasting license numbers.

f. Attestation that the blasting subcontractor is OSHA and MSHA compliant.

g. A plan for monitoring damage to nearby structures.

3. Seismic Survey for determining maximum charges. Article 1.6, C.
4. Drilling and Blasting Schedule, Article 3.2, D.

1.4 QUALITY ASSURANCE

A. Seismic Survey Firm: CONTRACTOR shall pay for and employ the services of a company specializing in seismic surveys with at least 5 years experience.

B. Explosive Firm: CONTRACTOR shall pay for and employ an explosives firm specializing in explosives for disintegration of rock, and having at least 5 years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for explosive disintegration of rock and to NFPA 495 for handling explosive materials.

B. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

1.6 PROJECT CONDITIONS

A. Conduct survey and document conditions near locations of rock removal (prior to blasting) and photograph conditions identifying irregularities.

B. Advise OWNER of adjacent buildings or structures in writing, prior to executing seismographic survey. Explain details of Blasting Plan and seismic operations.

C. Obtain a Seismic Survey prior to rock excavation to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties, other Work, or remaining foundation materials.

1.7 DEFINITIONS

A. For purposes of classification of excavation, Rock is defined as a sound and solid mass, layer, or ledge of mineral matter in place, and of such hardness and texture that cannot be excavated after loosening with a single tooth hydraulic ripper mounted on a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds (Caterpillar D-8k or equivalent) or by a Caterpillar 973 front-end loader or equivalent without drilling or blasting.

B. In areas where the use of the ripper as described is impractical, Rock is defined as a sound material of such hardness and texture that it cannot be loosened or broken down by the curling force of a late model backhoe equivalent to or larger than a Caterpillar Model 225. The backhoe shall be equipped with rock teeth and shall attack the material to be excavated from all angles.

PART 2 PRODUCTS

N/A

PART 3 EXECUTION

3.1 PREPARATION

A. Prior to implementing any work under Rock Excavation, the CONTRACTOR shall carefully inspect the Work installed under of other Sections of these Specifications and verify that all such Work is complete to the point where Rock Excavation may properly commence without adverse impact. CONTRACTOR shall ensure that adequate security measures are in place and that only authorized personnel have access to the blasting zone.

B. The CONTRACTOR is responsible for obtaining all permits required to conduct blasting operations. All blasting operations shall adhere to the requirements of the permit. The CONTRACTOR shall be responsible for meeting all of the requirements of the permits, including conducting surveys, posting notifications, and monitoring and reporting.

3.2 BLASTING OPERATIONS

A. No blasting materials may be stored on or near the Site.

B. CONTRACTOR shall assume all risk in assessment of the depth and character of the bedrock, and shall conduct investigations.

C. CONTRACTOR shall develop a Blasting Plan that will achieve the lines, grades, and elevations shown on the Drawings. All excavations shall comply with OSHA Guidelines.

D. The OWNER and ENGINEER shall be notified of the drilling and blasting schedule prior to beginning field activities.

E. Blasting shall minimize the development of large, oversize boulders. Maximum particle size shall be 1 foot in diameter. All oversized materials shall be mechanically broken down to suitable sizes at CONTRACTOR's expense for placement in areas requiring fill or for off-site transportation.

F. CONTRACTOR shall employ controlled blasting procedures that results in the peak particle velocity at the near edge of existing landfill liner systems being 1.0 inch per second or less. The blasting procedures shall minimize fracturing of rock beyond and beneath the limits of excavation. The CONTRACTOR shall measure the peak particle velocity at the near edge of the existing landfill liner system. The CONTRACTOR shall revise the Blasting Plan appropriately if ground vibrations, air blast pressures, fly rock or oversized material exceed the criteria established in the Blasting Plan.

G. A report of the vibration monitoring shall be submitted by the CONTRACTOR to the OWNER and ENGINEER at the completion of blasting activities.

H. Fly rock shall be controlled through the use of blasting mats or by modifying the Blasting Plan appropriately.

I. Groundwater may be encountered during the blasting operations. CONTRACTOR is responsible for wet blasting if necessary.

J. As part of the blasting operation, the CONTRACTOR is to provide daily reports of the drilling and blasting, including but not limited to, the number and location of holes drilled for each drill hole; the depth of overburden, depth of rock drilled above design elevation and total depth of drilling, hole spacing and size, maximum number of holes per delay, charge per delay and types of explosives and detonators used.

3.3 FINISHING

A. Blend slopes with landscape features.

3.4 PROTECTION

A. Notify all area utility companies prior to commencing work in accordance with state and local regulations.

B. Locate, identify, and protect all utilities from damage.

C. CONTRACTOR shall conduct operations so as not to exceed 65 decibels at property lines at any time.

D. CONTRACTOR is responsible to protect all facilities during blasting operations. CONTRACTOR will be fully responsible to repair any and all damage as a direct or indirect result of blasting operations.

-- END OF SECTION --

SECTION 02220 TRENCHING, BACKFILLING AND COMPACTION

PART 1 GENERAL

1.01 DESCRIPTION

The work under this Section includes all excavation, backfill, compaction, pavement removal, site restoration and cleanup for the construction of underground pipelines, and their related structures.

1.02 RELATED WORK

A. Section 02720 - Storm Sewer System

1.03 DEFINITIONS

A. Pipeline Embedment:

1. Backfill material encasement extending from the full depth of bedding to a distance of twelve (12") inches above the top of the pipe.
2. Embedment is composed of bedding, initial backfill and foundation.

B. Foundation:

1. The load bearing portion of the embedment which underlines the bedding material.
2. Normally the excavated trench bottom except where unstable conditions exist and then alternate methods of foundation stabilization are required.

C. Bedding: Backfill material between a pipe and the foundation on which it rests.

D. Initial Backfill: Backfill placed from the top of the bedding and along the sides of the pipe to a distance of twelve (12") inches above the top of the pipe.

E. Final Backfill: Backfill placed from a distance of twelve (12") inches above the top of the pipe to the finished grade.

F. Embankment: Fill material placed above original ground surface to provide cover over a conduit which is fully or partially exposed.

G. Rock: Where "Rock" is used as the name of an excavated material, it shall mean boulders or pieces of rock, concrete or masonry measuring one (1) cubic yard or more, hard shale or solid ledge rock and masonry which, in the opinion of the CQA ENGINEER, requires for its removal the continuous use of pneumatic tools.

1.04 QUALITY ASSURANCE

H. Tests required by this section shall be performed by a qualified independent testing laboratory meeting the requirements of Section 01400.

I. The CONTRACTOR shall insure that all testing laboratory personnel contact the project representative prior to conducting tests to mutually select the test site. No testing shall commence without this contact.

J. All work shall comply with local development standards and state department of transportation specifications.

K. Regulatory Requirements:

1. Comply with applicable requirements of federal, state, and local laws, regulations and codes having jurisdiction at project site.

L. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the work of this Section.

1.05 SUBMITTALS

A. A minimum of two (2) copies of all test results shall be submitted to the DESIGN ENGINEER, and one copy to the CONTRACTOR.

1.06 MEASUREMENT AND PAYMENT

Not applicable.

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL

A. The requirements of this Article shall apply to all backfill materials unless otherwise specified.

B. All material shall be suitable and free from roots, wood, scrap material, and other vegetable matter and refuse.

C. Acceptable material shall generally be a natural or artificial mixture of soil types normally found in natural deposits in the project vicinity or material obtained from the CONTRACTOR's excavations.

D. All material shall be sufficiently dry for compaction and shall not contain excessive amounts of soft or highly plastic clays.

E. Maximum size of stone shall not exceed four (4") inches.

2.02 BEDDING MATERIAL

A. Fine granular bedding:

1. Materials for fine granular bedding shall consist of well graded fine to course sands or gravel meeting the gradation requirements of ASTM C 33 for fine aggregates.
2. Natural materials or artificial mixtures, consisting largely of a mixture of sand and clay, found in natural deposits in the project vicinity may be utilized as long as the material meets the proper proportions and gradation requirements.
3. The material shall generally pass a 3/8" sieve with no more than 10% passing a No. 100 sieve, and shall be non-plastic.

B. Gravel Bedding:

1. Materials used for gravel bedding shall consist of natural rounded or angular, graded stone or crushed rock, with little or no fines.
2. Generally, the aggregate size shall range from 1 1/2" to 3/8".
3. ASTM classification shall be No. 57 stone.

2.03 UNSUITABLE MATERIALS

A. General: Any material, which in the opinion of the CQA ENGINEER, contains vegetable matter, muck, roots, and rubbish shall be considered unsuitable.

B. The following, as defined in the United Soils Classification System, shall be considered the basis for classifying unsuitable material unless specifically noted in other sections of the specifications:

1. Highly plastic clay soils of the CH and MH descriptions with moisture contents more than 10% over the standard proctor optimum moisture.
2. Border line soils of the SC-CH description with moisture contents more than 10% over the standard proctor optimum moisture.
3. Organic soils of the OL and OH description with over 5% organics.
4. Highly organic soils of the PT description.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Clearing and Care of Surface Materials:

1. Topsoil shall be stockpiled at a suitable location so that it can be replaced.

B. Trees, plants, and existing structures and utilities shall be protected with appropriate barriers prior to construction.

3.02 GENERAL TRENCH EXCAVATION

A. The requirements of this Article shall apply to all trench excavation unless otherwise specified.

B. Trench excavation shall be of such depth to enable proper installation of embedment materials that will result in construction of the pipeline to the alignment and grade, or depth of cover, as shown on the Construction Drawings.

1. Over-excavation and replacement of materials with proper bedding material shall be required where specified by the CQA ENGINEER.
2. If during the course of construction, the trench is inadvertently over-excavated, that area shall be backfilled with fine granular bedding material, unless gravel bedding is required where unsuitable materials are encountered in the subgrade or where specified by the CQA ENGINEER.

C. All such related structures and appurtenances shall be constructed to the alignment, grade, and position as shown on the Construction Drawings.

D. In all cases where materials are deposited along open excavation they shall be placed so that in the event of rain, no damage will result to the work or adjacent property.

E. Unstable trench bottom:

1. Where an unstable trench bottom condition is encountered due to the presence of muck, quicksand, or other unsuitable materials, the unstable soil material shall be removed to a depth which is sufficient to produce a firm foundation.
2. The unstable soil material shall then be replaced with Class B embedment for the full depth of unstable material excavation.
3. The depth of unstable soil excavation and bedding replacement will be dependent upon the severity of the trench bottom soil conditions.
4. Depths of bedding shall be as a minimum those specified for Class B embedment, contained in Article 3.07, C. of this Section.
5. Alternate foundations shall be used where required as specified in Article 3.08 of this Section.

F. Regardless of the type of embedment used, all bell holes for bell and spigot pipe shall be excavated at proper intervals so that the barrel of the pipe will rest for its entire length upon the bottom of the trench or bedding material.

G. All bedding materials shall achieve the required densities by tamping with suitable tools and shaped to receive the pipe and support it at the exact elevation and line as shown on the Construction Drawings.

H. Wet excavation:

1. Where the excavation area shown on the Construction Drawings falls under the water surface near the banks of a flowing stream or other body of water or in high ground water areas, the CONTRACTOR may adopt and carry out any method he may deem feasible for the performance of the excavation work and for the protection of the work thereafter; provided the method and equipment to be used has received prior approval of the CQA ENGINEER.
2. During the selected method of construction, the excavation area shall be effectively protected from damage during the excavation period and until all contemplated construction work therein has been completed to the satisfaction of the CQA ENGINEER.
3. The cost of all temporary construction work necessary or incidental thereto, including the cost of installing and removing sand bags, coffer dams, sheet piling, excavation and backfill, pumping and dewatering, shall be considered as an integral part of the cost of excavation and no separate payment therefore shall be allowed or made.

I. Disposal of materials:

1. Disposal of waste materials and smoothing of disturbed material during trenching operations shall be performed as the pipe is laid and shall not be allowed to lag more than 500 feet behind the pipe laying operations.
2. All materials removed by excavation which are suitable for the purpose shall be used whenever practicable for backfilling pipe trenches, foundations and footings, and for such other purposes as may be shown on the Construction Drawings or directed by the CQA ENGINEER.
3. All materials not used for backfilling, foundations, or footings shall be considered as waste materials and disposed of by the CONTRACTOR in an approved manner.
4. Waste materials may be deposited in spoil banks at locations as shown on the Construction Drawings.
5. If no disposal areas are shown on the Construction Drawings, the CONTRACTOR shall provide at his own expense disposal areas satisfactory to the CQA ENGINEER.
6. Waste materials shall not be left in unsightly piles, but shall be spread in uniform layers and neatly leveled and shaped.
7. Spoil banks shall be provided with adequate openings to permit surface drainage of adjacent lands.
8. On completion of any part of the work proper disposal shall be made of all surplus or unused materials left within the construction limits of such work and the surface of the work left in a neat and workmanlike condition.

3.03 WATER IN TRENCHES

A. Trenches shall be reasonably free from water while the pipes are being laid.

1. The CONTRACTOR shall remove and dispose of any water (including storm water), sewage, or any other liquid which may be found or may accumulate in the excavations.
2. This may be done by pumping, an adequate well point system, or other means of dewatering approved by the CQA ENGINEER.

B. The CONTRACTOR shall examine the site after excavating, and before proceeding with the work he shall notify the CQA ENGINEER of any evidence of water rising in such areas.

C. Static water levels shall be drawn down below the bottom of the excavation sufficiently to allow for placement of bedding and backfill.

1. Under certain conditions, the CQA ENGINEER may permit the CONTRACTOR to remove the water with the use of trenchside pumps through the use of an approved bedding.
2. The depth of bedding material will depend upon the amount of water, but care shall be taken to ensure that the trench wall soil material is such that it will not be removed from the area adjacent to the bedding.

D. The CONTRACTOR shall not open up more trench than the available pumping facilities are able to dewater.

E. The CONTRACTOR shall assume responsibility of disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working.

F. In no case shall the pipe lines be used as drains for such water, and the ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers and not by improvised equipment.

G. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matters into the pipe lines, and on completion of the work, any such material which may have entered the pipe lines must be cleaned out so that the entire system will be left clean and unobstructed.

H. Release of groundwater to its static level shall be performed in a manner to maintain undisturbed state of natural foundation soils, prevent disturbance of compacted backfill or bedding, and prevent flotation of pipelines.

I. The CONTRACTOR shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, and shall have available at all times competent workmen for operation of pumping equipment.

J. Dewatering systems shall be designed and operated to prevent removal of natural soils and to prevent excessive reductions in the groundwater outside the excavation to the extent that it would damage or endanger adjacent structures or property.

3.04 ROCK EXCAVATION

A. Where rock is encountered in the process of trench excavation it shall be completely uncovered and stripped of all loose material over the area as specified herein.

B. Rock shall be excavated in accordance with Section 02211 Rock Excavation.

C. Ledge rock, boulders, and large stones shall be removed to provide a clearance of not less than six (6") inches in every horizontal direction from all parts of pipe, fittings, and other appurtenances.

D. Where rock is encountered at grade in trenches, the trench shall be excavated not less than six (6") inches below the bottom of the pipe bell, refilled with fine, granular material thoroughly tamped in-place and shaped to the pipe.

E. Excavated rock shall not be mixed with material selected for tamped backfilling under and around the pipe or up to a level at least two (2') feet above the pipe.

3.05 TRENCH SIZE

A. Gravity piping:

1. As soil conditions will permit, the sides of trenches shall be cut in vertical, parallel planes from the bottom of the trench to the top of the pipe and have maximum width of two (2') feet plus the outside diameter of the pipe as shown on the Construction Drawings.
2. The width of the remaining depth of the trench may be as wide as necessary except as restricted by limits of right-of-way or existing improvements that are to be protected; the sides, however, shall be as nearly vertical as practicable or allowable.
3. If the trench width from the bottom of the trench to the top of the pipe is over-excavated in excess of that specified, sewers shall be laid on a gravel bedding at no extra cost to the OWNER.

B. Pressure Piping:

1. Trenches for pressure piping shall provide a minimum of 30 inches cover over the barrel of the pipe, except as otherwise shown.
2. Width of trench at and below top of the pipe shall not exceed twelve (12") inches on either side of pipe.

3. Width of trench above top of pipe may be as wide as necessary within limits of right-of-way, with banks as nearly vertical as practicable or allowable, and except as restricted by existing improvements, that are to be protected.

3.06 EXCAVATION FOR APPURTENANCES AND STRUCTURES

A. Excavation for appurtenances shall be made to a size that will allow at least twelve (12") inches between the outer surfaces of the appurtenance and the excavation wall or shoring.

B. Excavation for precast manholes and other precast structures shall be undercut six (6") inches below the bottom of the precast structure and shall be backfilled with gravel bedding as specified under the bedding material in this section.

C. Undercutting and providing a bedding for structures shall be considered as an integral part of the work and no separate payment shall be allowed or made.

3.07 EMBEDMENT OF PIPE

A. Pipeline embedment shall consist of all bedding materials, including concrete, foundation and initial backfill as shown on the Construction Drawings.

B. Class A Embedment:

1. Concrete Cradle: The pipe shall be embedded in a monolithic cradle of plain or reinforced concrete.

   a. The minimum thickness shall be one-fourth (1/4) the inside pipe diameter or a minimum of four (4") inches under the barrel and extending up the sides for a height equal to one-fourth (1/4) the outside diameter.

   b. The cradle shall have a width at least equal to the outside diameter of the pipe barrel plus eight (8") inches or poured to the full width of the trench.

2. Concrete arch: The pipe shall be embedded in carefully compacted gravel bedding with a monolithic plain or reinforced concrete arch.

   a. The gravel bedding shall have a thickness of one-fourth (1/4) the outside diameter or three (3") inches minimum between the barrel and bottom of trench excavation extending to the springline of the pipe.

b. The concrete arch shall have a minimum thickness of one-fourth (1/4) the inside diameter at the crown and have a minimum width equal to the outside pipe diameter plus eight (8") inches or poured to the full width of the trench.

C. Class B Embedment:

1. Class B embedment shall be used where an unstable trench bottom condition is encountered or where established by the CQA ENGINEER or where shown on the Construction Drawings.
2. The pipe shall be laid on gravel bedding placed on a flat trench.
3. The gravel bedding shall have a minimum thickness of one-fourth (1/4) the outside pipe diameter.
4. The gravel bedding shall extend to the springline of the pipe barrel, or one-half (1/2) the outside diameter of the pipe.

D. Class C Embedment:

1. Class C embedment shall be used as the normal or ordinary embedment and shall be used unless unstable trench conditions are present or where otherwise shown on the Construction Drawings.
2. The pipe shall be embedded in fine granular material on a trench bottom which shall be level in cross-section except that a continuous trough shall be shaped in the bedding which will fit the pipe barrel with reasonable closeness.
3. 3The bedding shall have a minimum thickness beneath the pipe of six (6") inches or one-eighth (1/8) of the outside diameter of the pipe, whichever is greater.
4. The bedding shall extend up the sides of the pipe one-sixth (1/6) of the outside diameter of the pipe.

E. Initial backfill material, which is from the bedding to one (1') foot above the pipe:

1. Shall be carefully deposited in successive horizontal layers of not more than twelve (12") inches in loose depth on each side of the pipe.
2. Shall be thoroughly and carefully tamped or rammed around the pipe with approved tools until reaching a minimum cover of not less than one (1') foot over the top of the pipe.

3.08 ALTERNATE FOUNDATIONS

A. Where the bottom of the trench is found to consist of material which is unstable to such a degree that, in the opinion of the CQA ENGINEER, it cannot be removed and replaced with an adequate bedding material, alternative foundations methods may be required.

B. The CQA ENGINEER may require, depending upon the severity of the unstable soil, to provide special foundations such as piling, concrete mats (or a combination thereof), sheeting with keyed-in plank foundation, or other means of stabilization.

C. The type of alternative foundation methods shall be constructed in accordance with the Construction Drawings or as approved by the CQA ENGINEER.

D. Should additional instructions or Detailed Drawings be required; they will be furnished in accordance with the Supplemental General Conditions.

3.09 BACKFILLING TRENCHES

A. The backfilling of sewer or other pipe line trenches shall be started immediately after the pipe work and embedment preparation has been inspected by the CQA ENGINEER.

B. Final backfill material, which if from a height of one (1') foot above the pipeline upward:

1. Shall be backfilled in well compacted layers.
2. If the trench extends along or across streets, roadways, useable alleys, or sidewalks or any areas to be paved in new construction, the remainder of the trench shall be backfilled and tamped to its full depth in the manner specified for initial backfill.
3. Shall be backfilled in the manner specified for initial backfill where indicated on the Construction Drawings.

C. Placement of backfill material in layers greater than twelve (12") inches loose fill shall require prior approval of compaction methods and equipment.

D. All backfilling shall be done in such manner as will not disturb or injure the pipe or structure over or against which it is being placed.

E. Any pipe or structure injured, damaged or moved from its proper line or grade during backfilling operations shall be opened up and repaired and then re-backfilled as herein specified.

F. Where excavation has been made, the top one (1') foot of backfill material shall consist of fine, loose earth free from large clods, vegetable matter, debris, stone, or other objectionable materials.

G. Temporary surfaces:

1. Where pipe trenches are cut across or along existing pavement, the CONTRACTOR shall construct a temporary surface over the cut by filling and tamping the upper six (6") inches of the cut with selected gravel, crushed stone or reef which will not disintegrate under traffic and which shall be maintained in good condition under traffic until the permanent pavement has been constructed.
2. No specific payment will be allowed for temporary surfacing.

3.10 COMPACTION AND TESTING

A. Compaction and testing for quality control shall be in conformance with Section 01400 and the Specific requirements of this Section.

B. Minimum tests required on all materials to prove compliance with the specifications shall be as follows:

1. A determination of soil classification, sieve analysis, maximum dry density as per ASTM D-698 and optimum moisture content shall be made from each material source.
2. In-place density test shall be made on all materials under roadways, streets, useable alleys, or other similar areas as required by the CQA ENGINEER.

C. Compaction requirements:

3. Unless otherwise specifically noted elsewhere in these Specifications or on the Construction Drawings, material shall meet the following compaction requirements.

    a. Bedding and initial backfill material shall be well compacted.
    b. Final backfill and embankments shall be compacted to a density equal to or greater than the surrounding undisturbed soil.
    c. Compaction on total (initial & final) backfill and base material under roadways shall meet density requirements as indicated in Section 02210.
    d. Embedment shall be well compacted.

4. The theoretical maximum density shall be arrived at in the manner prescribed under applicable documents.
5. Material containing excessive moisture shall not be placed.
6. Its placement may be delayed until it has dried out to the proper moisture content, or it may be thoroughly mixed with a drier material to obtain the desired water content.

7. Material with insufficient moisture shall be wetted sufficiently before compaction to obtain the desired moisture content.
8. Adequate equipment for furnishing and sprinkling water shall be kept available at all times during the progress of the work.

--END OF SECTION--

SECTION 02252 PROTECTIVE SOIL COVER ON LANDFILL CAP

PART 1 GENERAL

1.01 SCOPE OF WORK

The CONTRACTOR shall furnish all labor, material, supervision, and equipment to install the Protective Soil Cover on the Landfill Cap, including hauling, spreading and final grading and all necessary and incidental items as detailed or required to complete the cover, all in accordance with the plans and specifications.

PART 2 PRODUCTS

2.01 SOIL COVER MATERIAL

A. Soil that meets all of the following requirements shall be classified as select soil fill for use in construction of the secure cell soil cap.

1. Soil shall be classified according to the Unified Soil Classification System (USCS) as SC, ML, MH, CH, or CL (ASTM D2487). Liquid limit, plasticity index (PI), and percent passing the No. 200 sieve will be considered for proper classification.
2. Select soil fill materials shall be reasonably free of gypsum, ferrous, and/or calcareous concretions and nodules, refuse, roots, or other deleterious substances.
3. Continuous and repeated visual inspection of the materials being used will be performed by the CONTRACTOR to ensure proper soils are being used. In addition, the CQA ENGINEER shall make frequent inspections of the placement operations and materials, and will consult with the site personnel on suitable materials and locations of such.
4. The lower 18” of protective soil cover shall be uniform, smooth, and free of debris, rock, plant materials, and other foreign material larger than 3 inches in diameter. The material should contain no sharp edges.
5. The top 6" of soil cover must be capable of supporting growth of vegetative cover.

PART 3 EXECUTION

3.01 CONSTRUCTION OF SOIL COVER

A. Soil for the cover shall be placed and spread with light weight rubber tired or track equipment. When spreading the soil shall be stockpiled at depths of a minimum four feet and thence spread to the thickness indicated utilizing light weight rubber tired or track equipment so as not to damage the geocomposite or geomembrane.

B. The soil cover shall be a total of 24" thick. On slopes the thickness shall be measured perpendicular to the slope of face.

C. After completion of the soil cover the cap shall be surveyed, or measured with on-site GPS to ensure the specified thickness has been achieved.

D. Soil berms should be compacted to 95% dry density standard proctor.

E. After the specified soil cover thickness has been achieved and verified the CONTRACTOR shall proceed immediately with the grassing.

F. Any damage to the geomembrane and/or GDM shall be repaired in accordance with Section 02755 – Geomembrane (FML) Cap and under the direction of the CQA ENGINEER.

--END OF SECTION--

SECTION 02720 STORM SEWER SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Installation of storm sewer lines, flared end sections and other appurtenances.

1.02 RELATED WORK

B. Section 02220 - Trenching, Backfilling and Compaction

C. Construction Drawings and General Provisions of Contract, including General and Supplementary Conditions, Special Conditions, and Detailed Specification Sections, apply to work specified in this section.

PART 2 PRODUCTS

2.01 REINFORCED CONCRETE PIPE (RCP)

Reinforced concrete pipe used for the drainage system shall conform to AASHTO Specifications M-170 and ASTM C76. Diameter and class of pipe shall be as indicated.

2.02 JOINT MATERIAL

Joint material shall be as manufactured by Ram-Nek or equal, and which meets or exceeds all requirements of Federal Specifications SS-S-00210 “Sealing Compound, Preformed Plastic for Pipe Joints, Type I, Rope Form”.

2.03 DROP INLETS AND HEADWALLS

Drop inlets and headwalls shall be in accordance with the details in the Construction Drawings.

2.04 ALUMINUM CARRIER PIPE

Corrugated aluminum pipes shall have annular – corrugated interior and exterior and shall meet the requirements of AASHTO M196.

2.05 CORRUGATED POLYETHYLENE PIPE (CPP)

A. Material and Fittings

Pipe for downdrains, culverts, and geocomposite drainage media drainage shall be double walled corrugated polyethylene pipe. Pipe and fittings shall be manufactured from high density polyethylene conforming with the minimum requirements of cell

classification 424420C for four (4") through ten (10") inch diameters, or 435400C for 12 through 60 inch diameters in accordance with ASTM D3350. For pope diameters through 12 through 60 inches virgin pipe material shall comply with the notched constant ligament-stree (NCLS) test as specified in Section 9.5 and 5.1 of AAHTO M294 and ASTM F2306, respectively.

B. Pipe and Fittings

Pipe shall have a smooth interior and annular exterior corrugations. Four (4") inch through ten (10") inch pipe shall meet AASHTO M252, Type S. Twelve (12") inch through sixty (60") inch pipe shall meet AASHTO M294, Type S or ASTM F2306. Fittings shall confirm to AASHTO M252, M294 or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the soil-tight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.

C. Joint Performance

Pipe shall be joined using a bell and spigot connection as specified above. The joint shall be soil-tight and gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the manufacturer. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

2.06 MISCELLANEOUS

A. Flared End Section

Construction shall be in accordance with details shown on Construction Drawings.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

Pipe shall be protected during handling against impact shocks and free fall. The pipe shall be laid so as to produce a straight line of pipe on a uniform grade, each pipe laid to form a closed joint with the preceding pipe and so as to form a smooth inside flow line.

--END OF SECTION--

SECTION 02754 GEOCOMPOSITE DRAINAGE MEDIA (GDM)

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for the installation of the geocomposite drainage media (GDM), as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.

B. The Contractor shall be prepared to install the GDM in conjunction with the geomembrane cap and other components of the cap system.

1.02 REFERENCES

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) are hereby made a part of these specifications.

ASTM D413	Standard Test Methods for Rubber Property - Adhesion to Flexible Substrate
ASTM D792	Standard Test Methods for Density and Specific Gravity of Plastic by Displacement.
ASTM D1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique.
ASTM D1777	Standard Test Method for Measuring Thickness of Textile Materials.
ASTM D4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextiles Related Products.
ASTM D5199	Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembrane

1.03 CONSTRUCTION QUALITY ASSURANCE (CQA) TESTING

A. The Contractor shall comply with all terms and requirements of the Construction Quality Assurance Plan (contained in this document).

B. GDM that is rejected upon testing shall be removed from the project site and replaced at Contractor's cost. Sampling and quality assurance testing of GDM supplied as replacement for rejected material shall be performed by the CQA ENGINEER at Contractor's cost.

1.04 SUBMITTALS

A. Prior to shipping to the site, the Contractor shall submit to the CQA ENGINEER two (2) copies of a mill certificate or affidavit signed by a legally authorized official of the Manufacturer. The Contractor shall also submit two samples, one yard square in size each, with the mill certificate. The mill certificate or affidavit shall attest that the GDM meets the required properties stated in these Specifications. The samples shall be labeled with the Manufacturer's lot or batch number, machine directions, date of sampling, project number, and Manufacturer and product names.

B. For GDM delivered to the site, quality control certificates, signed by the Manufacturer's quality assurance manager shall be provided for every 50,000 square feet of GDM. Each certification shall have roll identification number(s), sampling procedures, frequency, and test results.

C. The Contractor shall furnish the CQA ENGINEER a copy of delivery tickets or other approved receipts as evidence for materials received that will be incorporated into the construction.

1.05 MEASUREMENT AND PAYMENT

Not Applicable.

PART 2 PRODUCTS

2.01 MATERIALS

A. The Geonet shall be manufactured by extruding two (2) sets of polyethylene strands to form a three dimensional structure to provide planer water flow.

B. A filter geotextile shall be heat bonded to both sides of the Geonet. Heat bonding shall be performed by the Manufacturer prior to shipping to the site. The filter geotextile shall have a minimum weight of 6 oz/sy. Protective cover material shall be tested to insure compatibility with the 6 oz/sy geotextile.

C. The Geonet shall contain UV inhibitors to prevent ultraviolet light degradation.

D. The Geonet conforms to the following minimum properties:

REQUIRED GEOCOMPOSITE DRAINAGE MEDIA PROPERTIES AND MANUFACTURER'S QUALITY CONTROL TEST DATA FINAL CAP SYSTEM

PROPERTY	TEST METHOD	UNITS	VALUE	FREQUENCY
Thickness (geonet only)	ASTM D 5199	inches	0.25	Every roll
Resin Design (geonet only)	ASTM D 1505	g/cm^3	0.94	50,000 ft^2
Ply Adhesion	ASTM D 413	lb/inch	2.0	50,000 ft^2
Transmissivity	ASTM D 4716	$m^3/m^2/s$	$1x10^{-3}$	100,000 ft^2

Notes: Conduct test for transmissivity at a normal compressive load of 500 psf and at a hydraulic gradient of 0.25 after a seating period of at least 100 hours. Boundary conditions are soil interface on the upper filter Geotextile and smooth geomembrane against the lower filter Geotextile.

REQUIRED GEOCOMPOSITE DRAINAGE MEDIA PROPERTIES AND MANUFACTURER'S QUALITY CONTROL TEST DATA BASE LINER SYSTEM

PROPERTY	TEST METHOD	UNITS	VALUE	FREQUENCY
Thickness (geonet only)	ASTM D 5199	inches	0.25	Every roll
Resin Design (geonet only)	ASTM D 1505	g/cm^3	0.94	50,000 ft^2
Ply Adhesion	ASTM D 413	lb/inch	2.0	50,000 ft^2
Transmissivity	ASTM D 4716	$m^3/m^2/s$	$5x10^{-4}$	100,000 ft^2

Notes: Conduct test for transmissivity at a normal compressive load of 15,000 psf and at a hydraulic gradient of 0.05 after a seating period of at least 24 hours. Boundary conditions are soil interface on the upper filter Geotextile and smooth geomembrane against the lower filter Geotextile.

E. The GDM shall be capable of providing an interface friction (shear) resistance of ≥26.4° or an equivalent shear strength (combination of friction angle (ø) and cohesion (c)) between the GDM/Geomembrane interface and the GDM/Protective Cover interface.

F. Each roll of GDM delivered shall have the following identification information:

1. Manufacturer's name
2. Product identification
3. Thickness

4. Roll number
5. Lot number
6. Roll dimensions

PART 3 EXECUTION

3.01 SHIPPING, HANDLING AND STORAGE

A. During periods of shipment and storage, all GDM shall be protected from direct sunlight, temperature greater than 140^{o} F, water, mud, dirt, dust, and debris. To the extent possible, the GDM shall be maintained wrapped in heavy-duty protective covering until use. GDM delivered to the project site without protective wrapping shall be rejected.

B. GDM that are damaged during shipping or storage shall be rejected and replaced at Contractor expense.

3.02 INSTALLATION

A. GDM shall be placed to the lines and grades shown on the Contract Drawings. At the time of installation, the GDM shall be rejected, if it has defects, rips, holes, flaws, evidence of deterioration, or other damage.

B. The GDM shall be placed only on Geomembrane that has been accepted by the CQA ENGINEER.

C. The Contractor shall provide temporary anchorage of the GDM during installation to prevent movement during construction. Such anchorage may include sandbags and the like, as approved by the CQA ENGINEER. Permanent bonding to the Geomembrane shall be prohibited.

D. In general, seams shall be oriented parallel to the line of maximum slope, i.e., oriented up and down the slope.

E. Adjacent rolls of GDM shall be overlapped a distance of at least three (3) inches and secured using polyethylene ties. Tie spacing shall be every ten (10) feet.

The overlaying filter geotextile, where applicable, shall extend at least six (6) inches past the geonet joint and shall be permanently bonded by heat bonding or sewing as approved by the CQA ENGINEER.

F. Any GDM that is torn, crushed, or punctured shall be repaired or replaced by the Contractor at no additional cost to the Owner. The repair shall consist of a patch of the same type of material, placed over the failed area and shall overlap the existing material a minimum of twelve (12) inches from any point of the rupture. The patch shall be connected to the Geonet using polyethylene ties at a five (5) foot spacing.

G. The installing crew shall be approved by the manufacturers/fabricator for the installation of the GDM.

-- END OF SECTION--

SECTION 02755 GEOMEMBRANE (FML) CAP

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The CONTRACTOR shall furnish all labor, materials, supervision and equipment to complete the installation of the Linear Low Density Polyethylene (LLDPE) Geomembrane Cap, including, but not limited to, layout, seaming, patching, and all necessary and incidental items required to complete the Work, in accordance with the Contract Drawings and these specifications.

B. Sufficient material shall be furnished to cover all lined areas shown on the Construction Drawings, including overlaps at field seams and anchor trenches.

C. It is the intent of these specifications to ensure a quality finished product. It shall be the responsibility of the CONTRACTOR to ensure that this requirement is met.

1.02 QUALITY

A. The CONTRACTOR will be required to submit a quality control program to the CQA ENGINEER prior to initiating field work.

B. The OWNER shall employ and pay for the services of a third-party CQA ENGINEER, in accordance with Section 01400 - Quality Control, to confirm the installation of the liners.

C. All installation procedures and testing shall be in accordance with these specifications and OWNER's independent Construction Quality Assurance (CQA) Manual. A copy of this manual is enclosed.

D. All field destructive and non-destructive testing will be performed by the CONTRACTOR. Samples for laboratory testing will be taken by the CONTRACTOR for testing at the CONTRACTOR's laboratory as well as the CQA ENGINEER's laboratory.

1.03 SUBMITTALS

A. The geomembrane manufacturer shall submit certification that all materials manufactured for the project have been produced in accordance with these specifications along with results from a quality control program. This information must be submitted for review prior to material delivery. The CQA ENGINEER reserves the right to halt installation until proper certification is submitted and determined acceptable for use.

B. The CONTRACTOR shall submit to the CQA ENGINEER, six full sets of panel layout construction drawings. Field welds and panels shall have an identification system.

Construction Drawings shall be submitted to the CQA ENGINEER at least two weeks prior to installation.

C. The manufacturer of the geomembrane used in this work shall approve all shop drawings and a proposed cap layout to cover the cap area shown on the Construction Drawings.

D. Details shall be included to show the termination of the geomembrane at the perimeter of capped areas, the methods of sealing around penetrations and methods of anchoring.

E. The CONTRACTOR shall submit to the CQA ENGINEER a physical sample of the geomembrane and geonet to be used. The samples shall be labeled with the manufacturer's name, product identification, lot number and roll number.

F. The CONTRACTOR shall also submit to the CQA ENGINEER inventory tickets, roll numbers or batch identifications, packing papers and invoices for the geomembrane and geonet used.

G. The CONTRACTOR shall provide personnel resumes demonstrating compliance with the following requirements:

1. A minimum of one field superintendent per shift shall be designated by the CONTRACTOR and approved by the CQA ENGINEER. Each field superintendent shall have a minimum of three years and five million square feet of field experience in installing geomembranes. Any change or replacement of superintendent during the Project must be approved by the CQA ENGINEER.
2. The weld technicians shall have a minimum of one year and one million square feet geomembrane welding experience.

1.04 WARRANTY

A. Material

The MANUFACTURER is responsible for guaranteeing it's product. The warranty shall include all that is listed below:

1. Shall begin at the time of issuance of CQA ENGINEER's Certification of Substantial Completion.
2. The material shall be free from defects and be able to withstand normal weathering and use from the date of installation for a period of 20 years under normal uses and services for which it is designed and manufactured.
3. This limited warranty does not include damages or defects resulting from acts of God, casualty or catastrophe such as, but not limited to earthquake, flood, piercing hail, or tornado.
4. "Normal Use" excludes: exposure to harmful chemicals, mechanical abuse by machinery, equipment, or people, excessive pressure beyond that indicated by the final overburden or municipal refuse and cover indicated on the drawings.

PART 2 PRODUCTS

2.01 GEOMEMBRANE CAP

A. The geomembrane shall comprise linear low density polyethylene material manufactured of new, first-quality products designed and manufactured specifically for the purpose of capping in landfills.

B. The geomembrane material shall be so produced as to be free of holes, blisters, undispersed raw materials or any sign of contamination by foreign matter. Any such defect shall be repaired in accordance with the manufacturer's recommendations. The CQA ENGINEER may reject all or portions of units (or rolls) of geomembrane if significant quantities of production flaws are observed.

C. The geomembrane material shall meet the material properties and testing frequencies as specified in the Geosynthetic Research Institute GRI Test Method GM-17, as latest revised, for 40 mil Linear Low Density Polyethylene (LLDPE) geomembrane.

D. The geomembrane cap shall be the required minimum liner thickness as shown on the Construction Drawings.

E. If natural colored, the manufacturer shall add carbon black per ASTM D 1248 Specifications, Section 3.1.2.3, Class C.

F. The manufacturer's quality control program shall include the following inspections and tests:

1. Inspection for: Appearance on both sides, manufacturing defects, and thickness at 10 random locations across each sample strip.
2. Testing shall be conducted in accordance with the Geosynthetic Research Institute GRI Test Method GM-17, as latest revised, for 40 mil Linear Low Density Polyethylene (LLDPE) geomembrane. The minimum thickness requirement shall be the lowest individual measurement, not the average. The results shall be reported.
3. A quality chart of each roll of sheet shall be prepared and a copy attached to the roll. Information plotted on the chart shall include the location and type of defect, if any.

G. The geomembrane shall be shipped rolled. Folded or otherwise creased material will not be accepted. The material shall be marked and tagged with the following information:

1. Serial Number
2. Resin Type
3. Roll Length
4. Gross Weight
5. Inspected By

6. Date of Manufacture
7. Resin Lot Number
8. Roll Width
9. Net Weight

H. Material which has been delivered to the project site shall be stored in a dry area and protected from precipitation and direct sunlight.

I. Care shall be taken to keep the materials clean and free from debris prior to installation.

PART 3 EXECUTION

3.01 GENERAL

The geomembrane cap shall be constructed as soon as practical after filling of the cell. The cap shall be installed following the manufacturer's printed recommendations, using sound, accepted engineering practices. The entire geomembrane cap installation shall be completed by one crew. The installing crew shall be approved by the manufacturer/fabricator for installation of 40 mil geomembrane.

A manufacturer's technical representative shall be at the Pre-Deployment Meeting and on site at the time of installation.

A. Geomembrane

1. No horizontal seams are allowed within five feet of the toe of the slope.
2. Unroll only those factory-packaged sections which are to be anchored or seamed together in one day. Panels should be positioned with the overlap recommended by the manufacturer, but not less than 2-inches.
3. After panels are initially in place, remove as many wrinkles as possible. Unroll several panels and allow the geomembrane to "relax" before beginning field seaming. The purpose of this is to make the edges, which are to be bonded, as smooth and free of wrinkles as possible.
4. Once panels are in-place and smooth, commence field seaming operations.
5. No support equipment used by any CONTRACTOR shall be allowed on the geomembrane. Personnel working on the geomembrane shall not smoke, wear damaging shoes or engage in any activity which damages the geomembrane.
6. The anchor trench shall be excavated, backfilled and compacted. Care should be taken when backfilling the trench to prevent any damage to the geomembrane.
7. Damaged and sample coupon areas of geomembrane shall be repaired by the CONTRACTOR. Repaired areas will be tested for seam integrity by the CONTRACTOR. Damaged materials are the property of the CONTRACTOR and will be removed from the site at the CONTRACTOR's expense. The CONTRACTOR will retain all ownership and responsibility for the geomembrane until acceptance by the OWNER.

3.02 SEAMING

A. Geomembrane

1. Field Seaming

a. All foreign matter (dirt, water, oil, etc) shall be removed from the area to be bonded. If the seam is to be bonded by the extrusion process, the bonding surfaces must be thoroughly cleaned by mechanical abrasion or alternate methods approved by the CQA ENGINEER to remove surface cure and prepare the surfaces for bonding. No solvents shall be used to clean the geomembrane.

b. Tack welds, if used, shall use heat only; no double-sided tape, glue or other method will be permitted. The geomembrane should be seamed completely to the ends of all panels to minimize the potential of tear propagation along the seam. The completed cap shall not exhibit "trampolining" and shall be in full contact with the underlying soil cap.

c. At the end of each day or installation segment, all unseamed edges shall be anchored by sand bags or other approved device. Sand bags shall weigh approximately 20 pounds and shall be placed no further apart than 20 foot spacing along the open end of the geomembrane. Sand bags securing the geomembrane on the side slopes should be connected by a rope fastened at the top of the slope by a temporary anchor. If high winds are expected, boards along the edge of unseamed panels, with weighted sand bags on top, should be used to anchor the geomembrane. Sand bags fastened by rope should be used to secure unseamed edges on the side slopes. Staples, U-shaped rods or other penetrating anchors shall not be used to secure the geomembrane. The temporary anchoring of the geomembrane is fully the responsibility of the CONTRACTOR. Any material damaged as the result of weather effects, shall be repaired or replaced at no cost to the OWNER.

d. It is imperative to keep surface water runoff from beneath the geomembrane at all times during installation. The CONTRACTOR's panel placement and seam welding technique and welding schedule shall minimize or eliminate the accumulation of water beneath the geomembrane. Any water found ponded beneath the geomembrane after the geomembrane has been installed shall be removed by the CONTRACTOR at no cost to the OWNER. Any soil subgrade beneath installed geomembrane that has become excessively moist, soft or unsuitable to perform its intended function shall be replaced at no cost to the OWNER.

e. After field seaming is complete in a given area, geomembrane edges in the anchor trench should be buried. Do not bury the

geomembrane edge in the anchor trench within 30 feet of an incomplete or unbounded field seam.

2. Field seaming may be extrusion or fusion welding or a combination of these methods. Solvent welding is not acceptable. The CQA ENGINEER reserves the right to reject any proposed seaming method believed unacceptable.

   a. Extrusion welding applies a molten bead of material to preheated sheets of geomembrane. The sheets are then joined by pressure.

   b. The fusion welding process heats the area to be joined to the melting point and then applies pressure to join the melted surfaces.

   c. The sheets to be joined shall be overlapped at least 2-inches after the necessary aligning and cutting.

   d. In general, seams should be oriented parallel to the line of maximum slope, i.e. oriented up and down, not across, the slope. In corners and odd shaped geometric locations, the number of field seams should be minimized.

   e. No horizontal seams should be within 5 feet from the toe of the slope.

   f. No seaming should be attempted above 40 degrees C (104 degrees F) ambient air temperature. Below five (5) degrees C (41 degrees F) ambient air temperature, preheating of the geomembrane may be required. It shall be the responsibility of the CONTRACTOR to demonstrate that conditions are favorable for seaming by acceptable test (start-up) seams which duplicate, as closely as possible, actual field conditions. Preheating may be achieved by natural and/or artificial means (shelters and heating devices).

   g. A moveable protective layer of plastic may be required, as recommended by the CQA ENGINEER, to be placed directly below each overlap of geomembrane that is to be seamed. This is to prevent any moisture build-up between the sheets to be welded.

   h. Seaming will extend to the outside edge of panels to be placed in anchor trenches.

   i. If required, a firm substrata should be provided by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve proper support.

   j. Grinding prior to welding shall be as recommended by the geomembrane manufacturer and shall be done perpendicular to the sheet edge. Overground or improperly ground areas shall be replaced at the CONTRACTOR's expense.

   k. No folds, wrinkles or "fish-mouths" shall be allowed within the seam area. Where wrinkles or folds occur, the material shall be cut, overlapped and an extrusion-weld shall be applied. During wrinkle or fold repairs, adjacent geomembrane may not necessarily be required to

meet the 2-inch minimum overlap, if approved by the CQA ENGINEER. All welds on completion of the work shall be tightly bonded and sealed.

3.03 TESTING OF GEOMEMBRANE

A. General

1. Samples of the field seams shall be taken and tested in accordance with ASTM D6392 to ensure that tensile strength at yield and break, elongation at yield and break meet the minimum specifications. A quality control certificate shall be issued with the material.
2. The CONTRACTOR shall employ on-site physical non-destructive testing on all welds.
3. A quality control technician shall inspect each sheet and seam. Any area showing a defect shall be marked and repaired in accordance with geomembrane repair procedures.

B. Test Seams: Test seams will be made each day prior to commencing field seaming. These seams will be made on fragment pieces of geomembrane to verify that seaming conditions are adequate. Such test seams will be made at the beginning of each seaming period and, at the CQA ENGINEER's discretion, at least once every four hours, for each seaming apparatus used that day. Also, each seamer will make at least one test seam each day.

1. The test seam sample will be at least 1.5 m (5 feet) long by 0.3 m (1 foot) wide with the seam centered lengthwise. Six adjoining specimens 25 mm (1-inch) wide each will be die cut from the test seam sample. These specimens, which will be tested with a tensiometer in the field for shear (three samples) and peel (three samples) by the CONTRACTOR and witnessed by the CQA ENGINEER, should not fail in the seam. If a test seam fails, the entire operation will be repeated. If the additional test seam fails, the seaming apparatus or seamer will not be accepted and will not be used for seaming until the deficiencies are corrected and two consecutive successful full test seams are achieved. Test seam failure is defined as failure of any one of the specimens tested in shear or peel.
2. The CQA ENGINEER or his representative will observe all test seam procedures. The remainder of the successful test seam sample will be assigned a number and marked accordingly by the CQA ENGINEER, who will also log the date, hour, ambient temperature, number of seaming unit, name of seamer and pass or fail description. At least one tested specimen from each test as selected by the CQA ENGINEER will be retained by the CQA ENGINEER. The CQA ENGINEER will transmit these specimens to the OWNER following acceptance of the geomembrane materials and installation by the OWNER.
3. The criteria for determining passing welded seams shall be as stated in the “Seam Strength” table in the Geomembrane Liner Section of the CQA Manual.

C. Field Seams: Field seams will be tested by the CONTRACTOR continuously using non-destructive techniques and at specified intervals using destructive tests. Requirements for non-destructive and destructive testing are as follows:

1. Single Weld Seams: The CONTRACTOR shall maintain and use equipment and personnel at the site to perform continuous vacuum box testing on all single weld production seams or when the geometry of the weld makes pressure testing impractical.

a. Equipment for Vacuum Testing:

1. Vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
2. Vacuum pump assembly equipped with a pressure controller and pipe connection.
3. A rubber pressure/vacuum hose with fittings and connections.
4. A bucket and means to apply a soapy solution.

b. Procedure for Vacuum Testing:

1. Trim excess overlap from seam, if any.
2. Turn on the vacuum pump to reduce the vacuum box to approximately 5 in. of mercury, i.e. 3 psi gauge.
3. Apply a generous amount of solution of strong liquid detergent and water to the area to be tested.
4. Place the vacuum box over the area to be tested and apply sufficient downward pressure to "seat" the seal strip against the liner.
5. Close the bleed valve and open the vacuum valve.
6. Apply a minimum of 3 psi vacuum to the area as indicated by the gauge on the vacuum box.
7. Ensure that a leak tight seal is created.
8. For a period of not less than 5 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
9. If no bubbles appear after 15 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inch overlap, and repeat the process.
10. Mark all areas where soap bubble appear and repair the marked areas. After repairs are made, retest these areas.

2. Double Weld Seams: The CONTRACTOR shall maintain and use equipment and personnel to perform air pressure testing of all double weld seams. The system shall be capable of applying a pressure of at least 30 psi for not less than five minutes. The CONTRACTOR shall perform all pressure and vacuum testing under the supervision of the CQA ENGINEER. Pressure loss tests shall be conducted in accordance with the procedures outlined in "Pressurized Air Channel Test for Dual Seamed Geomembranes", Geosynthetic Research Institute Test Method GM-6. As outlined by the test method, following a two minute pressurized stabilization period, pressure losses over a measurement period of five minutes shall not exceed the following: 40 mil - 4 psi.
3. Destructive testing will be performed on a maximum of every 500 linear feet of field seam. The locations will be selected by the CQA ENGINEER. Sufficient size samples will be obtained by the CONTRACTOR to provide one sample to the archive, one sample to the CQA ENGINEER for laboratory testing, and two samples to be retained by the CONTRACTOR for both field and laboratory testing. Testing requirements are as follows: Each sample shall be large enough to test five specimens in peel and five specimens in shear. The criteria for determining passing welded seams shall be as stated in the “Seam Strength” table in the Geomembrane FML Cap Section of the CQA Plan.

    a. Tests shall be conducted in peel and shear using a tensiometer. No strain measurements from field tests of seams will be accepted. Field tests will be evaluated for the criteria described above in paragraph B. 2. or 3.
    b. The CQA ENGINEER will observe all production seam field test procedures. The remainder of the successful test seam sample will be assigned a number and marked accordingly by the CQA ENGINEER, who will also log the date, seam number, approximate location in the seam, and field test pass-or-fail description, if applicable. The CQA ENGINEER will be responsible for the archive specimen.

3.04 REPAIRS OF DAMAGED AND SAMPLED AREAS

A. Damaged and sample coupon areas of geomembrane shall be repaired by the CONTRACTOR by construction of a cap strip. No repairs shall be made to seams by application of an extrusion bead to a seam edge previously welded by integrity. Damaged materials are the property of the CONTRACTOR and will be removed from the site at the CONTRACTOR's expense. The CONTRACTOR will retain all ownership and responsibility for the geomembrane until acceptance by the OWNER.

3.05 ANCHOR TRENCH BACKFILLING

The anchor trench will be backfilled and compacted to a dry density not less than 90 percent of the maximum dry density determined by the Standard Proctor (ASTM D-698). Care should be

taken when backfilling the trench to prevent any damage to the geomembrane. Anchor trench spoil shall be used as backfill material, wherever possible.

3.06 PROTECTION OF LEADING EDGES

Between construction of partial sections of the membrane cap, leading edges of the membrane may be exposed or buried for extended periods of time prior to their joining to adjacent, subsequent membrane sections. The combined action of abrasive soil and equipment impact stresses may "etch" unprotected membrane surfaces sufficiently to affect seam strengths. Therefore, it is necessary to protect leading edges in high activity areas with sacrificial layers of geomembrane sheet until they are ready for final seaming. As a minimum, each leading edge to be seamed that must be buried or which must be exposed for periods of one month or longer shall be continuously covered by a layer of geotextile overlain by a layer of geomembrane sheet. The geotextile shall be nonwoven and have a minimum weight of 6 oz. per square yard. The sacrificial geomembrane sheet shall have a minimum thickness equal to that of the membrane liner to be protected. Both protective cover sheet layers shall have a minimum width of 2 feet. The protective cover sheets shall be either covered with soil or weighted with sand bags to prevent displacement by wind. The edge of the sheet to be protected shall be approximately centered beneath the overlying protective layers prior to burial or weighing with sandbags. Leading edges located in areas expected to receive direct traffic from construction equipment shall be buried under a minimum thickness of one foot of buffer soil.

3.07 CAP ACCEPTANCE

The CONTRACTOR shall retain ownership and responsibility for the geomembrane cap system until acceptance by the OWNER.

The cap system shall be accepted by the OWNER when:

- The installation is complete as determined by the CQA ENGINEER;
- Verification of the adequacy of all seams and repairs, including associated testing, is complete;
- All documentation of installation is completed, including all CQA reports;
- The CONTRACTOR provides the OWNER with record drawings of the panel layout and seam locations with reference numbers for test locations;
- The CONTRACTOR, the Manufacturer and the CQA ENGINEER provide written certification that the installation was in accordance with the manufacturer's general recommendations, the OWNER's CQA plan, and specifications, with exceptions noted.
- The cap system has been accepted by the North Carolina Division of Environment and Natural Resources Solid Waste Section.

--END SECTION--

SECTION 02930 GRASSING

PART 1 GENERAL

1.01 WORK INCLUDED

Provide seedbed preparation, liming, fertilizing, seeding, and mulching of all newly graded finish earth surfaces, unless indicated otherwise, and all areas inside or outside the limits of construction that are disturbed by the Contractor's operation. Areas shall be hydroseeded, except small areas that are inaccessible to the hydroseeding equipment, which shall be drilled seedbed.

1.02 SUBMITTALS

A. Contractor shall furnish Certificates of Conformance from manufacturers or agencies.

1. Seed
2. Fertilizer
3. Lime
4. Soil Testing Recommendation - County Extension Service

B. Manufacturer's Literature

Including physical characteristics, application and installation instructions, and recommendations:

1. Hydraulic Mulch Material
2. Erosion Control Material

1.03 DELIVERY

A. Fertilizer and Lime

Deliver materials to the site in the original, unopened containers bearing the manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. In lieu of containers, furnish fertilizer and lime in bulk with a certificate indicating the above information accompanying each delivery.

B. Seed

Deliver seed to the site in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material. Label in conformance with USDA Federal Seed Act 53 Stat. Rules and Regulations and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected.

1.04 STORAGE AND HANDLING

Store lime, fertilizer, and seed in dry locations away from contaminants. Protect seed from drying out. When handling materials, do not drop or dump from vehicles.

1.05 MEASUREMENT AND PAYMENT

Not applicable.

PART 2 PRODUCTS

2.01 SEED

Permanent seeding shall be in accordance with the North Carolina Erosion and Sediment Control Planning and Design Manual and following schedule:

SPECIES	RATES / ACRE (lbs./acre)	PLANTING DATES
Tall Fescue	100	Aug 20 - Oct 25 Feb 1 - April 15
Kobe Lespedeza	10	Aug 20 - Oct 25 Feb 1 - April 15
Sericea Lespedeza	30	Aug 20 – Oct 25 Feb 1 - April 15

Temporary seeding shall be used for spoil piles standing less than six (6) months. Long-term spoil piles shall be permanently seeded.

Mulch shall be applied to seeded areas within 24 hours after temporary and permanent seeding operations. Mulch shall be essentially free of noxious weeds and applied at a rate of approximately 92 lbs/1,000 square feet (4,000 lbs/acre).

On areas where ground surface exceeds approximately five (5%) slopes, the mulch shall be tacked using a sufficient amount of asphalt or similar binding material to hold mulch in place.

Seedbed Preparation

1. Work lime and fertilizer into the soil where conventional equipment can be used. Use disk or similar equipment to prepare to depth of 3-4 inches. Use ripper if necessary.

2. Lime and fertilizer may be applied with seed mixture when a hydroseeding used and where mulch will be applied. Seedbed preparation may not be necessary where hydroseeding equipment is used.
3. Slopes that are too steep for conventional equipment (2:1 or steeper) should be seeded with hydroseeding equipment.

   Where hydroseeding equipment is not available for use on steep slopes, scarify the soil surface with a chain harrow, pick chain, grader blades with chisels, hand tools, or other equipment that will pit the soil or make trenches approximately 1-2 inches deep, 6-12 inches apart across the slope in which the seed can lodge and germinate.

2.02 LIME

ASTM C 602, commercial agricultural limestone containing a minimum of 94 percent of total carbonates, 52 percent calcium, and 42 percent magnesium. Provide the following ASTM E 11 gradation: minimum 100 percent passing the No. 20 sieve and 75 percent passing the No. 100 sieve. Application rates shall be as recommended by the North Carolina Department of Agriculture through standard soil testing procedures.

2.03 FERTILIZER

Commercial grade, free flowing, uniform in composition and bearing the manufacturer's guaranteed statement of analysis. Analysis of fertilizer and application rates shall be as recommended by the North Carolina Department of Agriculture through soil testing procedures, and in accordance with this schedule:

(Continued on next page)

FERTILIZER REQUIREMENTS

TYPE OF SPECIES	YEAR	ANALYSIS OR EQUIVALENT N-P-K	RATE	N TOP DRESSING RATE
1. Cool season grasses	First	6-12-12	1,500 lbs/ac	50-100 lbs/ac ½/
2. Cool season grasses and legumes	First	6-12-12	1,500 lbs/ac	0-50 lbs/ac 1/
3. Ground covers	First	10-10-10	1,300 lbs/ac 3/	- -
4. Temporary cover crops seeded alone	First	10-10-10	500 lbs/ac	30 lbs/ac 4/
5. Warm season grasses	First	6-12-12	1,500 lbs/ac	50-100 lbs/ac 2/5/

1/ Apply in spring following seeding
2/ Apply in split applications when high rates are used
3/ Apply in three (3) split applications
4/ Apply to grass species only
5/ Apply when plants grow to a height of 2 to 4 inches

2.04 MULCH

Free from noxious weeds, mold, or other deleterious material. Provide wood cellulose fiber when hydroseeding.

A. Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish air-dry condition and of proper consistency for placing with commercial mulch-blowing equipment.

B. Wood Cellulose Fiber

Processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual metering of materials application. Composition on air-dry weight basis: 9-15 percent moisture, pH range 3.5 to 5.0.

2.05 WATER

Suitable quality for irrigation.

PART 3 EXECUTION

3.01 SEED BED PREPARATION

Areas required to be seeded shall have been brought to the required subgrade. New areas to be seeded shall be thoroughly tilled to a minimum depth of four (4) inches by scarifying, disk harrowing, or other approved methods. Remove debris and stones larger than one inch remaining on the surface after tillage.

A. Fertilizer and Lime

Apply fertilizer and lime at the rates recommended by North Carolina Department of Agriculture.

B. Drill Seeding For New Seeding

Incorporated fertilizer and lime into the soil to a minimum depth of four (4) inches. Application may be performed as part of the tillage operations.

C. Hydroseeding

Apply liquid fertilizer in amounts recommended by the North Carolina Department of Agriculture. Apply lime manually.

3.02 SEEDING

A. Seeding Conditions

Immediately before seeding, restore soil to the proper grade. Do not seed when the ground is muddy or in any unsatisfactory condition for seeding.

B. Seeding Method

Apply seed within 24 hours after seedbed preparation. Sow seed with approved sowing equipment using one or a combination of the following methods. Sow one-half the seed in one direction and sow remainder at tight angles to the first sowing.

C. Drill Seeding

Use cultipacker seeders or grass seed drills. Drill seed uniformly to maximum depth of ¼" clay soils and ½" in sandy soils. Cover seed by spike-tooth harrow, cultipacker, or other approved devices.

D. Hydroseeding

Mix seed, fertilizer, and wood cellulose fiber in required amount of water to produce a homogenous slurry. After seed, water, and fertilizer have been thoroughly mixed, add 1,500 pounds of wood cellulose fiber per acre (dry weight) and apply the slurry. Seed shall not remain in water containing fertilizer for more than one (1) hour prior to application and shall be agitated during application.

3.03 PROTECTION OF SEEDED AREAS

Immediately after seeding, protect the area against traffic and other use by erecting barricades, as required, and placing approved signs at appropriate intervals until final acceptance.

3.04 RESTORATION

Restore to original condition existing lawn areas which have been damaged during seeding operations. Clean paving when work in adjacent areas is complete.

3.05 TURF

A. Duration

Turf establishment period will be in effect until final acceptance.

B. Maintenance

During turf establishment period, mow the seeded area to an average height of two (2") inches whenever the average height of grass becomes four (4") inches. Remove excess clippings, eradicate weeds, apply water and/or fertilizer, overseed, and perform other operations necessary to promote turf growth.

3.06 FINAL ACCEPTANCE

A. Final Inspection and Acceptance

At the end of the turf establishment period, final inspection will be made upon written request at least 10 days prior to the anticipated date. Final acceptance will be based upon a satisfactory stand of turf, defined as 95 percent ground cover of the established species.

B. Replanting

In areas which do not have a satisfactory stand of turf, replant as directed.

--END OF SECTION--

SECTION 03312 CONCRETE WORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

This section covers the materials, placement and testing for concrete where called for on the plans.

1.02 CODES AND STANDARDS

Work in this section shall comply with the following:

1. ACI 301 "Specifications for Structural Concrete for Buildings".
2. ACI 318 "Building Code Requirements for Reinforced Concrete".
3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

1.03 MEASUREMENT AND PAYMENT

A. No measurement shall be made for "Concrete Work".

B. Payment for work or products required in this section shall be included in the unit/lump sum price bid in the Proposal for the item to which the work in this section applies.

PART 2 PRODUCTS

1.04 CONCRETE

Concrete mixes shall comply with the following unless otherwise shown on the plans:

28-day compressive strength	4,000 psi
Slump	$\leq$ 3"
Water / Cement Ratio	$\geq$ 0.46

1.05 REINFORCING MATERIALS

A. Reinforcing Bars

ASTM A 615, Grade 60, deformed.

B. Welded Wire Fabric

ASTM A 185, welded steel wire fabric.

PART 3 EXECUTION

1.06 PLACEMENT

A. Placement shall comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete".

1.07 QUALITY CONTROL TESTING

Sampling and testing for quality control shall be directed by the CQA ENGINEER and shall include slump and compression testing in accordance with applicable standards.

-- END SECTION --

IX CQA PLAN

CQA PLAN
CONSTRUCTION QUALITY ASSURANCE PLAN

2015 PARTIAL CLOSURE CONSTRUCTION
CHARLOTTE MOTOR SPEEDWAY LANDFILL V
CABARRUS COUNTY, NORTH CAROLINA

FOR

REPUBLIC SERVICES

MAY 2015

HHNT
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I. GENERAL

A. Republic Services of South Carolina, LLC, (the OWNER) will retain an engineering consulting firm (CQA Firm) to assure that proper construction techniques and procedures are used and to verify that the materials used meet the Contract Specifications. The CQA Firm must employ engineers licensed to practice engineering in the State of North Carolina and experienced in the field of solid waste management and sanitary landfill construction. At the completion of the work, the program requires certification reports indicating that the facility has been constructed in accordance with the Construction Specifications and approved design. It is the responsibility of the certifying Engineer(s) to prepare these reports.

B. To implement the construction project, a CONTRACTOR, familiar with earthwork and geomembrane construction, will serve as a general contractor (CONTRACTOR) providing construction services. In addition, a CQA ENGINEER will be retained to serve as an independent third party to ensure project conformance of all construction activities to established CQA standards. In most instances, the CONTRACTOR will perform all earthwork activities, and may retain a geomembrane contractor for installation of geosynthetic materials. Republic may, at their discretion, directly contract with a geomembrane contractor for installation of geosynthetic materials. The CQA Plan provides guidance information and procedures that should be undertaken by Republic, the DESIGN ENGINEER, and the CONTRACTOR so the work will be of the quality necessary to meet the project objectives and will be responsive to the requirements of Republic Services of South Carolina, LLC.

C. This CQA Plan is a supplemental document to the Construction Plans and Specifications for each project. Where a conflict arises, the Contract Documents will govern.

D. The activities addressed under this CQA Plan include the following activities:

- Grading;
- Soil cap construction;
- Installation of a geomembrane cap and drainage layer; and
- Placement of soil protective cover and vegetative support layer

E. Definitions

- **Quality Control:** A planned system of activities, or the use of such a system, whose purpose is to provide a level of quality that meets the needs of users. The objective of quality control is to provide construction quality control that is safe, adequate, dependable, and economical. The overall system involves integrating the quality factors of several related steps including: the proper specification of what is wanted, production to meet the full intent of the specification, inspection to determine whether the resulting material, product, service, etc. is

in accordance with the Construction Specifications, and review of usage to determine necessary revisions of the Construction Specifications.

In practice, Quality Control refers to those procedures, criteria, and tests employed and paid for by the CONTRACTOR(s) to confirm that the work satisfies the CONTRACTOR's standards and is in compliance with the Construction Plans and Specifications. This CQA Plan does not address quality control procedures, criteria, and/or tests employed by the CONTRACTOR.

- **Quality Assurance:** A planned system of activities whose purpose is to provide assurance that the overall quality control program is in fact being effectively implemented. The system involves a continuing evaluation of the adequacy and effectiveness of the overall quality control program with the ability to have corrective measures initiated where necessary. For a specific material, product, service, etc., this involves verifications, audits, and the evaluation of the quality factors that affect the specification, production, inspection, and use of the product, service, system, or environment.

  In practice, Quality Assurance refers to those procedures, criteria, and tests required and paid for by the OWNER to confirm that the work performed by the CONTRACTOR(s) is in compliance with the approved Construction Plans and Specifications and any additional requirements of this CQA Plan.

- **Lot:** A quantity of resin (usually the capacity of one rail car) used in the manufacture of polyethylene geomembrane rolls. The finished roll will be identified by a roll number traceable to the resin lot used.

- **Panel:** The unit area of geomembrane that will be seamed in the field. A panel is identified as a roll or portion of a roll that is larger than 100 square feet.

- **Subgrade Surface:** The soil layer surface which immediately underlies the structural fill, compacted clay liner/cap, or geomembrane liner/cap.

F. Parties referenced in this CQA Plan shall consist of the following:

1. DESIGN ENGINEER: The DESIGN ENGINEER is the official representative of the OWNER. The DESIGN ENGINEER is responsible for the preparation of the construction plans and specifications of the project and for the preparation of the CQA Plan. The DESIGN ENGINEER is also responsible for the interpretation of these documents and for resolution of construction matters that arise during construction. The DESIGN ENGINEER shall review and approve shop drawings, authorize minor variations in the work from the contract documents and reject defective work (duties and responsibilities are described in the General Conditions as "ENGINEER"). The DESIGN ENGINEER shall be a registered professional engineer licensed in North Carolina.

2. CQA ENGINEER: Responsible for defining quality assurance requirements compatible with the project objectives, verifying basic data as reasonable and complete, outlining procedures to process data, development of statistical procedures for the analysis of test data and preparing quality assurance memoranda and quality control reports. The CQA ENGINEER shall report to the DESIGN ENGINEER. The CQA ENGINEER shall be a registered professional engineer licensed in North Carolina. Reference to the CQA ENGINEER, for the purpose of this document, shall include the CQA ENGINEER or his representative.

3. Engineering Technicians: Responsible for field observations, testing and inspection. Technicians will be assigned to the project as deemed necessary by the CQA ENGINEER and will be responsible to the CQA ENGINEER. The CQA ENGINEER, Technician or the CQA ENGINEER's representative shall be on-site during all construction activities, except clearing and grubbing and initial cell excavation. A daily log of all field technicians, testing and inspection shall be maintained by the Technician.

4. OWNER: The OWNER is the individual, entity, or private company with whom the CONTRACTOR has entered into the Agreement and for whom the Work is performed. For this project, the OWNER is Republic Services of South Carolina, LLC.

5. CONTRACTOR: The CONTRACTOR has the primary responsibility for ensuring that the landfill cell is constructed in accordance with the Construction Plans and Specifications developed by the ENGINEER and approved by the permitting agency. Other responsibilities include the performance of all construction activities at the site including site facilities, administration, material purchasing, procurement, supervision, construction quality control, installation, and subcontracting. The CONTRACTOR is responsible for the protection of completed work until it is accepted by the OWNER. The CONTRACTOR is also responsible for informing the OWNER and CQA Consultants of the scheduling and occurrence of all construction activities.

6. Geomembrane Manufacturer (Manufacturer): The party responsible for manufacturing the geomembrane rolls.

7. Geosynthetic CQA Laboratory (Testing Laboratory): Party, independent from the OWNER, Manufacturer and Installer, responsible for completing laboratory tests on samples of geosynthetics obtained at the site or during manufacturing usually under the direction of the OWNER.

8. Geotechnical CQA Laboratory: Party, independent from the OWNER or CONTRACTOR, responsible for completing laboratory tests on soil samples obtained at the site or source usually under the direction of the OWNER.

9. Geomembrane Installer (Installer): The Installer is responsible for field handling, sorting, placing, seaming, loading (against wind), and other aspects of the geosynthetics installation, including geomembranes, geotextiles, geonets, geosynthetic clay liners, and geonet composites.

II. GRADING

A. GENERAL

The CQA ENGINEER shall test the grading, placement, and compaction of in-situ materials and structural fill. The CQA ENGINEER shall certify the materials and construction were in accordance with the plans, specifications, and this CQA Plan.

B. RELATED WORK

The CQA ENGINEER should reference the grading section of the technical specifications for pertinent soil materials, physical properties and construction requirements.

C. SUBGRADES

During construction, conformance and performance testing of the subgrade soil materials shall be performed by the CQA ENGINEER. The CQA ENGINEER shall monitor proofrolling of areas that are cut to achieve grade. Material placed to achieve grades indicated on the plans shall be tested by the CQA ENGINEER in accordance with the test methods and frequencies listed herein to verify that the compacted fill materials used by the CONTRACTOR complies with the technical specifications. Areas of proof rolling or compacted fill that do not conform to the technical specifications will be delineated and reported to the CONTRACTOR. These areas will be re-worked by the CONTRACTOR and re-tested until passing results are achieved.

The CQA ENGINEER shall monitor the repair and re-work of subgrade which is damaged by excess moisture (causing softening) and insufficient moisture (causing desiccation and shrinkage) or be freezing. If such conditions are found to exist, the CQA ENGINEER shall evaluate the suitability of the subgrade by the following methods as applicable:

- moisture / density testing;
- continuous visual inspection during proof-rolling;
- other test methods identified herein.

D. CONFORMANCE TESTING

It will be necessary for the CQA ENGINEER to observe and test the structural fill soils to ensure they are uniform and conform to the requirements of the technical specifications. For soil materials obtained from on-site or off-site borrow areas, visual inspections and conformance tests shall be performed by the CQA ENGINEER prior to the materials being used. Borrow area inspections may also be utilized by the CQA ENGINEER to ensure that only suitable soil materials are transported to the site. For both on-site and off-site borrow areas containing non-uniform materials, it shall be necessary for the CONTRACTOR and the CQA ENGINEER to coordinate excavation and monitoring of the segregation of substandard materials. All materials failing to comply with conformance standards shall be rejected for use.

Initial evaluation of various soil types by the CQA personnel during construction shall be largely visual; therefore, the CQA personnel must be experienced with visual-manual soil classification procedures. CQA personnel shall observe soils for deleterious materials (e.g., roots, stumps, rocks, and large objects). When necessary, the visual-manual procedure for the description and identification of soils shall be conducted by the CQA ENGINEER and the description shall be in accordance with test method ASTM D2488.

E. TEST METHODS AND FREQUENCY

All testing shall be conducted in accordance with the technical specifications or as directed by the DESIGN ENGINEER. The field testing methods, used to evaluate the suitability of soils during their installation, shall be performed by the CQA ENGINEER in accordance with current ASTM test procedures indicated in the table below. Documentation and reporting of the test results shall be the responsibility of the CQA ENGINEER.

The Standard Proctor Test (ASTM D698) shall be used for the determination of moisture / density relationships unless otherwise indicated. In-place surface moisture / density nuclear test method ASTM D2922 or drive cylinder test method ASTM D2937 shall be used for in-situ field testing. The sand cone test method ASTM D1556 or drive cylinder test method ASTM D2937 shall be used to establish correlations of moisture and density in cases of uncertainty, and as a check of the nuclear surface moisture / density gauge calibration. Any conflict regarding acceptance of test results shall be resolved by the DESIGN ENGINEER.

Testing shall be conducted during the course of the work. The minimum construction testing frequencies are presented in the table below. The frequency may be increased at the discretion of the CQA ENGINEER or if variability of the materials is observed by the CQA ENGINEER. Sampling locations shall be selected by the CQA ENGINEER. If necessary, the location of routine in-place density tests shall be determined using a non-biased sampling approach.

A special testing frequency shall be used at the discretion of the CQA ENGINEER when visual observations of construction performance indicate a potential problem.

MINIMUM TESTING REQUIREMENTS FOR STRUCTURAL FILL	
TEST	**FREQUENCY**
Laboratory Moisture-Density / ASTM D698	1 test for each type of soil encountered
Field Density and Moisture Content / Sand Cone, ASTM D1556 Drive Cylinder, ASTM D2937 Nuclear, ASTM D2922	1 test per 1,000 c.y. of structural fill

F. COMPACTION

The CQA ENGINEER shall confirm that structural fill conforms to compaction requirements as follows:

Description	**General Compaction**
Sediment Basin Embankments	95%
Roadways	95%
Shoulders and Embankments	95%
Utilities Under Structures	95%
Other Areas	95%

G. PROTECTION OF SUBGRADES AND FILL SURFACES

The CQA ENGINEER shall monitor newly graded areas to verify the CONTRACTOR is protecting these areas from traffic and erosion until construction is complete.

III. GEOMEMBRANE FML CAP

A. GENERAL

Stringent quality assurance and careful documentation are required in the production and installation of all geosynthetic materials. The work addressed under this section shall facilitate proper construction of all geosynthetic components of the cap for the landfill. All work shall be constructed to the lines, grades, and dimensions indicated on the project plans, in accordance with the Construction Specifications, or as required by the OWNER or DESIGN ENGINEER.

The CQA ENGINEER shall issue a written daily report of activities to the DESIGN ENGINEER. These reports shall include, at a minimum, observations and test results as well as problems encountered and solutions achieved. Construction reports summarizing significant events, as well as addressing all problems encountered and their solutions, shall be issued to the DESIGN ENGINEER. The format of these reports and frequency shall be established at the pre-construction meeting.

The CQA ENGINEER shall certify the materials and installation are in accordance with the plans, specifications, and this CQA Plan.

B. MATERIAL

1. The geomembrane will be 40 mil Linear Low Density Polyethylene (LLDPE) supplied and installed by firms approved by the OWNER.

2. Seams for providing watertight joints will be extrusion or double hot wedge fusion seams using techniques approved by the CQA ENGINEER.

3. Construction Quality Assurance shall confirm the material meets the minimum physical properties and test frequencies of the Geosynthetic Research Institute GRI Test Method GM-17, as latest revised, for 40 mil Liner Low Density Polyethylene (LLDPE) Geomembrane.

4. The CQA ENGINEER or his representative will sample two (2) rolls from each shipment of geomembrane at the manufacturing plant prior to shipment to the site.

5. The random samples must be representative of the material supplied and exclude the outer wrap of geomembrane if signs of scuffing or other damage are observed. Samples should be full roll width and at least 2 feet long.

6. The laboratory testing of the samples selected by the CQA representative shall be directed by the CQA ENGINEER and shall confirm conformance with the following properties:

a.	Thickness	(ASTM D5199 for smooth sheet (ASTM D5994 for textured sheet)
b.	Density	(ASTM D1505)
c.	Melt Index	(ASTM D1238)
d.	Carbon Black Content	(ASTM D1603)
e.	Tensile Properties	(ASTM D6693 or GRI GM-13)
f.	Tear Resistance	(ASTM D1004, DIE C)
g.	Asperity Height	(GRI GM-12)

7. The CQA ENGINEER or his representative will measure geomembrane thickness of each roll made for the project at the manufacturing plant prior to shipment. Material that does not fall within acceptable thickness criteria will be rejected.

C. GEOMEMBRANE MANUFACTURER AND INSTALLER

1. The Geomembrane Installer will submit the following as obtained from the Geomembrane Manufacturer to the CQA ENGINEER:

   a. Production Certification including project references
   b. Testing Program of Compound Ingredients
   c. Material Certification
   d. Test Data for Material and Resin
   e. All of the above submittals will be reviewed and retained by the CQA ENGINEER

2. The Geomembrane Installer will submit the following to the CQA ENGINEER prior to the installation:

   a. Qualifications of Geomembrane Installer Superintendent and Foreman
   b. Resumes of Geomembrane CONTRACTOR field crew
   c. Six (6) sets of geomembrane panel layout drawings

D. DELIVERY AND STORAGE

1. Upon delivery at the site, the CQA ENGINEER shall inventory all rolls and conduct a surface observation of each roll or factory panel for defects or damage. The inspection will be performed without unrolling rolls or unfolding factory panels unless defects or damages are found or suspected. The CQA ENGINEER will indicate those rolls with severe flaws that should be removed from the site and those rolls with minor flaws.

2. The CONTRACTOR will be responsible for the storage of the geomembrane on-site upon arriving at the site. The OWNER will provide storage space in a location (or several locations) such that on-site transportation and handling are minimized. Storage space should be protected from theft, vandalism, passage of vehicles, etc.

3. The CQA ENGINEER will verify that storage space selected is in a well-drained area and that cribbing techniques have been used as needed to ensure that the materials will not be sitting in ponded water in the event of rainfall.

E. GEOMEMBRANE INSTALLATION

1. An initial CQA meeting (pre-deployment meeting) will be held prior to installation. The Geomembrane Installer, CQA ENGINEER or his representative, and a representative of the OWNER will be in attendance. The following issues will be discussed and agreed upon by all parties and shall be included in a report in the CQA documentation.

   a. Testing of welds
   b. Characteristics of "good" weld, and
   c. Repair procedures

2. The CQA ENGINEER or his representative will mark all areas where grinding is considered to be excessive. The location and repair method for the excessive grinding will be recorded in the daily field reports. The method or repair will be determined by the CQA ENGINEER.

3. Overheating of the geomembrane will be monitored by the CQA ENGINEER or his representative. At the discretion of the CQA ENGINEER, coupons will be cut from the end of the extrusion seams and the bottom side of the seam will be observed for visible warping or deformation. The location and repair method of overheated areas will be recorded in the daily field reports. The method of repair will be determined in the field by the CQA ENGINEER.

4. During seaming, the CQA ENGINEER or his representative will observe the seams for the following:

   a. proper preparation
   b. grinding technique, where applicable, and
   c. overheating

5. The CQA ENGINEER or his representative will observe the geomembrane during the coolest part of the day to check for slack. Any areas where excessive "trampolining" occurs will be marked by the CQA ENGINEER for repair by the Geomembrane Installer.

6. The CQA ENGINEER or his representative will mark all areas where the geomembrane indicates a protrusion from the compacted soil cap. The method of repair will be determined in the field by the CQA ENGINEER.

F. TEST SEAMS

1. Test seams shall be made each day prior to commencing field seaming. The seams shall be made on fragment pieces of geomembrane under the same surface and environmental conditions as the production seams to verify that seaming conditions are adequate. The test seams shall be made at the beginning of each seaming period; at changes of equipment, equipment settings, operator, weather, or sheet temperature; at the CQA ENGINEER's discretion, and at least once every four to six hours during continuous operation of each welding machine; or at change in material type (i.e., smooth-to-smooth seam versus smooth-to-textured seam).

2. The test seam sample shall be at least five feet long by one foot wide with the seam centered lengthwise. For dual track fusion welds nine, one-inch wide by six-inch long test strips shall be cut from the test seam. Quantitatively test three specimens for inside peel adhesion (peel), three for outside peel, and then three specimens for bonded seam strength (shear). For extrusion welds six, one-inch wide by six-inch long test strips shall be cut from the trial seam. Quantitatively test three specimens for peel and three specimens for bonded seam strength (shear).

3. A test seam sample shall pass when the results of the tests in both peel and shear achieve the strengths provided in the seam strength table in Section I and when the break can be described as a film tear bond. A film tear bond is defined as a failure in the ductile mode of one of the bonded sheets by tearing prior to complete separation to the bonded area.

- Peel strength (fusion) – ASTM D6392
- Peel strength (extrusion) – ASTM D6392
- Shear strength (fusion & extrusion) – ASTM D6392

4. Test seams shall be repeated, in its entirety, when any of the test seam samples fail in either peel or shear. If additional test seams fail, the seaming apparatus or seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful full test seams are achieved. No welding equipment or welder shall be allowed to begin production welds until equipment and welders have a successfully completed test seam. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the cap installation. Installer shall demonstrate that acceptable seaming can be achieved by completing passing trial seams.

5. The remainder of the successful test seam shall be assigned a number and marked accordingly by the CQA ENGINEER, who shall also log the date, hour, ambient temperature, number of seaming apparatus, name of seamer, and pass or fail description. The sample itself should be archived until project completion.

G. FIELD DESTRUCTIVE TESTING

1. The Geomembrane Installer will obtain 12" x 60" samples of field seams, suitable for testing, at an average frequency of one sample per 500 linear feet of weld. The date, time and equipment, seam number, and seaming parameters will be marked on each sample and recorded by the CQA ENGINEER.

2. Samples retained will be tested in the field by the Geomembrane Installer. A minimum of five specimens from each sample will be tested in peel and shear (ASTM D6392).

   Five specimens from each sample shall be tested for Bonded Seam Strength (shear) using ASTM D6392. Failures in grind areas of extrusion seams may require resampling and retesting.

   At least five specimens from each sample shall be tested for Peel Adhesion using ASTM D6392.

   The criteria for determining passing welded seam shall be as stated in the “Seam Strength” table in this section. If unresolved discrepancies exist between the CQA ENGINEER’s and CONTRACTOR’s test results, the archived sample may be tested by the CQA ENGINEER. Samples which do not pass the shear and peel tests will be resampled from locations at least 10 feet on each side of the original location. These two re-test samples must pass both sear and peel testing. If these two samples do not pass, then additional samples will continue to be obtained until the questionable seam area is defined.

3. The CQA ENGINEER or the OWNER may require additional random samples to be taken for testing in areas which visually appear defective and not in accordance with the project requirements.

   At the end of each double wedge welded field seam of 100' or more in length, a 1" wide coupon is to be cut from near the end of the seam. This coupon is to be tested in peel using a field tensiometer. The CQA ENGINEER will observe this test and FTB type failures will be the criteria for preliminary acceptance of the production seam. (Final seam acceptance is contingent on air and destructive testing).

H. NON-DESTRUCTIVE TESTING

1. The CQA ENGINEER shall confirm that the geomembrane installer has conducted non-destructible testing of the entire length of all field seams in accordance with Section 02750 of the Technical Specifications. The testing method shall be approved by the CQA ENGINEER in advance.

2. Non-destructive testing will be observed by the CQA ENGINEER or his representative on a full-time basis.

I. DESTRUCTIVE LABORATORY TESTING

1. Destructive seam samples will be laboratory tested by the CQA ENGINEER. Testing frequency shall average one sample per 500 linear feet of field seam.

   a. Test samples will be at least 12" x 36". A minimum of five peel specimens will be tested for each sample in accordance with ASTM D6392 for the properties listed in the Seam Strength table in this section. At least five specimens from each sample will be tested for bonded shear strength (shear) in accordance with ASTM D6392. These test samples shall be taken at the same locations as the CONTRACTOR's destructive testing samples.

   b. All laboratory specimens will be conditioned for a minimum of one hour prior to testing at the Standard Atmosphere for Testing Geosynthetics, that is, air maintained at a relative humidity of 65 $\pm$5% and a temperature of 21 $\pm 2^{o}$C (70 $\pm 4^{o}$F).

2. The load and elongation at failure will be measured for each specimen. FTB is the qualifying criterion.

   a. The CQA ENGINEER will describe the type of failure for each specimen and record the presence of any disbonding, delamination, foreign material in the bond area, etc.

b. The criteria for determining passing welded seams shall be as stated in the "Seam Strength" table in this section.

c. If a peel specimen fails in the grinding or preparation area, this should be clearly noted on the test report. Both sides of the double-wedge fusion seam must pass the testing requirements to constitute a passing test.

d. If unresolved discrepancies exist between the CQA ENGINEER's and CONTRACTOR's test results, the archived sample may be tested by the CQA ENGINEER. Samples which do not pass the shear and peel tests will be resampled from locations at least 10 feet on each side of the original location. These two re-test samples must pass both shear and peel testing. If these two samples do not pass, then additional samples will continue to be obtained until the questionable seam area is defined.

SEAM STRENGTH AND RELATED PROPERTIES OF THERMALLY BONDED SMOOTH AND TEXTURED LINER LOW DENSITY POLYETHYLENE (LLDPE) GEOMEMBRANE
40 MIL SHEET

Property	Units	Value
Hot Wedge Seams (1)		
shear strength (2)	lb/in	60
shear elongation at break (3)	%	50
peel strength (2)	lb/in	50
peel separation	%	25
Extrusion Fillet Seams		
shear strength (2)	lb/in	60
shear elongation at break (3)	%	50
peel strength (2)	lb/in	44
peel separation	%	25

(1) Value listed for shear and peel strengths are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values. Average of all 5 must meet minimum specified value
(2) Elongation measurements should be omitted for field testing
(3) A maximum of one non-film tear bond failure out of a set of 5 tests is acceptable provided the non-film tear specimen meets strength requirements

J. REPAIRS

Any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test shall be repaired. Damaged geomembrane shall be removed and replaced with acceptable geomembrane materials if damage cannot be satisfactorily repaired. Installer shall be responsible for repair of damaged or defective areas.

Agreement upon the appropriate repair method shall be decided between the CQA ENGINEER and the Installer. Procedures available include the following:

- Patching - Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter;
- Spot Welding - Used to repair pinholes, other localized flaws (minor) or where geomembrane thickness has been reduced;
- Capping - Used to repair large lengths of failed seams; and
- Replacement - Used to remove the unacceptable seam and replace with new material.

In addition, surfaces of the geomembrane which are to be repaired by extrusion welds shall be lightly abraded with disc grinder or equivalent to assure cleanliness. All geomembrane surfaces shall be clean and dry at the time of repair. Patches or caps shall be extended at least six inches for extrusion weld and four inches for wedge weld beyond the edge of the defect. All corners of patch material shall be rounded.

The CQA ENGINEER shall number and log each patch repair, and the Installer shall non-destructively test each repair using methods specified in this CQA Plan.

K. FINAL INSPECTION

A final inspection shall be completed by the Installer, DESIGN ENGINEER, CQA ENGINEER and OWNER prior to the Installer demobilizing from the site. All identified problem areas shall be repaired by the Installer and accepted by the CQA ENGINEER prior to the Installer demobilizing from the site.

IV. GEOCOMPOSITE DRAINAGE MEDIA (GDM)

A. GENERAL

The CQA ENGINEER shall certify the materials and installation are in accordance with the plans, specifications, and this CQA Plan.

B. MATERIAL

1. The geocomposite shall be a composite consisting of a HDPE geonet sandwiched between two (2) layers of 6 oz/sy minimum geotextile fabric. Protective cover material must be tested to verify compatibility with 6 oz/sy geotextile fabric. The composite shall meet the physical properties detailed in the table of required geocomposite drainage media properties in this section and be approved by the CQA ENGINEER.

2. During shipment and storage, the geocomposite shall be protected from ultraviolet light exposure, precipitation, contamination or other damaging conditions. Geocomposite rolls shall be shipped and stored in relatively opaque and watertight wrappings. The CQA ENGINEER shall verify that rolls of geocomposite have been shipped and are stored in accordance with the specifications.

3. All handling on-site is the responsibility of the Installer. The CONTRACTOR or Manufacturer is responsible for submittal of shipping manifests and all other relevant documents to the CQA ENGINEER.

4. The CQA ENGINEER or his representative shall take random samples from each shipment of geocomposite delivered to the site, sampling a minimum of 8 rolls from each shipment. The 3' x 3' samples shall be retained as part of the project records. The ENGINEER shall at the OWNER's expense, take a minimum of two samples and have them tested for the properties listed below; should visual inspection by the CQA ENGINEER reveal any apparent deficiencies in the material additional testing may be performed.

REQUIRED GEOCOMPOSITE DRAINAGE MEDIA PROPERTIES AND MANUFACTURER'S QUALITY CONTROL TEST DATA FINAL CAP SYSTEM				
Property	Test Method	Units	Value	Test Frequency
Thickness (geonet only)	ASTM D5199	inches	0.25	Every roll
Resin Density (geonet only)	ASTM D 1505	g/cm^3	0.94	50,000 ft^2
Ply Adhesion	ASTM D 413 or GRI GC7	lb/inch	2.0 (TYP) 1.0 Min. Avg.	50,000 ft^2
Transmisssivity [(1)]	ASTM D4716	$m^3/m^2/s$	$1x10^{-3}$ m^2/s	100,000 ft^2
Mass Per Unit Area (unit weight) Geotextile Only	ASTM D5216	oz/yd^2	6[(2)]	100,000 ft^2
Interface Friction	ASTM D5321	degrees	≥ 26.4[(3)]	2 per cap project

Notes:
[(1)] Conduct test for transmissivity at a normal compressive load of 500 psf and at a hydraulic gradient of 0.25 after a seating period of at least 100 hours. Boundary conditions are soil interface on the upper filter Geotextile and textured geomembrane against the lower filter Geotextile.
[(2)] Nominal value.
[(3)] The interface friction (shear) resistance shall be ≥ 26.4° or an equivalent shear strength (combination of friction angle (ø) and cohesion (c)). Tests shall be performed on the GDM/Geomembrane interface and the GDM/Protective Cover interface.

REQUIRED GEOCOMPOSITE DRAINAGE MEDIA PROPERTIES AND MANUFACTURER'S QUALITY CONTROL TEST DATA BASE LINER SYSTEM				
Property	Test Method	Units	Value	Test Frequency
Thickness (geonet only)	ASTM D5199	inches	0.25	Every roll
Resin Density (geonet only)	ASTM D 1505	g/cm^3	0.94	50,000 ft^2
Ply Adhesion	ASTM D 413 or GRI GC7	lb/inch	2.0 (TYP) 1.0 Min. Avg.	50,000 ft^2
Transmisssivity [(1)]	ASTM D4716	$m^3/m^2/s$	$5x10^{-4}$ m^2/s	100,000 ft^2
Mass Per Unit Area (unit weight) Geotextile Only	ASTM D5216	oz/yd^2	6[(2)]	100,000 ft^2
Interface Friction	ASTM D5321	degrees	≥ 26.4[(3)]	2 per cap project

Notes: [1] Conduct test for transmissivity at a normal compressive load of 15,000 psf and at a hydraulic gradient of 0.05 after a seating period of at least 24 hours. Boundary conditions are soil interface on the upper filter Geotextile and textured geomembrane against the lower filter Geotextile.
[2] Nominal value.
[3] The interface friction (shear) resistance shall be ≥ 26.4° or an equivalent shear strength (combination of friction angle (ø) and cohesion (c)). Tests shall be performed on the GDM/Geomembrane interface and the GDM/Protective Cover interface.

C. GEONET MANUFACTURER AND INSTALLER

1. The CONTRACTOR shall submit the following as obtained from the Geonet Manufacturer to the CQA ENGINEER to review:

   a. Production Certification
   b. Material Certification
   c. Test Data for Material

2. The CONTRACTOR shall submit the following to the CQA ENGINEER prior to installation:

   a. Qualifications of installer superintendent, foreman and field crew.
   b. Six sets of field installation drawings.

D. INSTALLATION

1. The CQA ENGINEER will allow installation of the geonet to proceed after he has provided certification of the geomembrane cap or a section thereof.

2. The CQA ENGINEER shall monitor the installation of the geonet to verify there is no damage to the geomembrane cap. Should the cap be damaged the CQA ENGINEER shall direct the CONTRACTOR to make the necessary repairs.

3. The CQA ENGINEER or his representative shall be present during all placement operations and shall verify that all work is in accordance with the plans and specifications.

4. At the conclusion of this activity, the CQA ENGINEER shall provide a written certification that the work has been installed according to plans and specifications.

V. PROTECTIVE SOIL COVER (ON LANDFILL CAP)

A. GENERAL

The CQA ENGINEER shall certify the materials and installation are in accordance with the plans, specifications and this CQA Plan.

B. MATERIAL

1. Soil that meets all of the following requirements shall be classified as select soil fill for use in construction of the protective soil cover.

    a. Soil shall be classified according to the Unified Soil Classification System (USCS) as ML, MH, CH, SC, or CL (ASTM D2487). Liquid limit, plasticity index (PI), and percent passing the No. 200 sieve will be considered for proper classification.

    b. Select soil fill materials shall be reasonably free of gypsum, ferrous, and/or calcareous concretions and nodules, refuse, roots, or other deleterious substances.

    c. The soil cover shall be uniform, smooth, and free of debris, rock, plant materials, and other foreign material larger than 3" in diameter. The material should contain no sharp edges.

2. The top 6" of soil cover must be capable of supporting growth of vegetative cover. The top 6" may consist of the soils listed in XII.B.1.a, expanded to include SM.

C. STOCKPILING AND MATERIAL APPROVAL

1. All material to be used as soil cover shall be approved in advance by the CQA ENGINEER. The CQA ENGINEER must verify the soil meets all the material requirements.

2. Verification can be accomplished during excavation and stockpiling or prior to use at existing stockpiles.

3. The CQA ENGINEER shall prepare reports of all testing, analysis and verification.

D. CONSTRUCTION

1. The CQA ENGINEER shall provide verification of the following:

    a. Approved stockpiled material was used to construct the cover.

b. The soil cover was constructed in accordance with the approved plans, specifications, and this CQA Plan.

c. The geomembrane and GDM were not damaged during the construction of the soil cover.

d. After the soil cover thickness of 18" has been achieved, the layer thickness shall be measured by the test excavation or hard auger boring.

e. Landfill sideslope berms shall be compacted to a density of 95% or more of the Standard Proctor (ASTM D-698) maximum dry density. In-place testing shall be performed by the CQA ENGINEER to confirm the required compaction is achieved.

f. At least one (1) sample for every 5,000 in-place cubic yards will be taken and tested in accordance with ASTM D-422 (Grain Size) by the CQA ENGINEER.

g. Tested samples will meet or exceed the requirements outlined in the specifications.

h. If tests indicate that the in-place material does not meet the required specifications, the material will be removed, replaced, and retested.

i. The final lift of the soil cover layer grades will be measured to plus or minus two-tenths of a foot measured across any 10-foot section.

VI. CERTIFICATION

A. The CQA ENGINEER will provide certification that the 12" thick foundation layer, LLDPE geomembrane layer, protective cover soils, and other associated ancillary facilities for the particular landfill area are constructed according to the approved plans, specifications, and this CQA Plan. Said certification shall have the CQA ENGINEER's seal as a professional engineer registered in the State of North Carolina. The report shall be submitted as each cap or section is constructed.

B. A copy of all test reports and field notes outlined in this CQA Plan will be submitted to the North Carolina Department of Environmental and Natural Resources for their review and approval within 30 days of completion of a cap or section.

C. The project will not be deemed complete and acceptable until the North Carolina Department of Environmental Health and Natural Resources has accepted the construction certification and all supplement reports and data as complete. The CONTRACTOR and the CQA ENGINEER should completely familiarize themselves with the Rules and Regulations of the North Carolina Department of Environmental Health and Natural Resources concerning composite liner and closure cap systems.