CRAVEN STREET IMPROVEMENTS

FOR

THE CITY OF ASHEVILLE

BID SET

MAY 2014

CITY OF ASHEVILLE PROJECT NO.: ST-13-14-006

MC COMMISSION NO.: 3267

PROJECT CONTACTS

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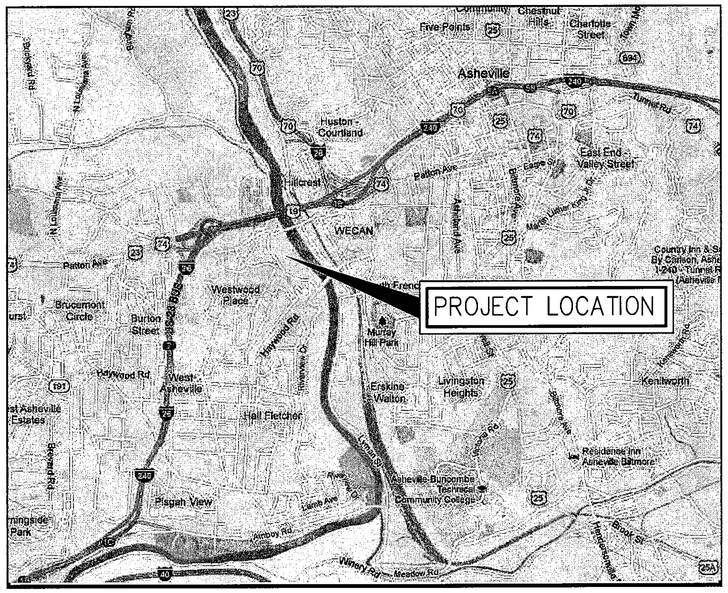
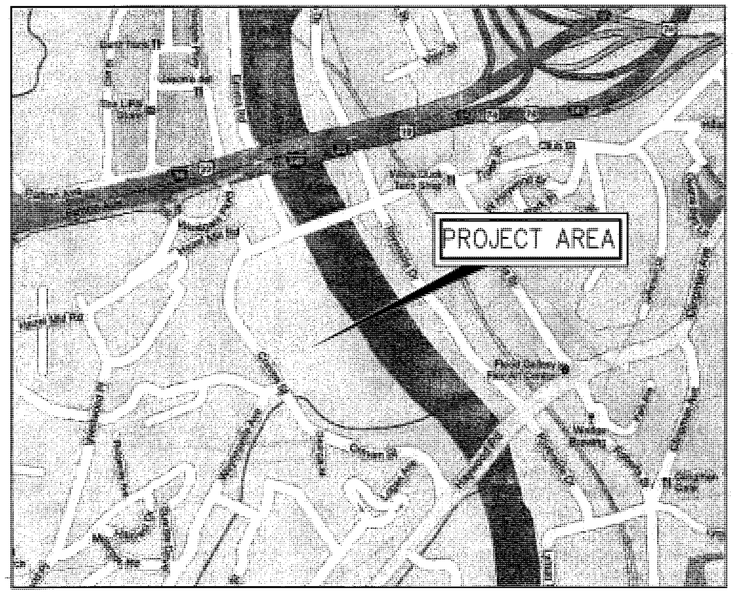


LOCATION MAP

NO SCALE



VICINITY MAP

NO SCALE

SHEET LIST

SHEET	TITLE
C1.....	TITLE SHEET
C2A.....	STANDARD ABBREVIATIONS
C2B.....	LEGEND AND GENERAL NOTES
C3.....	MASTER PLAN
C3A.....	MASTER PLAN SHEET INDEX
C3B.....	PRELIMINARY PLAT
C4A,B,C,D,E.....	DEMOLITION PLAN SHEETS
C5A,B,C,D,E.....	CRAVEN STREET PLAN AND PROFILE SHEETS
C5 F.....	LID PARKING/TRAILHEAD SITE/PLANTING PLAN
C5 G.....	STRIPING PLAN
C6A,B,C,D,.....	PHASE 1 GRADING, STORM DRAINAGE AND EC.
C6E,F,G,H;I,.....	FINAL GRADING, STORM DRAINAGE EC PLANS
C6J,K,L,.....	
C7A,B,C,D,E.....	WATER, SEWER AND MISC UTILITIES
C8A,B,C,D,E,F,.....	GREENWAY PLAN AND PROFILE SHEETS
C8G,H,I,J,.....	GREENWAY PLAN AND PROFILE SHEETS
C8K,L,M,.....	GREENWAY DETAILS
C8N,O,P,Q.....	GREENWAY EROSION CONTROL PLANS
C8R,.....	SEWER REPLACEMENT AT GREENWAY BRIDGE PLAN
C9A,B,C,D,E,F.....	STREAM ENHANCEMENT PLAN SERIES
C10A,B,C,D,E.....	SITE, ROAD, EROSION, WATER DETAILS
C10F.....	GREENWAY ARCH PLAN
C11A,B,.....	WATER DETAILS AND NOTES
C11C,.....	SEWER DETAILS AND NOTES
C12A,B,C,D,E,F,G,.....	STORMWATER BMP PLANS AND DETAILS
C13A,B,C,D,E,F,G,H,I,J.....	GREENWAY WALL SERIES
S1,2,3,.....	STRUCTURAL PLANS-GREENWAY BRIDGE
S4,5,.....	STRUCTURAL PLANS-GREENWAY ARCH CULVERT
S6,.....	STRUCTURAL PLANS-GRADE CONTROL STRUCTURE

SET NUMBER _____

COA PERMIT #

EDA INVESTMENT # 04-01-06747

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FOR CONSTRUCTION

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CITY OF ASHEVILLE
NORTH CAROLINA

CRAVEN STREET IMPROVEMENTS

Mattern & Craig
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2-WAY	TWO-WAY INTERSECTION
A/B	AS BUILT
AB	ANCHOR BOLT, AGGREGATE BASE
ABAN	ABANDON OR ABANDONED
ABBR	ABBREVIATION
ABUT	ABUTMENT
ABV	ABOVE
AC	ACRE, ALTERNATING CURRENT, AIR CONDITIONING
ACSM	AMERICAN CONGRESS ON SURVEYING & MAPPING
ACT	ACOUSTICAL
ADD	ADDITIONAL
ADJ	ADJACENT
AFF	ABOVE FINISH FLOOR
AGGR	AGGREGATE
AI	ANGLE IRON
ALT	ALTERNATE
ALTA	AMERICAN LAND TITLE ASSOCIATION
ALUM	ALUMINUM
ANC	ANCHOR
APPROX	APPROXIMATE
APRV	APPROVE(D)
APT	APARTMENT
ARCH	ARCHITECTURAL
ARV	AIR RELEASE VALVE
ASSY	ASSEMBLY
AST	ABOVEGROUND STORAGE TANK
AWWA	AMERICAN WATER WORKS ASSOCIATION
AVE	AVENUE
AVG	AVERAGE
AX	AXLE
AZ	AZIMUTH
BARB	BARBED WIRE (FENCE)
BB	BRUSH BARRIER
BDG	BRIDGE
BDY	BOUNDARY
BEG	BEGIN, BEGINNING
BF	BUFFER ZONE
BFP	BACK FLOW PREVENTER
BFV	BUTTERFLY VALVE
BIT	BITUMINOUS
BJ	BELL JOINT
BKF	BACKFILL
BL	BASE LINE
BLDG	BUILDING
BLKG	BLOCKING
BLVD	BOULEVARD
B/M	BLANKETS & MATTING
BM	BENCH MARK, BEAM
BND	BOUND
BOL	BOLLARD
BOTT	BOTTOM
BOV	BLOW OFF VALVE
BP	BYPASS
BR	BRANCH
BRG	BEARING
BSMT	BASEMENT
BV	BUTTERFLY VALVE
BW	BOTTOM OF WALL
C	CHANNEL, COLD, CABLE
C/C or C TO C	CENTER TO CENTER
C&G	CURB & GUTTER
CC&G	CONCRETE C&G
CAB	CABINET
CAD	COMPUTER AIDED DRAFTING
CADD	COMPUTER AIDED DRAFTING & DESIGN
CALC	CALCULATE, CALCULATION
CAP	CAPACITY
CB	CATCH BASIN
CD	CHECK DAM
CE	CONSTRUCTION ENTRANCE/EXIT
CEM	CEMETERY
CF	CUBIC FEET
CG	CHANGE OF GRADE
CHK	CHECK
CHKD	CHECKED
CI	CAST IRON
CIP	CULVERT INLET PROTECTION, CAST-IN-PLACE, CAST IRON PIPE
CIRC	CIRCULAR
CKT	CIRCUIT
CL	CENTER LINE
CLF	CHAIN LINK FENCE
CLR	CLEAR, CLEARANCE
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNITS
CND	CONDUIT
CNTL	CONTROL
CO	CLEAN OUT
COGO	COORDINATE GEOMETRY
COMB	COMBINATION
CONC	CONCRETE
CONN	CONNECT, CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
COR	CORNER
COV	COVER
CP	COORDINATE POINT, CONTROL POINT
CPED	CABLE PEDESTAL
CPLG	COUPLING
CPP	CORRUGATED PLASTIC PIPE
CR	CREEK
CRS	CONSTRUCTION ROAD STABILIZATION
CR STONE	CRUSHED STONE
CSW	CONCRETE SIDEWALK
CTR	CENTER
CTY	COUNTY
CU	CUBIC, COPPER
CULV	CULVERT
CV	CHECK VALVE
CY	CUBIC YARD
D	DEPTH OR DEGREE OF CURVE
DAT	DATUM
DB	DEED BOOK
DC	DUST CONTROL
DD	TEMPORARY DIVERSION DIKE
DEG	DEGREE
DEPT	DEPARTMENT
DEMO	DEMOLISH, DEMOLITION
DF	DRINKING FOUNTAIN
DI	DROP INLET, DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISC	DISCONNECT
DIV	DIVISION
DMH	DROP MANHOLE
DN	DOWN
DR	DRIVE
DS	DOWN SPOUT, DEWATERING STRUCTURE
DTL	DETAIL
DV	DIVERSION
DW, D/W	DRIVEWAY
DWL	DWELLING
DWG	DRAWING
E	EAST, ELECTRIC
EA	EACH
EBL	EASTBOUND LANE
EC	END OF CURVE
EF	EACH FACE
EG	EDGE OF GRAVEL
EJ	EXPANSION JOINT
EL, ELEV	ELEVATION
ELEC	ELECTRICAL
EM	ELECTRIC METER
ENGR	ENGINEER
ENTR	ENTRANCE
EOL	END OF LINE
EP	EDGE OF PAVEMENT
EPA	ENVIRONMENTAL PROTECTION AGENCY
EPED	ELECTRIC PEDESTAL
EQ	EQUAL
EQPT	EQUIPMENT
ESC	EROSION AND SEDIMENT CONTROL
ESMT	EASEMENT
EST	ESTIMATE
EV	EVERGREEN
EW	EACH WAY, ENDWALL
EX, EXIST	EXISTING
EXC	EXCAVATE
EXP	EXPANSION
EXT	EXTERIOR, EXTENSION
F	FOUND
FAC	FACILITY
FC	FACE OF CURB
FD	FLOOR DRAIN, TEMPORARY FILL DIVERSION
FDN	FOUNDATION
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FES	FLARED END SECTION
FF	FINISH FLOOR
FFE	FINISHED FLOOR ELEVATION
FGL	FIBERGLASS
FH	FIRE HYDRANT
FIG	FIGURE
FIN	FINISH
FIXT	FIXTURE
FL	FLOOR
FLD	FIELD
FLEX	FLEXIBLE
FLG	FLANGE
FM	FORCE MAIN
FO	FIBER OPTIC
FP	FENCE POST
FR	FRAME, FILTER RING
FR RD	FRONTAGE ROAD
FS	FIRE SERVICE
FT	FOOT
FTG	FOOTING, FITTING
FTK	FUEL TANK
FUST	FILL PORT - UNDERGROUND STORAGE TANK
FUT	FUTURE
FWD	FORWARD
FWY	FREEWAY
G	GAS (NATURAL)
GA	GABION, GAUGE
GAL	GALLON
GALV	GALVANIZED
GAR	GARAGE
GC	GENERAL CONTRACTOR
GE	GEOTEXTILE
GEN	GENERAL
GEO	GEOGRAPHIC
GIS	GEOGRAPHIC INFORMATION SYSTEM
GM	GAS METER
GND	GROUND
GR	GRAVEL
GOVT	GOVERNMENT
GPM	GALLONS PER MINUTE
GPS	GLOBAL POSITIONING SYSTEM, GALLONS PER SECOND
GRTG	GRATING
GT	GROUT, GRADIENT TREATMENT
GV	GAS VALVE, GATE VALVE
GW	GRAY WATER
H	HOT
HAZMAT	HAZARDOUS MATERIAL
HB	HOSE BIBB
HCAP	HANDICAP
HD	HEAVY DUTY, HEAD
HDPE	HIGH DENSITY POLYETHYLENE
HGT	HEIGHT
HK	HOOK
HM	HOLLOW METAL
HOR, HORIZ	HORIZONTAL
HP	HORSE POWER, HIGH PRESSURE
HPT	HIGH POINT
HV	HIGH VOLTAGE
HVAC	HEATING, VENTILATING & AIR CONDITIONING
HYD	HYDRANT, HYDRAULIC
HWY	HIGHWAY
I	IRON, INTERSTATE
ICV	IRRIGATION CONTROL VALVE
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH
INSP	INSPECT
INSUL	INSULATION
INV	INVERT
IP	IRON PIN (PIPE), INLET PROTECTION
IR	IRON ROD
IRR	IRRIGATION
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
K	COPPER
KG	KILOGRAM
KW	KILOWATT
L	LENGTH, LONG
LBL	LABEL
LAT	LATERAL, LATITUDE
LC	LONG CHORD
LF	LINEAL FOOT
LG	LONG, LENGTH
LIC	LICENSE
LIM	LIMIT
LK	LAKE
LOC	LOCATION
LOD	LIMITS OF DISTURBANCE
LN	LINE, LANE LONG
LP	LIGHT POLE
LR	LONG RADIUS
LS	LEVEL SPREADER
LT	LEFT
LTD	LIMITED
LTG	LIGHTING
LPT	LIQUID PROPANE TANK
M	METER
MACH	MACHINERY
MAINT	MAINTENANCE
MAG	MAGNETIC
MAJ	MAJOR
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MB	MAILBOX
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE, MOUNTING HEIGHT
MIN	MINIMUM, MINUTE
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MKR	MARKER
MM	MASTER METER, MILLIMETER
MO	MASONRY OPENING
MON	MONUMENT
MRM	MILE REFERENCE MARKER
MSDS	MATERIAL SAFETY DATA SHEET
MTD	MOUNTED
MTG	MOUNTING
MTL	METAL
MU	MULCHING
MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
MV	MUD VALVE
MWEL	MONITORING WELL
N	NORTH, NEW
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
N&C	NAIL AND CAP
NC	NORTH CAROLINA
NCDEH	NC DIVISION OF ENVIRONMENTAL HEALTH
NCDENR	NC DEPT. OF ENVIRONMENT AND NATURAL RESOURCES
NCDOT	NC DEPT OF TRANSPORTATION
NEC	NATIONAL ELECTRICAL CODE
NIC	NOT IN CONTRACT
NO	NUMBER
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NTS	NOT TO SCALE
O	OLD
O2	LIQUID OXYGEN
OC	ON CENTERS
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OP	OUTLET PROTECTION
OPER	OPERATOR
OPNG	OPENING
OPP	OPPOSITE
OPRV	OVER PRESSURE RELIEF VALVE
ORN	ORNAMENTAL
ORTHO	ORTHOGRAPHIC PHOTOGRAPHY
OSHA	OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
P	PIPE
PB	PAPER BOX
PC	POINT OF CURVE
PCC	POINT OF COMPOUND
PE	PERMANENT EASEMENT
PED	PEDESTAL, PEDESTRIAN
PER	PERIMETER
PERF	PERFORATED
PERP	PERPENDICULAR
PF	PAVED FLUME
PG	PAGE, PRESSURE GAUGE
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PK	PARKER-KALON (SURVEY) NAIL
PKG	PARKING
PKWY	PARKWAY
PL	PLATE, PROPERTY LINE, PLACE
PLG	PLUG
PLYWD	PLYWOOD
PNL	PANEL
PNT	POINT
POL	POINT ON LINE
PP	POWER POLE
POB	POINT OF BEGINNING
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVE
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION, PERMANENT SEEDING
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT OF TANGENT
PUB	PULL BOX
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	PRIVATE
PWR	POWER
QUAD	QUADRANGLE
QUAL	QUALITY
QTY	QUANTITY
(R)	RAW WATER
R	RADIUS, RISER
RAD	RADIUS
RAS	RETURN ACTIVATED SLUDGE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN, ROAD
RDCR	REDUCER
REBAR	REINFORCING STEEL
RECPT	RECEPTACLE
RECT	RECTANGULAR
REINF	REINFORCE, REINFORCEMENT
REF	REFERENCE
REL	RELOCATED
REPL	REPLACE
REQD	REQUIRED
REV	REVISION, REVERSE
RIV	RIVER
RLS	REGISTERED LAND SURVEYOR
RR	RAILROAD, RIP RAP
RRS	RAILROAD SPIKE
RTE	ROUTE RT RIGHT R/W,
ROW	RIGHT OF WAY
RWD	RIGHT OF WAY DIVERSION
RWM	RIGHT OF WAY MONUMENT
RXR	HIGHWAY-RAIL GRADE CROSSING MARKER
S	SANITARY SEWER, SOUTH, SWITCH
SAF	SAFETY FENCE
SALV	SALVAGE
SAN	SANITARY
SB	SETTING BASIN, SEDIMENT BASIN, SPLASH BLOCK
SC	SIGNAL CONTROL, STREAM CROSSING
SCC	STORMWATER CONVEYANCE CHANNEL
SCH	SCHOOL
SCHD	SCHEDULE
SCR	SCREEN
SD	STORM DRAIN, SUBSURFACE DRAIN
SDC	STREAM DIVERSION CHANNEL
SEC	SECOND(S), SECONDARY, SECURITY
SECT	SECTION
SEP	SEPTIC TANK
SER	SERVICE
SF	SILT FENCE
SHLD	SHOULDER
SHT	SHEET
SHTG	SHEETING
SIG	SIGNAL
SIM	SIMILAR
SL	SIDELINE
SLD	SATELITE DISH
SN	SIGN
SO, SOD	SODDING
SPEC	SPECIFICATION
SP	SIGNAL POLE
SPCS	STATE PLANE COORDINATE SYSTEM
SQ	SQUARE
SR	STATE ROUTE, SURFACE ROUGHENING
SS	STAINLESS STEEL
SSS	STRUCTUAL STREAMBANK STABILIZATION
ST	STREET, SEDIMENT TRAP, STATE
STA	STATION
STB	STRAW BALE BARNER
STD	STANDARD
STL	STEEL
STR	STRAIGHT, STRUCTURE
STRUCT	STRUCTURAL
STY	STORY
SUCT	SUCTION
SUR	SURVEY
SURF	SURFACE
SURV	SURVEY
SW	SOLVENT WELD
S/W	SIDEWALK
SYMM	SYMMETRICAL
T	TREAD, TOP, TELEPHONE
TA	TURN ARROW
T&B	TOP AND BOTTOM
TBM	TEMPORARY BENCH MARK
TC	TURBIDITY CURTAIN
TDC	TURNED DOWN CURB
TDEC	TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION
TDOT	TENNESSEE DEPT. OF TRANSPORTATION
TE	TEMPORARY EASEMENT
TELE	TELEPHONE
TEMP	TEMPORARY
TER	TERRACE
THK	THICK
TK	TANK
TLP	TRAFFIC LIGHT POLE
TN	TENNESSEE
TO	TOPSOILING
TOPO	TOPOGRAPHIC
TP	TELEPHONE POLE, TREE PROTECTION
TPED	TELEPHONE PEDESTAL
TR	TREE, TRAIL
TR-CON	TREE - CONIFER
TRAF	TRAFFIC
TRANS	TRANSFORMER
TRTD	TREATED
TS	TOP OF SLAB, TEMPORARY SEEDING
TSC	TEMPORARY STREAM CROSSING
TSD	TEMPORARY SLOPE DRAIN
TV	TELEVISION
TW	TOP OF WALL
TWRA	TENNESSEE WILDLIFE RESOURCES AGENCY
TYP	TYPICAL
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
UGE	UNDERGROUND ELECTRIC
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
USC	UTILITY STREAM CROSSING
USC&GS	UNITED STATES COAST AND GEODETIC SURVEY
USGS	UNITED STATES GEOLOGICAL SURVEY
US HWY	UNITED STATES HIGHWAY
UST	UNDERGROUND STORAGE TANK
UT	UTILITY
UTM	UNIVERSAL TRANSVERSE MERCATOR
V, VAL	VALVE
VA	VIRGINIA
VAP BAR	VAPOR BARRIER
VBMP	VIRGINIA BASE MAPPING PROGRAM
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VDEQ	VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
VDH	VIRGINIA DEPARTMENT OF HEALTH
VDOT	VIRGINIA DEPARTMENT OF TRANSPORTATION
VEG	VEGETATION
VEH	VEHICLE
VERT	VERTICAL
VGIN	VIRGINIA GEOGRAPHIC INFORMATION NETWORK
VIF	VERIFY IN THE FIELD
VLT	VAULT
VN	VENT
VOL	VOLUME
VPI	VERTICAL POINT OF INTERSECTION
VSD	VERTICAL SIGHT DISTANCE
VSS	VEGETATIVE STREAMBANK STABILIZATION
VVLT	VALVE VAULT
W	WIDE FLANGE, WIDE, WATER
W/	WITH
W/O	WITHOUT
WBL	WEST BOUND LANE
WD	WOOD
WF	WOOD FENCE
WH	WELL HOUSE OR SPRING HOUSE
WL	WATER LINE, WATER LEVEL
WM	WATER METER
WPR	WATERPROOFING
WS	WATER SURFACE
WT	WATERTIGHT, WEIGHT
WV	WATER VALVE
WVDOT	WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
WW	WINGWALL
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH
X-ING	CROSSING
XREF	CROSS REFERENCE
XWLK	CROSSWALK
YD	YARD
ZN	ZONE

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035198 5/27/14 DANIEL S. QUESINBERRY

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EQUINOX ENVIRONMENTAL
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CRAVEN STREET IMPROVEMENTS

STANDARD ABBREVIATIONS

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C2A

STANDARD LINEWORK LEGEND

EXISTING	PROPOSED	DESCRIPTION
		BUILDING WITH PORCH OR STOOP
		FOUNDATION ONLY
		CONCRETE CURB
		CONCRETE CURB & GUTTER
		CONCRETE WALK OR SLAB
		PAVEMENT
		UNPAVED OR GRAVEL ROAD
		RAILROAD
		GUARDRAIL
		WIRE FENCE
		CHAINLINK FENCE
		WOODEN FENCE
35	35	CONTOUR, CONTOUR WITH ELEVATION
		TREE LINE
		CENTERLINE CREEK, SWALE OR DITCH
		WETLANDS LIMITS
		FLOODWAY-FLOODPLAIN
PL OR	PL OR	PROPERTY LINE
		CENTERLINE
PL	PL	BASELINE
		LIMITS OF WORK
		DIRECTION OF FLOW
SD	SD	STORM DRAIN AND ENDWALL
S	S	SANITARY SEWER
FM	FM	FORCE MAIN - PROFILE
FM	FM	FORCE MAIN - PLAN
G	G	GAS MAIN OR SERVICE LINE
W	W	WATER MAIN OR SERVICE LINE
E	E	ELECTRICAL LINE
UE	UE	UNDERGROUND ELECTRICAL LINE
T	T	TELEPHONE LINE
UT	UT	UNDERGROUND TELEPHONE LINE
FO	FO	FIBER OPTIC LINE
FO-U	FO-U	UNDERGROUND FIBER OPTIC LINE
C	C	CABLE LINE
UTIL	UTIL	UTILITY CONDUIT
E/T	E/T	ELECTRICAL\TELEPHONE LINES
E/T/C	E/T/C	ELECTRICAL\TELEPHONE\CABLE LINES
PE OR	PE OR	PERMANENT EASEMENT
TE OR	TE OR	TEMPORARY EASEMENT
		ABANDON OR REMOVE
		PAVED DITCH
		DRIVEWAY CULVERT
OR	OR	CULVERT WITH FLARED END SECT.

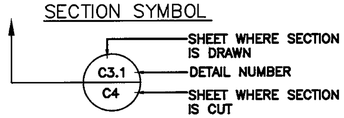
PIPE FITTINGS

	11.25° BEND		COUPLING
	22.5° BEND		PIPE JOINT MARK
	45° BEND		PIPE TEE
	90° BEND		

STANDARD SYMBOL LEGEND

EXIST	PROP	DESCRIPTION	EXIST	PROP	DESCRIPTION
ASD	ASD	ABOVEGROUND STORAGE TANK			PUMP
AI		ANGLE IRON			REDUCER
ARV	ARV	AIR RELEASE VALVE	RR		RAILROAD SIGNAL
AX		AXLE	RRS	RRS	RAILROAD SPIKE
BFP	BFP	BACK FLOW PREVENTER			ROW MONUMENT
		BASKETBALL GOAL	SC	SC	SIGNAL CONTROLLER
BH	BH	GEOLOGIC BORE HOLE	SEP	SEP	SEPTIC TANK
		BASELINE			SHRUB - 3 TYPES
	BM	BENCHMARK			
BOL	BOL	BOLLARD			SATELLITE DISH
BOV	BOV	BLOW OFF VALVE			SIGN
		CATCH BASIN		>	SANITARY SEWER FLOW
		CHECK DAM	S	S	SANITARY SEWER MANHOLE
℄	℄	CENTERLINE	D	D	STORM DRAIN MANHOLE
CO	CO	CLEAN OUT	STOP	STOP	PAINTED STOP MARKER
CP#	CP#	COORDINATE POINT			PAINTED STOP BAR
C	C	CABLE PEDESTAL	AHEAD	AHEAD	PAINTED AHEAD MARKER
//		DEMOLISH MARK	ENDS	ENDS	PAINTED ENDS MARKER
		DROP INLET	LANE	LANE	PAINTED LANE MARKER
ELEV	ELEV	SPOT ELEVATIONS	ONLY	ONLY	PAINTED ONLY MARKER
EB	EB	ELECTRIC BOX			
E	E	ELECTRIC MANHOLE	RXR	RXR	PAINTED RXR MARKER
EM	EM	ELECTRIC METER			
E	E	ELECTRIC PEDESTAL	SCHOOL	SCHOOL	PAINTED SCHOOL MARKER
ET	ET	ELECTRIC TRANSFORMER	YIELD	YIELD	PAINTED YIELD MARKER
		FIRE HYDRANT			PAINTED YIELD BAR
		FLOW ARROW			3 WAY TRAFFIC ARROW
		FLAG POLE			TRAFFIC ARROW - LEFT
F		FENCE POST			TRAFFIC ARROW - RIGHT
F-UST		FILL PORT-UST			TRAFFIC ARROW - STRAIGHT
FP	FP	FUEL PUMP			TRAFFIC ARROWS- STRAIGHT & L
GM	GM	GAS METER			TRAFFIC ARROWS- STRAIGHT & R
		GROUND SHOT	TB	TB	TRAFFIC CONTROL BOX
GP	GP	GUY POLE	TC	TC	TRAFFIC MANHOLE
		GUY WIRE	T	T	TELEPHONE MANHOLE
GV	GV	GAS VALVE	E		TELEPHONE - PAY PHONE
		GRAVE MARKER			PIPE TERMINIS
		ACCESSIBLE SYMBOL			TRAFFIC LIGHT POLE W/O & W/ LIGHT STANDARDS
ICV	ICV	IRRIGATION CONTROL VALVE			
IPF		IRON PIN - FOUND			TELEPHONE POLE
IPN		IRON PIN - NEW			TELEPHONE PEDESTAL
IPO		IRON PIN - OLD			TREE - 4 TYPES
IRO	IRF	IRON ROD - OLD / FOUND			
IRCN		IRON ROD W/ CAP - NEW			
IRN		IRON ROD - NEW			
IRS		IRON ROD - SET			
J	JB	JUNCTION BOX			TREE EVERGREEN - 3 TYPES
		LIGHT POLE			
LPT		LIQUID PROPANE TANK			
MB		MAIL BOX			
MM	MM	MASTER METER	TV	TV	TELEPHONE VAULT
		MONUMENT	UST	UST	UNDERGROUND STORAGE TANK
		MONITORING WELL	VN		VENT - MANHOLE, UST, ETC
PB		PAPER BOX	V	V	VALVE VAULT
		PIN CONTROL POINT	WELL		WELL
PF		PIPE - FOUND	W	W	WATER MANHOLE
PKN		PK NAIL NEW	WM	WM	WATER METER
PKO		PK NAIL OLD	WV	WV	WATER VALVE
		PROPERTY LINE			AERIAL PHOTO TARGET
		PLUG - WATERLINE			
		DEFAULT POINT MARK			
PM	PM	PARKING METER			
		POWER POLE			
PRV	PRV	PRESSURE REDUCING VALVE			
PS	PS	PLANTED STONE			
		PULL BOX			

SECTION SYMBOL



EROSION AND SEDIMENT CONTROL SYMBOLS

BF	POROUS BAFFLES
B/M	BLANKETS/MATTINGS
CD	CHECK DAM
CE	CONSTRUCTION ENTRANCE/EXIT
CIP	CULVERT INLET PROTECTION
CRS	CONSTRUCTION ROAD STABILIZATION
DC	DUST CONTROL
DD	TEMPORARY DIVERSION DIKE
DI	TEMPORARY DIVERSION
DS	DEWATER STRUCTURE
DV	DIVERSION DITCH
IP	INLET PROTECTION
LIM	LIMITS OF CONSTRUCTION
MU	MULCHING
OP	OUTLET PROTECTION
PS	PERMANENT SEEDING
RR	RIPRAP
SAF	SAFETY FENCE
SB	SEDIMENT BASIN
SD	SLOPE DRAIN
SF	SILT FENCE
SO	SODDING
ST	TEMPORARY SEDIMENT TRAP
STB	STRAW BALE BARRIER
TP	TREE PROTECTION
TS	TEMPORARY SEEDING
USC	UTILITY STREAM CROSSING

MATERIALS SYMBOLS

METAL	FINISHED WOOD OR PLYWOOD
BRICK	GRAVEL OR STONE
CONCRETE MASONRY	EARTH
CONCRETE	INSULATION (RIGID)
GROUT OR FINISHED CONCRETE	WOOD BLOCKING
PAVEMENT	

ESC NOTES: (SITE DESIGN)

(NC SEEDING)
EROSION AND SEDIMENT CONTROL NOTES:
TEMPORARY SEEDING: ALL DENUDED AREAS WHICH ARE NOT GRADED TO FINAL GRADE WITHIN 15 WORKING DAYS AND ALL SLOPES ON NORTH, WEST, AND SOUTH SIDES SHALL BE TEMPORARILY SEEDED BY MANUAL OR HYDROSEEDING METHODS. APPLY LIME INTO TOP 4-6 INCHES OF SOIL UNIFORMLY AT A RATE OF 1 TO 1 1/2 TONS/ACRE. FERTILIZE TOPO 4-6 INCHES OF SOIL WITH 10-10-10 GRADE FERTILIZER AT 700-1000 LB/ACRE.

PERMANENT SEEDING:
STABILIZE ALL DENUDED AREAS AT FINAL GRADE WITHIN 15 WORKING DAYS OR 90 CALENDAR DAYS. ALL SLOPES SHALL BE STABILIZED WITHIN 15 WORKING DAYS OR 30 CALENDAR DAYS. APPLY LIME AND FERTILIZER INTO TOP 4-6 INCHES OF SOIL UNIFORMLY AT A RATE OF 4000 LB/ACRE LIME AND 1000 LB/ACRE 5-10-10 GRADE FERTILIZER.

MULCH WITH STRAW AT 4000 LB/ACRE. ANCHOR AS REQUIRED. REFERTILIZE AS REQUIRED UNTIL GRASS IS WELL ESTABLISHED. RESEED, FERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

PERMANANT SEEDING MIXTURES:

FEBRUARY 1 - JULY 1
GENERAL SLOPE (3:1 OR LESS)
KENTUCKY 31 FESCUE @ 100 LB/ACRE
ENGLISH RYE @ 10 LB/ACRE

LOW-MAINTENANCE SLOPE (STEEPER THAN 3:1)
KENTUCKY 31 FESCUE @ 115 LB/ACRE
ENGLISH RYE @ 10 LB/ACRE

JUNE 1 - AUGUST 15
GENERAL SLOPE (3:1 OR LESS)
KENTUCKY 31 FESCUE @ 85 LB/ACRE
ENGLISH RYE @ 25 LB/ACRE

JUNE 1 - AUGUST 15
LOW-MAINTENANCE SLOPE (STEEPER THAN 3:1)
KENTUCKY 31 FESCUE @ 90 LB/ACRE
ENGLISH RYE @ 25 LB/ACRE
GERMAN MILLET @ 10 LB/ACRE

AUGUST 1 - DECEMBER 1
GENERAL SLOPE (3:1 OR LESS)
KENTUCKY 31 FESCUE @ 75 LB/ACRE
ENGLISH RYE @ 25 LB/ACRE
WHITE CLOVER @ 10 LB/ACRE
LOW-MAINTENANCE SLOPE (STEEPER THAN 3:1)
KENTUCKY 31 FESCUE @ 90 LB/ACRE
ENGLISH RYE @ 25 LB/ACRE
WHITE CLOVER @ 10 LB/ACRE

TEMPORARY SEEDING MIXTURES:
JULY 15 - JANUARY 1
BALBOA RYE @ 70 LB/ACRE
ITALIAN RYE @ 40 LB/ACRE

JANUARY 1 - MAY 1
ITALIAN RYE @ 40 LB/ACRE
KOREAN LESPEDEZA @ 35 LB/ACRE
SUMMER OATS @ 35 LB/ACRE

MAY 1 - JULY 15
SUDAN - SORGHUM CROSS @ 110 LB/ACRE
OR
STARR MILLET @ 110 LB/ACRE

MAINTAIN BY MOWING NO MORE THAN ONCE A YEAR. REFERTILIZE IN SECOND YEAR UNLESS GROWTH IS FULLY ADEQUATE. RESEED, FERTILIZE AND MULCH DAMAGED AREAS IMMEDIATELY.

(DENR)
EROSION AND SEDIMENT CONTROL NOTES:
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES (NCDENR).

TEMPORARY AND PERMANENT SEEDING MEASURES SHALL COMPLY WITH THE ASHEVILLE STANDARD SPECIFICATIONS AND DETAILS MANUAL.

(NC NARRATIVE)
EROSION AND SEDIMENT CONTROL NARRATIVE
SITEWORK SHALL PROCEED IN THE FOLLOWING MANNER:

THE CONTRACTOR SHALL INSTALL A STABILIZED CONSTRUCTION ENTRANCE. ALL EXISTING MEASURES INSTALLED PREVIOUSLY SHALL BE MAINTAINED. SITE DRAINAGE SHALL BE INSTALLED WITH INLET PROTECTION PROVIDED ON THE PROPOSED INLETS. THE SITE SHALL BE GRADED TO DIVERT ALL FLOWS TO THE GENERAL LINE OF THE STORM DRAIN SYSTEM. THE TEMPORARY DIVERSION CAN BE REMOVED WHEN THE DRAINAGE LINE IS ESTABLISHED THROUGH THE SITE. SITE UTILITIES, BUILDING FOUNDATION, AND PAVING SHALL BE CONSTRUCTED AS REQUIRED.

UPON FINAL SITE STABILIZATION, THE SEDIMENT TRAP SHALL BE CONVERTED TO A BIORETENTION CELL AS FOLLOWS AND AS DETAILED ON THE PLANS:

ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE SEDIMENT TRAP. THE ROCK SEDIMENT DAM SHALL BE REMOVED, AND REPLACED WITH SOIL BACKFILL COMPACTED AS STRUCTURAL FILL IN ACCORDANCE WITH THE GEOTECHNICAL EXPLORATION REPORT PREPARED FOR THIS SITE. THE DROP INLET AND 18" RCP OUTFALL SHALL BE INSTALLED. THE 6" PERFORATED UNDERDRAINS SHALL BE INSTALLED AND BACKFILLED WITH #57 STONE AS INDICATED. THE STONE SHALL BE OVERLAID WITH MIRAFI FW700 FILTER FABRIC OR APPROVED EQUAL. A MIXTURE OF 2 PARTS SAND, 1 PART ON-SITE CLAY SOILS AND 1 PART COMPOST SHALL BE PLACED IN MAXIMUM 18" LIFTS AND LIGHTLY COMPACTED TO THE SPECIFIED ELEVATION. A 3" LAYER OF MULCH SHALL BE PLACED TO THE SPECIFIED ELEVATION. THE SPECIFIED PLANTINGS SHALL BE PLACED.

ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES (NCDENR).

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL SEAL 035195 ENGINEER APRIL S. QUESINBERRY

Revisions	Date
TRC SUBMITTAL	6.25.13
BID SET	3.14.14
RE BID SET	5.27.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cote/Jenest & Stone

CRAVERN STREET IMPROVEMENTS

LEGEND AND GENERAL NOTES

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C2B

DEVELOPMENT DATA

PROJECT:
CRAVEN STREET AREA IMPROVEMENTS

OWNER/DEVELOPER:
CITY OF ASHEVILLE
PUBLIC WORKS DEPT
161 S CHARLOTTE STREET.
ASHEVILLE, NC 28802
(828) 259-5935

ENGINEER
MATTERN & CRAIG
12 BROAD ST.
ASHEVILLE NC 28801
(828) 254-2201

PROPERTY PARCELS

NEW BELGIUM BREWERY

LIQUID CENTER - 21 CRAVEN STREET
PRODUCTION FACILITY - 91 CRAVEN STREET

COMBINED PIN 9638-87-3707

BUNCOMBE COUNTY 9638-78-9646

PROGRESS ENERGY 9638-87-9135

ZONING INFORMATION

ZONING DISTRICT: - RIVER
PORTIONS OF THE PROJECT ABUTS THE FRENCH BROAD RIVER AND ARE CLASSIFIED RIVER RESOURCE YARD.
REQUIRED SETBACKS

15 FEET FRONT
0 FEET SIDE
50 FEET REAR AT RIVER

EROSION CONTROL AND STORM WATER MANAGEMENT

LIMITS OF DISTURBANCE: 12.50AC

PRE-DEVELOPMENT IMPERVIOUS:
ASPHALT 2.08AC, GRAVEL 1.39
PERCENTAGE IMPERVIOUS 42.8%

POST-DEVELOPMENT IMPERVIOUS:
ASPHALT 3.12AC, GRAVEL 0.61AC
PERCENTAGE IMPERVIOUS 46.9%

SOIL TYPE: C

PARKING DATA

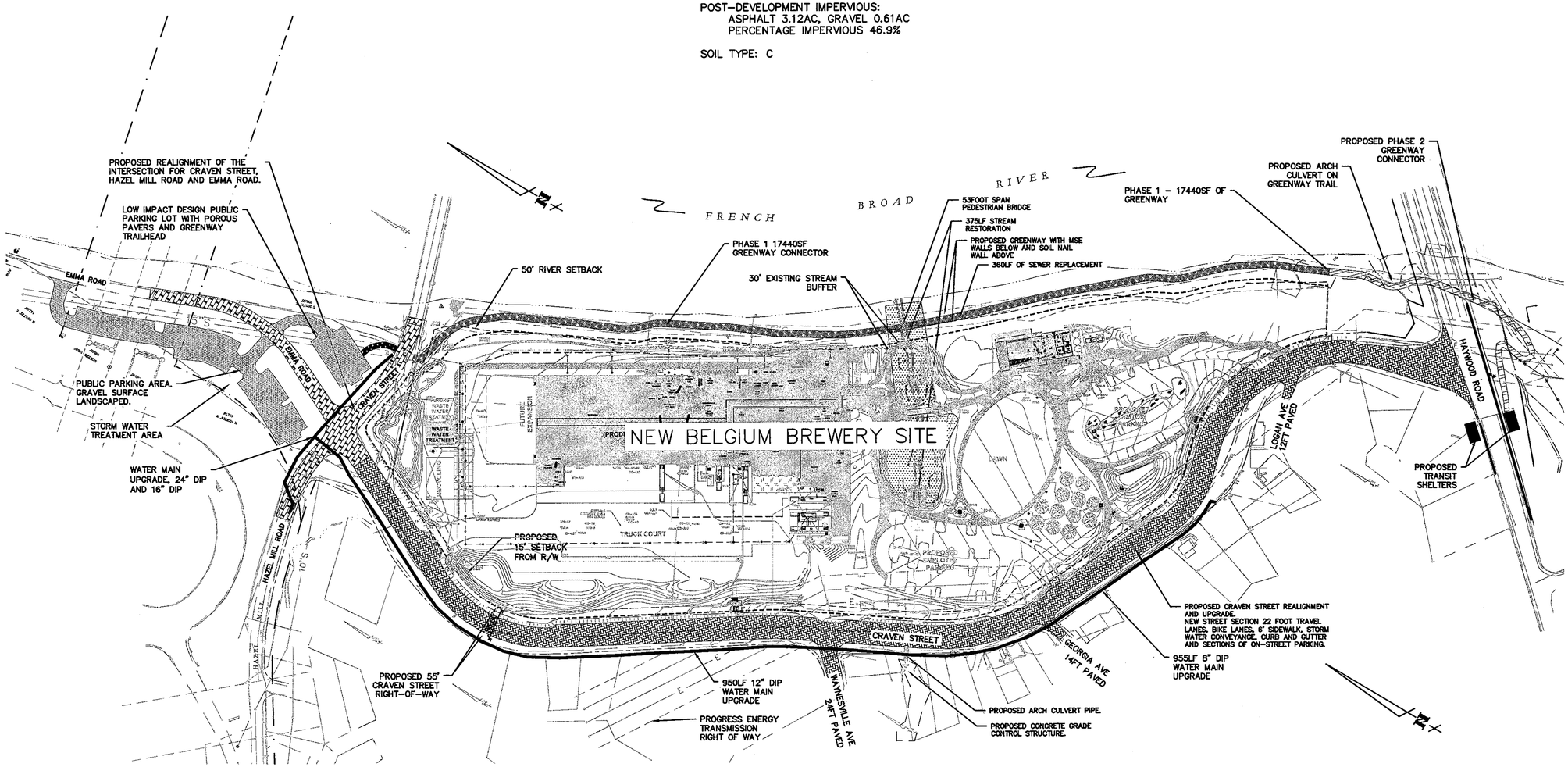
CRAVEN STREET PARKING SPACES = 43

LOW IMPACT PUBLIC PARKING
AND TRAIL HEAD SPACES : = 16
GRAVEL PARKING LOT SPACES: = 68
TOTAL SPACES = 84

HANDICAP PARKING REQUIRED = 4
HANDICAP PARKING PROVIDED = 4

HISTORICAL AND ARCHAEOLOGICAL DATE PRESERVATION

IF ARCHEOLOGICAL MATERIALS ARE ENCOUNTERED DURING CONSTRUCTION, THE PROCEDURES CODIFIED AT 33 CFR 800.13(B) WILL APPLY AND EDA, THE NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE, AND THE CATAWBA INDIAN NATION SHALL BE CONTACTED IMMEDIATELY. ARCHEOLOGICAL MATERIALS CONSIST OF ANY ITEMS, FIFTY YEARS OR OLDER WHICH WERE MADE OR USED BY MAN. THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO, STONE PROJECTILE POINTS (ARROWHEADS), CERAMIC SHERDS, BRICKS, WORKED WOOD, BONE AND STONE, METAL AND GLASS OBJECTS, AND HUMAN SKELETAL REMAINS.



FOR CONSTRUCTION

SCALE: 1" = 100'
0 50 100 200

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 RACHEL S. QUESINBERRY

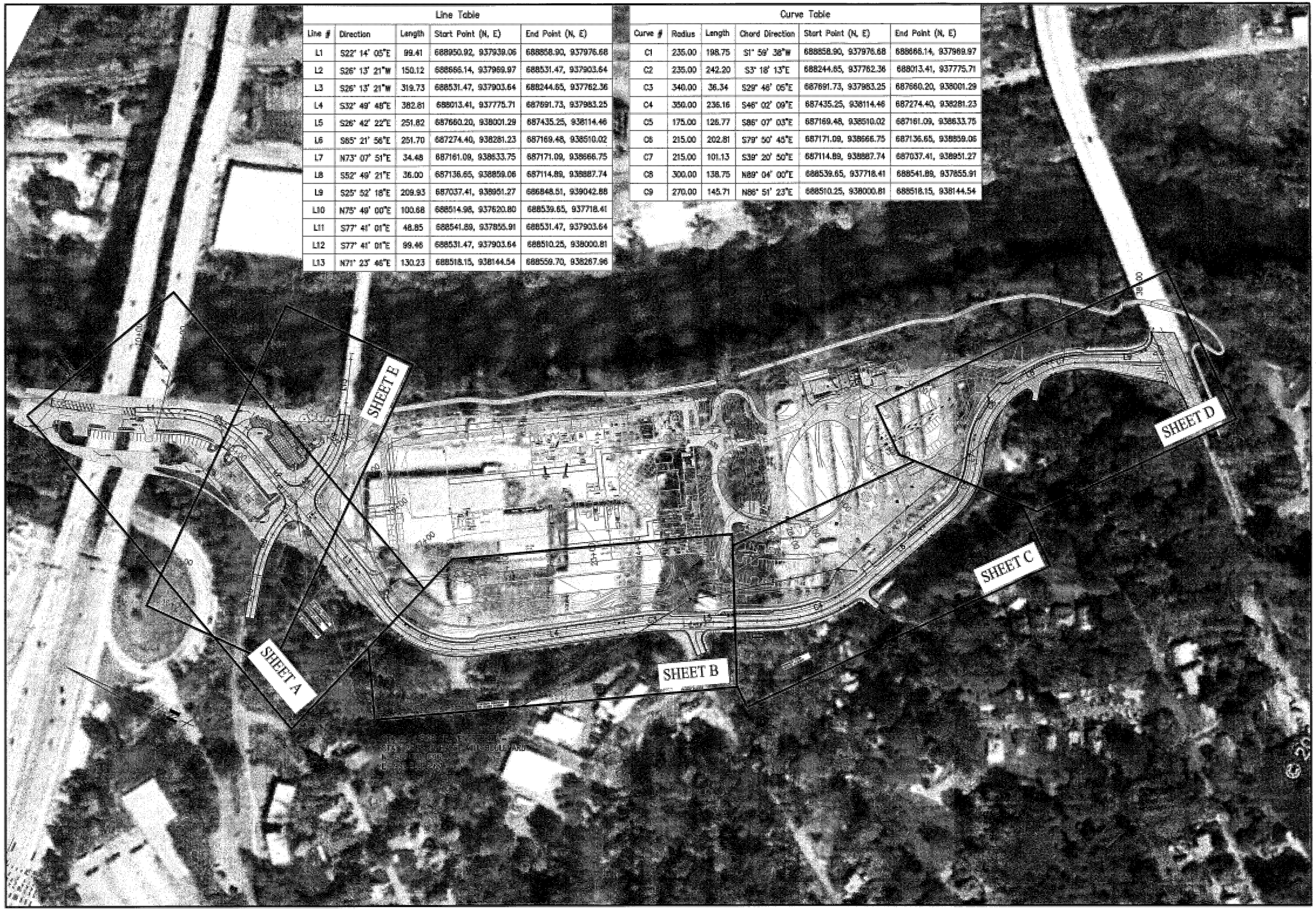
Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
BID SET	3.14.14
RE BID SET	5.27.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS
MASTER PLAN
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale:
Commission Number: 3267
Sheet No.: C3



Line Table

Line #	Direction	Length	Start Point (N, E)	End Point (N, E)
L1	S22° 14' 05"E	99.41	688950.92, 937939.06	688858.90, 937976.68
L2	S26° 13' 21"W	150.12	688666.14, 937969.97	688531.47, 937903.64
L3	S26° 13' 21"W	319.73	688531.47, 937903.64	688244.65, 937762.36
L4	S32° 49' 48"E	382.81	688013.41, 937775.71	687691.73, 937983.25
L5	S26° 42' 22"E	251.82	687660.20, 938001.29	687435.25, 938114.46
L6	S65° 21' 56"E	251.70	687274.40, 938281.23	687169.48, 938510.02
L7	N73° 07' 51"E	34.48	687161.09, 938633.75	687171.09, 938666.75
L8	S52° 49' 21"E	36.00	687136.65, 938659.06	687114.89, 938687.74
L9	S25° 52' 18"E	209.93	687037.41, 938951.27	686848.51, 939042.88
L10	N75° 49' 00"E	100.68	688514.98, 937620.80	688539.65, 937718.41
L11	S77° 41' 01"E	48.85	688541.89, 937855.91	688531.47, 937903.64
L12	S77° 41' 01"E	99.46	688531.47, 937903.64	688510.25, 938000.81
L13	N71° 23' 46"E	130.23	688518.15, 938144.54	688559.70, 938267.96

Curve Table

Curve #	Radius	Length	Chord Direction	Start Point (N, E)	End Point (N, E)
C1	235.00	198.75	S1° 59' 36"W	688858.90, 937976.68	688666.14, 937969.97
C2	235.00	242.20	S3° 18' 13"E	688244.65, 937762.36	688013.41, 937775.71
C3	340.00	36.34	S29° 46' 05"E	687691.73, 937983.25	687660.20, 938001.29
C4	350.00	236.16	S46° 02' 09"E	687435.25, 938114.46	687274.40, 938281.23
C5	175.00	126.77	S85° 07' 03"E	687169.48, 938510.02	687161.09, 938633.75
C6	215.00	202.81	S79° 50' 45"E	687171.09, 938666.75	687136.65, 938659.06
C7	215.00	101.13	S39° 20' 50"E	687114.89, 938687.74	687037.41, 938951.27
C8	300.00	138.75	N89° 04' 00"E	688539.65, 937718.41	688541.89, 937855.91
C9	270.00	145.71	N86° 51' 23"E	688510.25, 938000.81	688518.15, 938144.54

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESNBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSQ

Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

MASTER PLAN – SHEET INDEX

CITY OF ASHEVILLE, NORTH CAROLINA

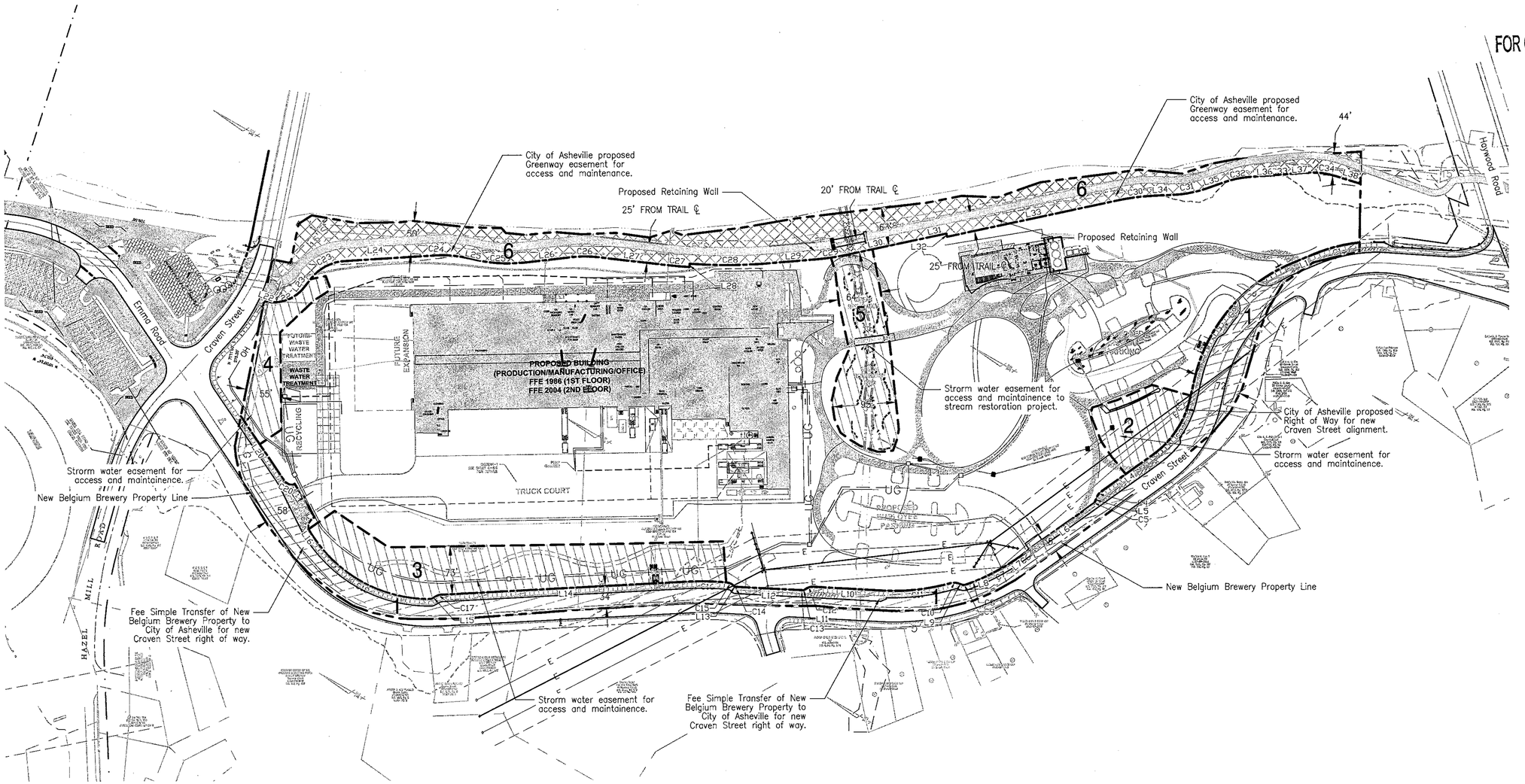
Vertical Scale: N/A

Horizontal Scale: 1" = 100'

Commission Number: 3267

Sheet No.: C3A

FOR CONSTRUCTION



CRAVEN STREET PROPOSED RIGHT-OF WAY			
Number	Length	Radius	Line/Chord Direction
C1	73.008	247.500	N44° 22' 19.05"W
L1	36.001		N52° 49' 21.42"W
C2	233.465	247.500	N79° 50' 45.31"W
C3	103.223	142.500	N86° 07' 02.65"W
L4	94.934		N65° 21' 56.10"W
C4	10.217	18.500	N81° 11' 15.52"W
L5	9.581		S82° 59' 25.06"W
C5	0.828	1.500	N81° 11' 15.52"W
L6	120.664		N65° 21' 56.10"W
C6	25.115	155.864	N67° 26' 49.09"W
L7	7.741		N70° 46' 42.96"W
C7	47.572	327.500	N58° 31' 21.52"W
L8	6.210		N44° 33' 27.63"W
C8	22.556	326.500	N51° 18' 30.02"W
C9	5.895	9.934	N34° 59' 40.50"W
L9	6.813		N10° 38' 49.37"W
C10	11.250	18.500	N28° 04' 03.24"W
C11	104.079	317.500	N36° 05' 49.39"W
L10	104.601		N26° 42' 21.68"W
C12	13.289	18.500	N47° 17' 06.13"W
L11	4.510		N67° 51' 50.59"W

CRAVEN STREET PROPOSED RIGHT-OF WAY			
Number	Length	Radius	Line/Chord Direction
C13	3.624	10.735	N50° 03' 04.05"W
L12	95.426		N26° 43' 29.05"W
C14	3.359	9.524	N00° 35' 30.12"W
L13	3.410		N15° 59' 45.05"E
C15	13.011	18.500	N04° 09' 09.59"W
C16	55.448	372.500	N28° 33' 55.96"W
L14	374.147		N32° 49' 47.69"W
C17	8.858	18.500	N46° 32' 48.57"W
L15	8.309		N60° 15' 49.45"W
C18	207.639	208.500	N02° 18' 25.73"W
L16	11.637		N26° 13' 20.94"E
C19	23.411	14.500	N72° 28' 36.16"E
C20	15.356	14.500	N04° 07' 00.72"W
L20	117.243		N26° 13' 20.94"E

GREENWAY EASEMENT			
Number	Length	Radius	Line/Chord Direction
L22	11.411		S10° 21' 45.85"E
C22	51.433	40.000	S47° 11' 55.86"E
L23	22.121		S84° 02' 05.87"E
C23	79.355	90.000	S58° 46' 31.91"E
L24	71.820		S33° 30' 57.96"E
C24	110.096	375.000	S25° 06' 19.27"E
L25	0.614		S16° 41' 40.58"E
C25	77.195	225.000	S26° 31' 24.01"E
L26	73.368		S36° 21' 07.45"E
C26	40.161	175.000	S29° 46' 39.22"E
L27	100.683		S23° 12' 10.99"E
C27	38.069	807.829	S24° 33' 11.06"E
L28	5.000		N64° 05' 48.86"E
C28	122.345	802.829	S30° 16' 07.67"E
L29	69.099		S34° 38' 04.19"E
C29	45.183	354.284	S38° 17' 17.02"E
L30	121.780		S41° 56' 29.84"E
L31	33.118		S41° 59' 40.25"E
L32	5.000		S48° 00' 19.75"W
L33	269.891		S41° 59' 40.25"E

GREENWAY EASEMENT			
Number	Length	Radius	Line/Chord Direction
C30	42.377	299.774	S37° 56' 41.14"E
L34	32.434		S33° 53' 42.03"E
C31	49.828	225.000	S40° 14' 21.73"E
L35	28.315		S46° 35' 01.43"E
C32	51.974	202.202	S39° 13' 12.26"E
L36	27.599		S31° 51' 23.09"E
C33	17.598	325.000	S33° 24' 27.46"E
L37	43.523		S34° 57' 31.83"E
C34	35.370	91.261	S23° 51' 21.12"E
L38	35.840		S12° 45' 10.42"E

This Preliminary Plat is for discussion purposes between the City of Asheville and New Belgium Brewery only

LEGEND

FEE SIMPLE

STORMWATER EASEMENT

GREENWAY EASEMENT

RIGHT OF WAY TABLE

PARCEL NO.	PROPERTY OWNERS NAME	AREA TAKEN	STORMWATER EASEMENT	GREENWAY EASEMENT
1	NEW BELGIUM BREWING	1.69 AC		
2	NEW BELGIUM BREWING		0.28 AC	
3	NEW BELGIUM BREWING		0.96 AC	
4	NEW BELGIUM BREWING		0.26 AC	
5	NEW BELGIUM BREWING		0.50 AC	
6	NEW BELGIUM BREWING			1.82 AC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 5/27/2014 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC	3.14.14
BID SET	5.27.14
RE BID SET	

Issue Date: 5/27/2014

Drawn By: HPO
Designed By: HPO

Checked By: GSQ
Date: 5/27/2014

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS

CRAVEN STREET IMPROVEMENTS

PRELIMINARY PLAT

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A

Horizontal Scale: 1:80

Commission Number: 3267

Sheet No.: C3B

FOR CONSTRUCTION

DEMOLISH EXIST. ROADWAY

2" MILL FOR ASPHALT OVERLAY SEE SITE PLANS FOR DETAILS

EXIST. STORM DRAIN LINE TO REMAIN

EXIST. SANITARY SEWER TO REMAIN

ABANDON EXIST. STORM DRAIN LINES

ABANDON EXIST. WATER LINE, SEE SHEET C7A–C7E FOR WATERLINE PLANS

ABANDON EXIST. STORM DRAIN LINES AND INLETS

12" SEWER ABANDONED PER MSD

MATCHLINE SHEET 6B STATION 18+00

SEE INSET BELOW

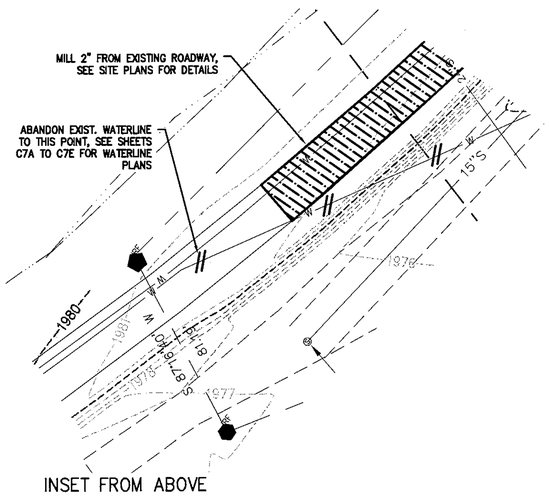
WESTGATE PARKWAY ASPHALT PAVEMENT

GRAVEL

EXISTING BRIDGE ABUTMENT

0 15' 30' 60'

SCALE: 1" = 30'–0"



INSET FROM ABOVE

NOTES:

1. DEMOLISH EXIST. ROADWAY IS TO INCLUDE REMOVAL OF EXISTING ASPHALT, BASE ASPHALT, AGGREGATE BASE, CURB, GUTTER, SURFACE DRAINAGE STRUCTURES, AND SIDEWALK.

HISTORICAL AND ARCHAEOLOGICAL DATE PRESERVATION

IF ARCHEOLOGICAL MATERIALS ARE ENCOUNTERED DURING CONSTRUCTION, THE PROCEDURES CODIFIED AT 33 CFR 800.13(B) WILL APPLY AND EDA, THE NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE, AND THE CATAWBA INDIAN NATION SHALL BE CONTACTED IMMEDIATELY. ARCHEOLOGICAL MATERIALS CONSIST OF ANY ITEMS, FIFTY YEARS OR OLDER WHICH WERE MADE OR USED BY MAN. THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO, STONE PROJECTILE POINTS (ARROWHEADS), CERAMIC SHERDS, BRICKS, WORKED WOOD, BONE AND STONE, METAL AND GLASS OBJECTS, AND HUMAN SKELETAL REMAINS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSQ

Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS EXISTING CONDITIONS & DEMOLITION

CITY OF ASHEVILLE, NORTH CAROLINA

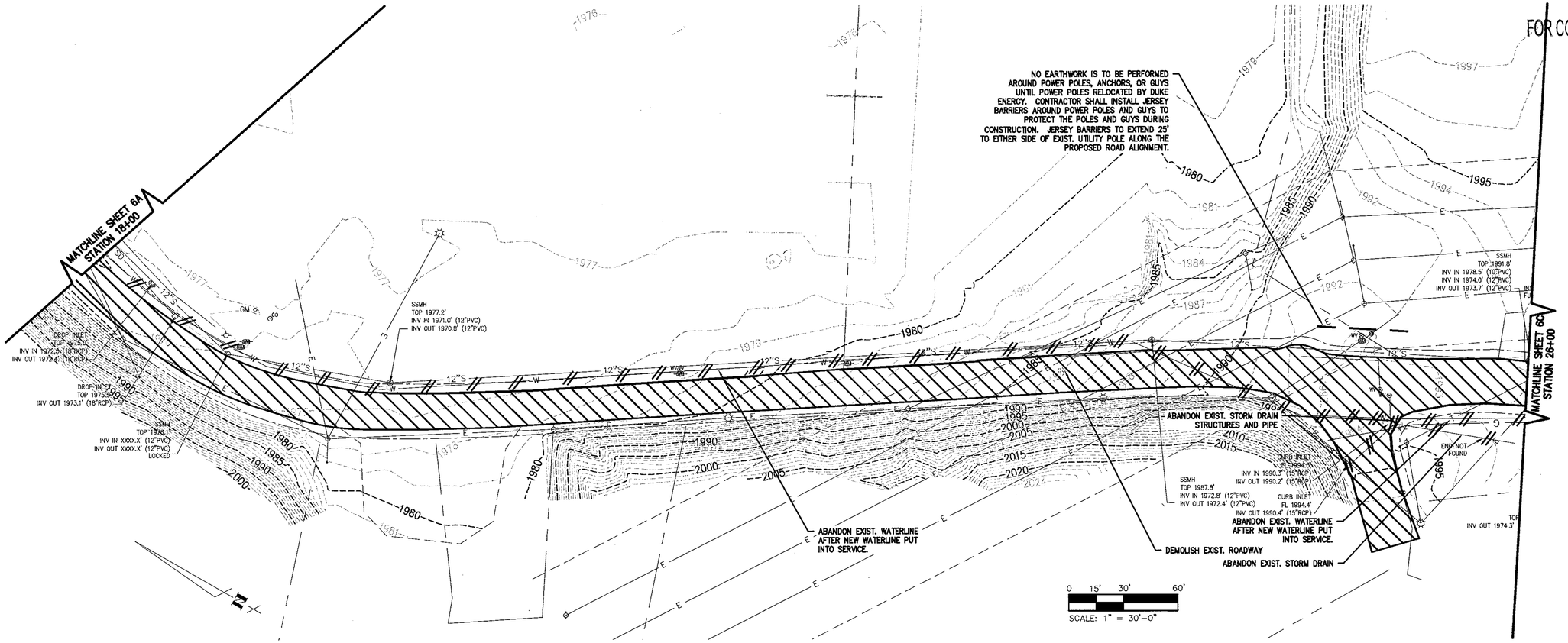
Vertical Scale: 1" = 5'

Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C4A

FOR CONSTRUCTION



NOTES:

1. DEMOLISH EXIST. ROADWAY IS TO INCLUDE REMOVAL OF EXISTING ASPHALT, BASE ASPHALT, AGGREGATE BASE, CURB, GUTTER, SURFACE DRAINAGE STRUCTURES, AND SIDEWALK.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
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EROSION CONTROL SUBMITTAL	3.14.14
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CONSTRUCTION RE BID SET	

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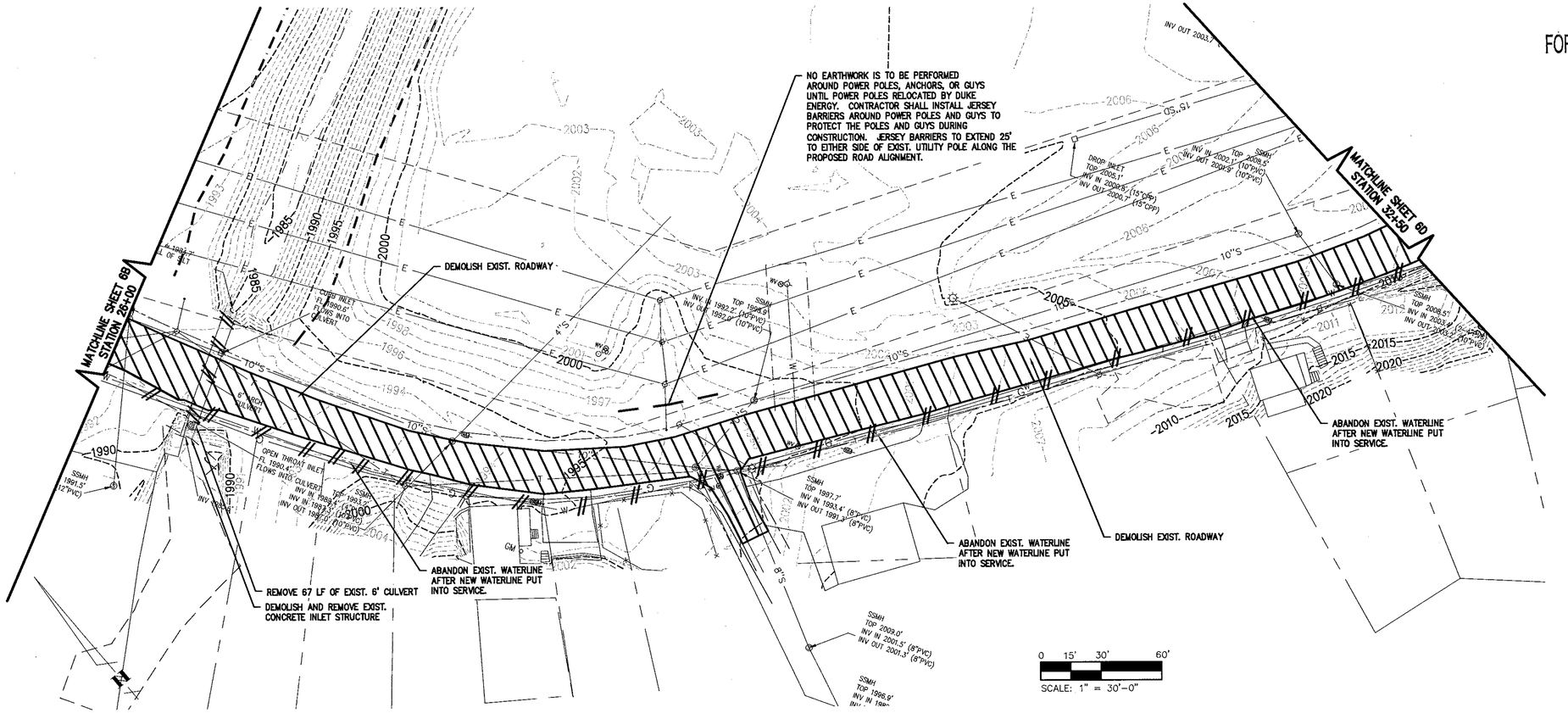
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS
EXISTING CONDITIONS & DEMOLITION
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C4B

FOR CONSTRUCTION



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014
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Designed By: HPO
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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

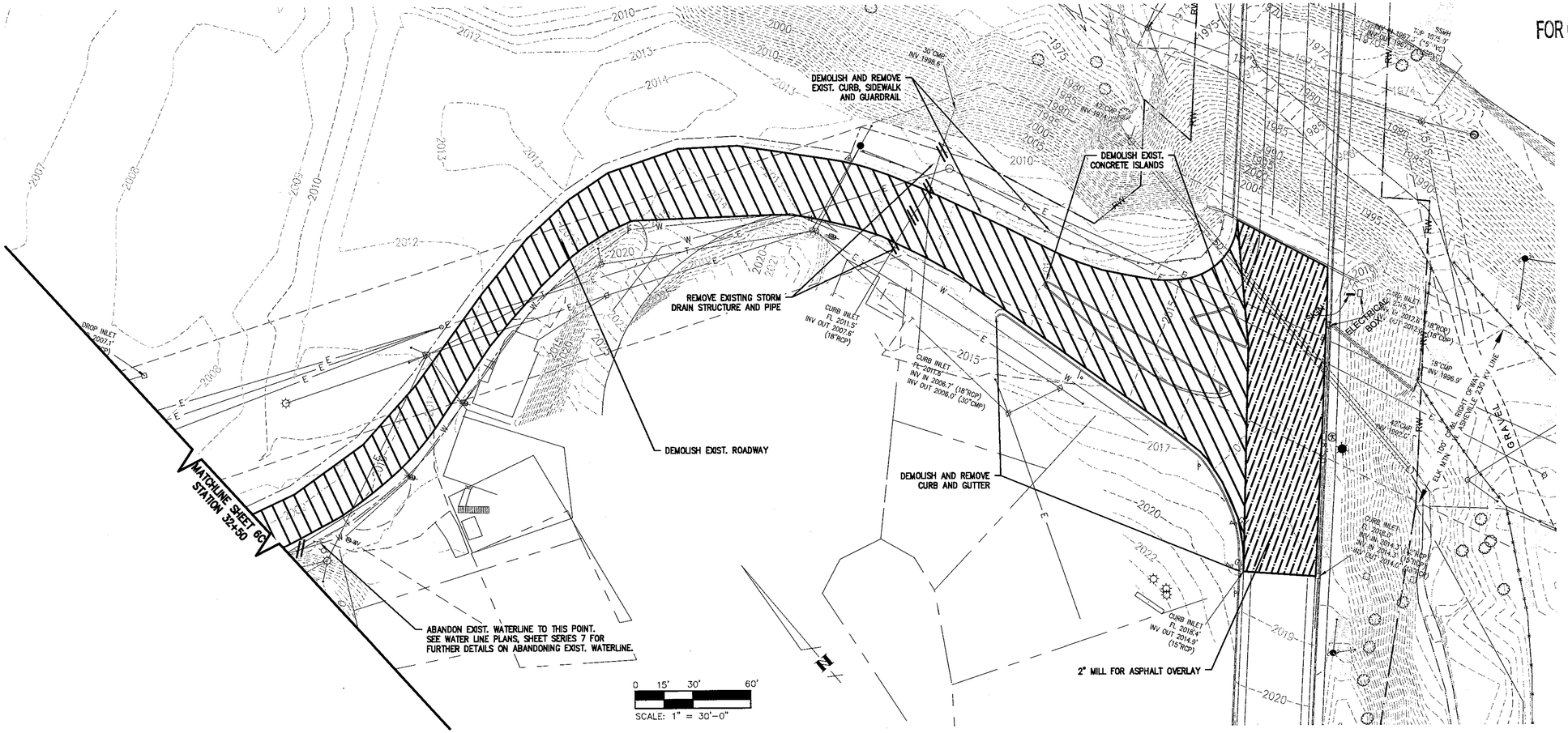
CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS
EXISTING CONDITIONS & DEMOLITION

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C4C

FOR CONSTRUCTION



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NORTH CAROLINA PROFESSIONAL SEAL 035195 ENGINEER GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14

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ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS EXISTING CONDITIONS & DEMOLITION

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
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Sheet No.: C4D

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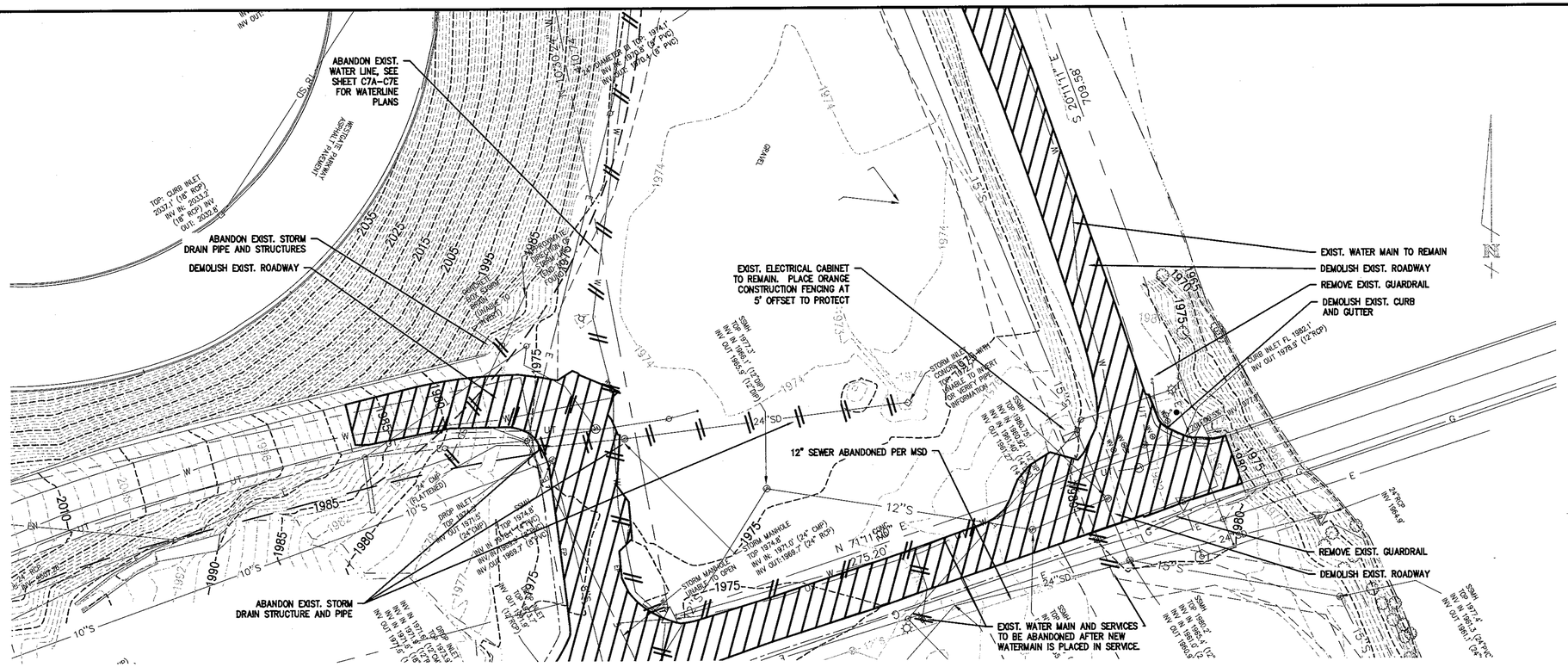

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NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT SEAL 035195 5/27/2014 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014
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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

HAZEL MILL ROAD IMPROVEMENTS
EXISTING CONDITIONS & DEMOLITION

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C4E

FOR CONSTRUCTION

SANITARY SEWER EASEMENT
18" CONCRETE PAVER BEAM FOR POROUS PAVER STD DET. 3.04
REMOVE EXISTING PAVEMENT
20' PROPOSED REAR SETBACK AND RIVER RESOURCE YARD (ASSUMED AVERAGE LOT DEPTH OF 100;)
EXISTING EMMA ROAD (PAVEMENT TO BE REMOVED)
18" CURB AND GUTTER AT ENTRANCE RADII
STAND UP VERTICAL CURB AT LANDSCAPE ISLAND STD DET. 3.11A
DOUBLE YELLOW CENTER, WHITE EDGE OF TRAVEL LANE MARKINGS PER MUTCD
SHARROW BIKE PAVEMENT MARKINGS ON EMMA TO MUTCD STANDARD BY COA.
BEGIN NEW PAVEMENT SECTION. STAND UP VERTICAL CURB STD DET. 3.11A AT LANDSCAPE ISLANDS TYP
MILL EXISTING EMMA ROAD TO A DEPTH OF 2" AND OVERLAY WITH SF 9.5B
NO LANDSCAPING TO BE PLANTED BENEATH INTERSTATE OVERPASS
PROPOSED 8" COMPACTED GRAVEL PARKING LOT
FLUSH CURB
5' SIDEWALK MONOLITHIC CURB SEE DETAIL 3.16A
NO STREET TREES TO BE PLANTED WITHIN SEWER EASEMENT
EXISTING CONCRETE ABUTMENT
2" SF 9.5B
8" CABC
STAND UP VERTICAL CURB STD DET. 3.11A AT LANDSCAPE ISLANDS TYP
STREET TREES AT 40' SPACING TYPICAL
ACCESSIBLE RAMP AT CROSSING TYP. DETAIL 3.17
PARKING LOT 1
PARKING LOT 2
PROPOSED R/W
50' R/W
15' SETBACK
50' RIVER SETBACK
I-240 R/W
RIVER EDGE
BEGIN PROJECT STA 15+00
PROPOSED CONCRETE WHEELSTOP TYP.
TREES AND SHRUBS TO BE PLANTED IN ACCORDANCE WITH COA STD DET. 3.22B
STORMWATER TREATMENT SEE DETAIL C12A
0' REAR SETBACK
PARCEL 2
PARCEL 1
HAZEL MILL ROAD – SEE SHEET C10A FOR CROSS SECTION
TRANSITION FROM CURB & GUTTER STD DET. 3.13
MILL 2' OF EXISTING PAVEMENT, BUILD UP ROAD GRADE TO PROPOSED ELEVATIONS AND PAVE
DOUBLE YELLOW CENTER MARKINGS PER MUTCD
STOP BAR AND TURN SIGNAGE PER MUTCD
CROSSWALK TYP. WHEELCHAIR RAMP STD DET 17B
PROP. STOP SIGN
6' CONCRETE SIDEWALK STD DETAIL 3.16.
30" CURB AND GUTTER STD DETAIL 3.11.
SHARED STORM WATER TREATMENT AREA CRAVEN STREET AND NBB SITE SEE C12 B.
NEW BELGIUM TRUCK ENTRANCE
MATCHLINE SHEET 5B STATION 18+00
EX. HAZEL MILL ROAD
EX.CRAVEN STREET
EX. PL
EX. ROW
NCDOT ROW
PROP. STOP SIGN STAND UP VERTICAL CURB STD DET. 3.11A
TEMPORARY CONSTRUCTION AND GRADING EASEMENT
PERMANENT STORM DRAINAGE EASEMENT.
MAIN ENTRANCE TO NBB PRODUCTION FACILITY. PROVIDE PAINTED CROSSWALK. CONCRETE DRIVEWAY APRON, SEE DETAIL 3.15A ON SHEET C10B
EXISTING CRAVEN ST PAVEMENT TO BE REMOVED
PC: 17+68.01
PT: 19+75.46

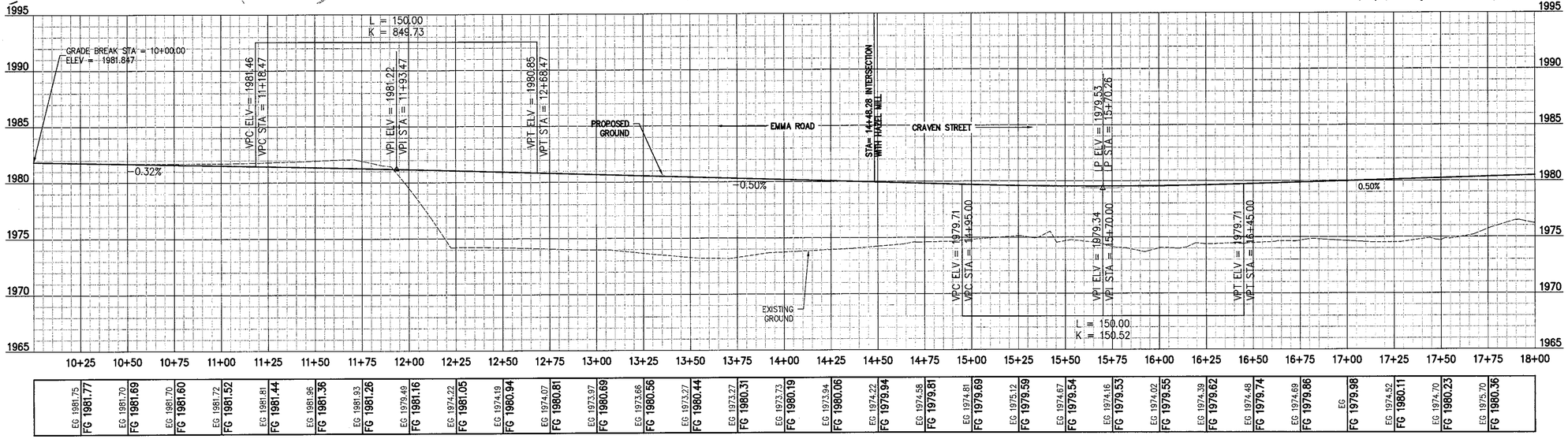
PIN: 9638-789646
PARCEL SIZE: 3.33 AC (GROSS)
0.59 AC (PARCEL 1 NET)
1.59 AC (PARCEL 2 NET)
1.15 AC (R/W AND OTHER PARCELS)

IMPERVIOUS COVERAGE (80% MAX)	TOTAL LOT SF	IMPERVIOUS SF	% IMPERVIOUS
PARCEL 1	25,906	9,295	36%
PARCEL 2	69,333	26,872	62%

*NOTE: PARCEL 1 IMPERVIOUS AREA = 2107 SF IF PAVERS ARE CONSIDERED PERVIOUS (8% IMPERVIOUS)

NOTE: UNLESS OTHERWISE DENOTED, PROPOSED RIGHT-OF-WAY LINE SHALL BE THE LIMIT OF THE CRAVEN STREET PROJECT AND THE START OF THE NEW BELGIUM SITE WORK.

0 15' 30' 60'
SCALE: 1" = 30'-0"



TORRY L. CAUDILL
REGISTERED
SEAL
035195
ENGINEER
GABRIEL S. QUESINBERRY

Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14
ADD SIDEWALK TO LOT2	5.27.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS ROAD PLAN AND PROFILE STA 10+00 – 18+00

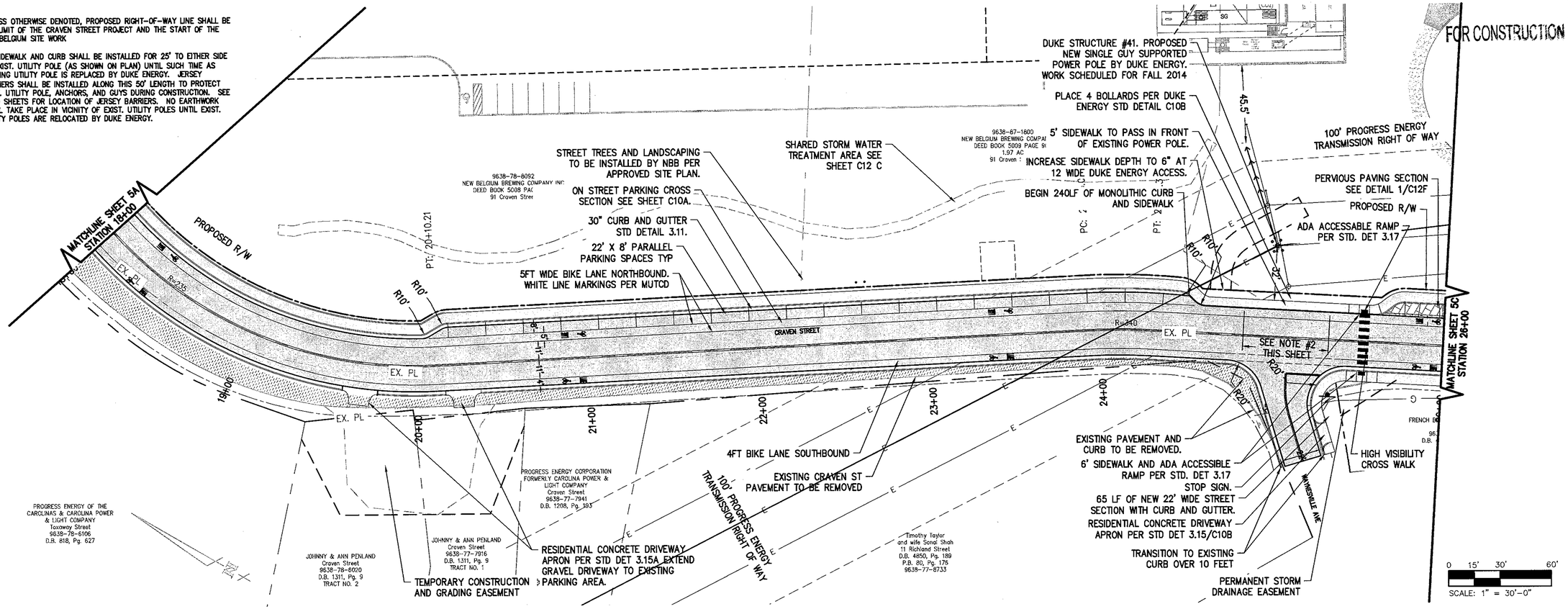
CITY OF ASHEVILLE, NORTH CAROLINA

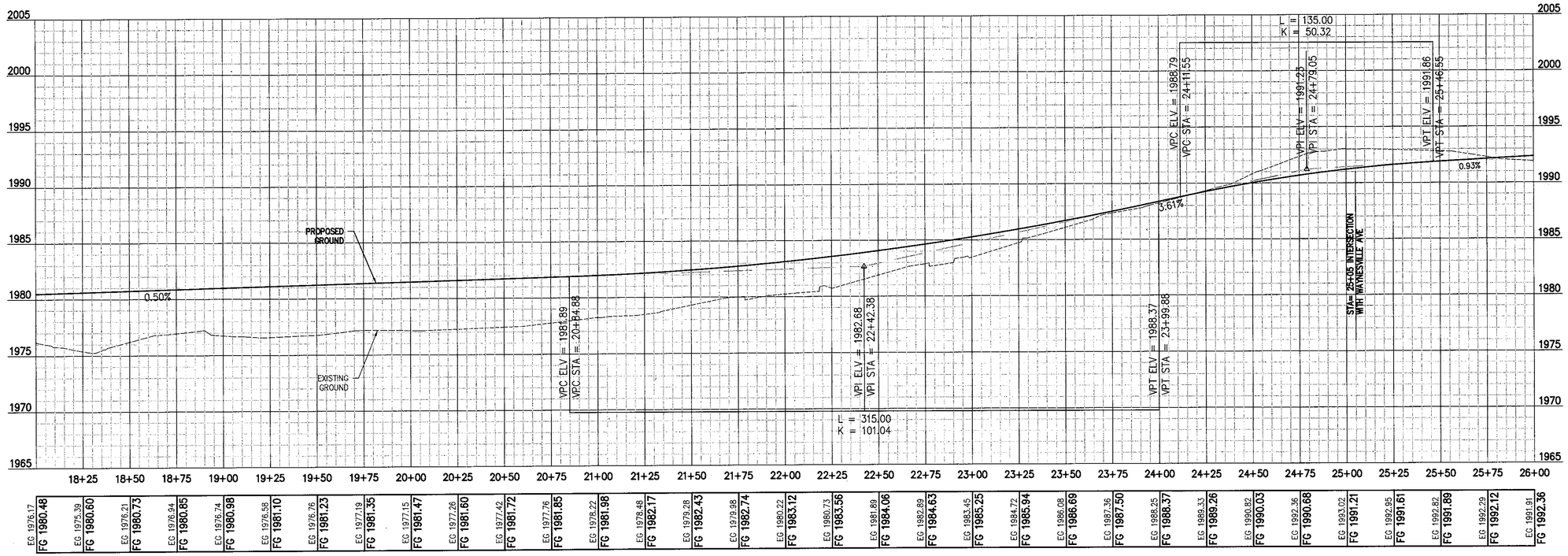
Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C5A

NOTES:

1. UNLESS OTHERWISE DENOTED, PROPOSED RIGHT-OF-WAY LINE SHALL BE THE LIMIT OF THE CRAVEN STREET PROJECT AND THE START OF THE NEW BELGIUM SITE WORK

2. NO SIDEWALK AND CURB SHALL BE INSTALLED FOR 25' TO EITHER SIDE OF EXIST. UTILITY POLE (AS SHOWN ON PLAN) UNTIL SUCH TIME AS EXISTING UTILITY POLE IS REPLACED BY DUKE ENERGY. JERSEY BARRIERS SHALL BE INSTALLED ALONG THIS 50' LENGTH TO PROTECT EXIST. UTILITY POLE, ANCHORS, AND GUYS DURING CONSTRUCTION. SEE DEMO SHEETS FOR LOCATION OF JERSEY BARRIERS. NO EARTHWORK SHALL TAKE PLACE IN VICINITY OF EXIST. UTILITY POLES UNTIL EXIST. UTILITY POLES ARE RELOCATED BY DUKE ENERGY.





NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
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Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
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Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS ROAD PLAN AND PROFILE STA 18+00 – 26+00

CITY OF ASHEVILLE, NORTH CAROLINA

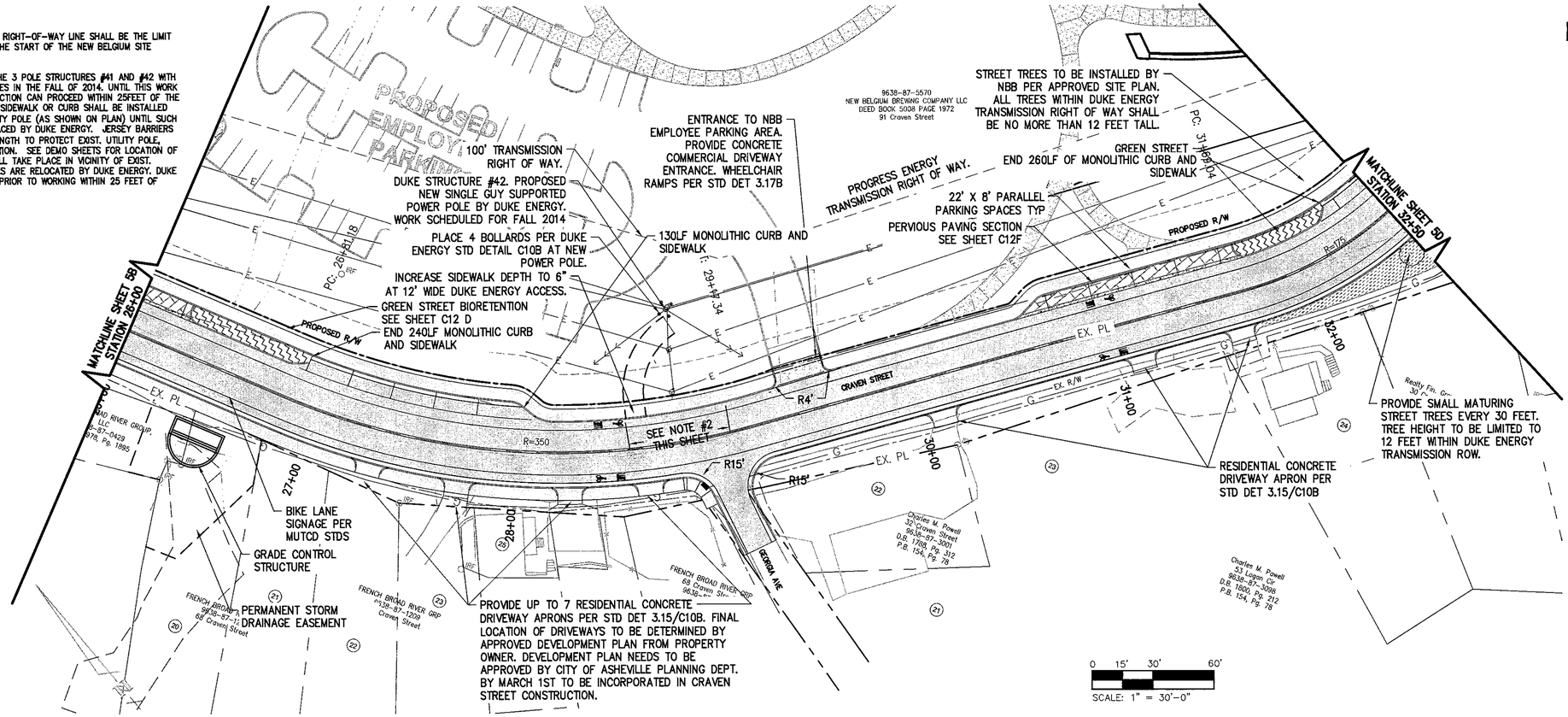
Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C5B

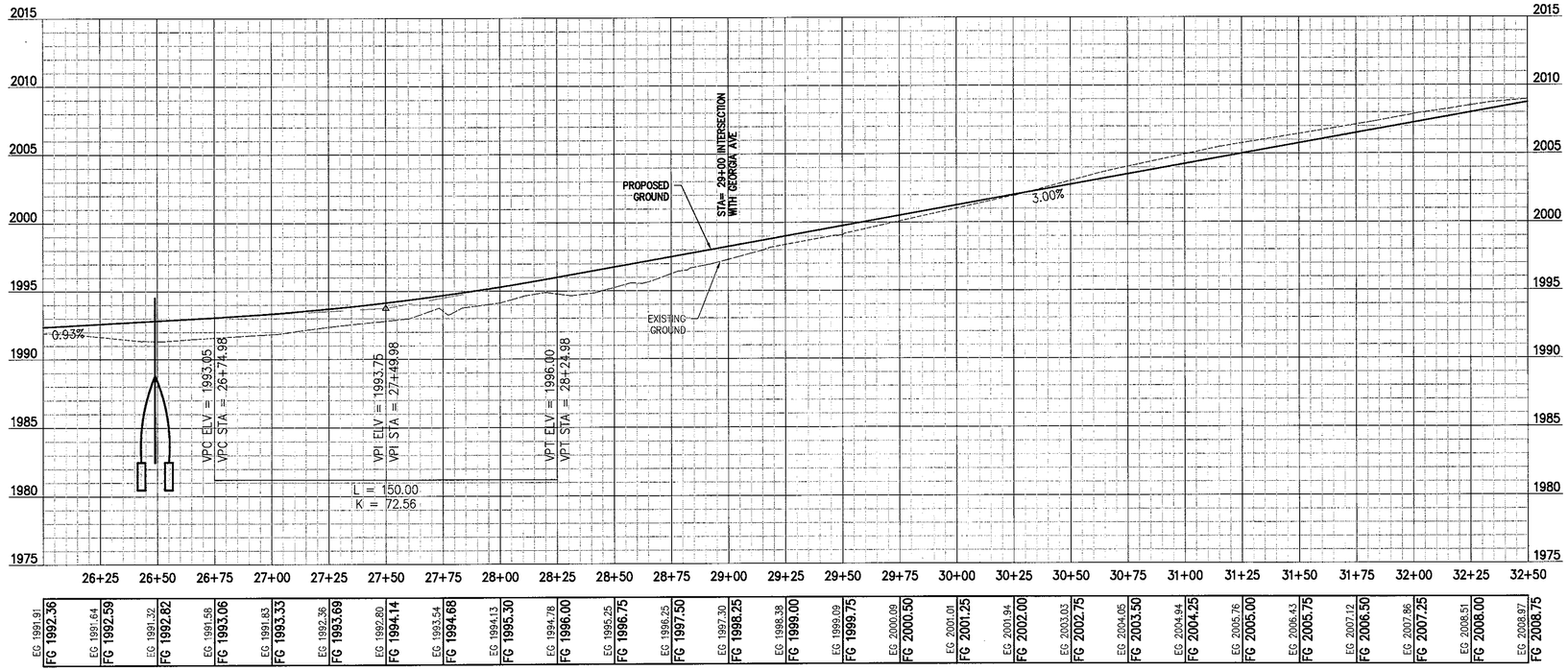
FOR CONSTRUCTION

NOTE:

1. UNLESS OTHERWISE DENOTED, PROPOSED RIGHT-OF-WAY LINE SHALL BE THE LIMIT OF THE CRAVEN STREET PROJECT AND THE START OF THE NEW BELGIUM SITE WORK.

2. DUKE ENERGY PROPOSES TO REPLACE THE 3 POLE STRUCTURES #41 AND #42 WITH SINGLE POLE GUY SUPPORTED STRUCTURES IN THE FALL OF 2014. UNTIL THIS WORK IS COMPLETED NO GRADING OR CONSTRUCTION CAN PROCEED WITHIN 25FEET OF THE EXISTING POLES OR GUY ANCHORS. NO SIDEWALK OR CURB SHALL BE INSTALLED FOR 25' TO EITHER SIDE OF EXIST. UTILITY POLE (AS SHOWN ON PLAN) UNTIL SUCH TIME AS EXISTING UTILITY POLE IS REPLACED BY DUKE ENERGY. JERSEY BARRIERS SHALL BE INSTALLED ALONG THIS 50' LENGTH TO PROTECT EXIST. UTILITY POLE, ANCHORS, AND GUYS DURING CONSTRUCTION. SEE DEMO SHEETS FOR LOCATION OF JERSEY BARRIERS. NO EARTHWORK SHALL TAKE PLACE IN VICINITY OF EXIST. UTILITY POLES UNTIL EXIST. UTILITY POLES ARE RELOCATED BY DUKE ENERGY. DUKE ENERGY MUST BE CONTACTED 72HOURS PRIOR TO WORKING WITHIN 25 FEET OF POLES OR GUY ANCHORS.





SEAL 035195 ENGINEER GABRIEL S. QUESTENBERRY

Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14
FOR CONSTRUCTION	7.14.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

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EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

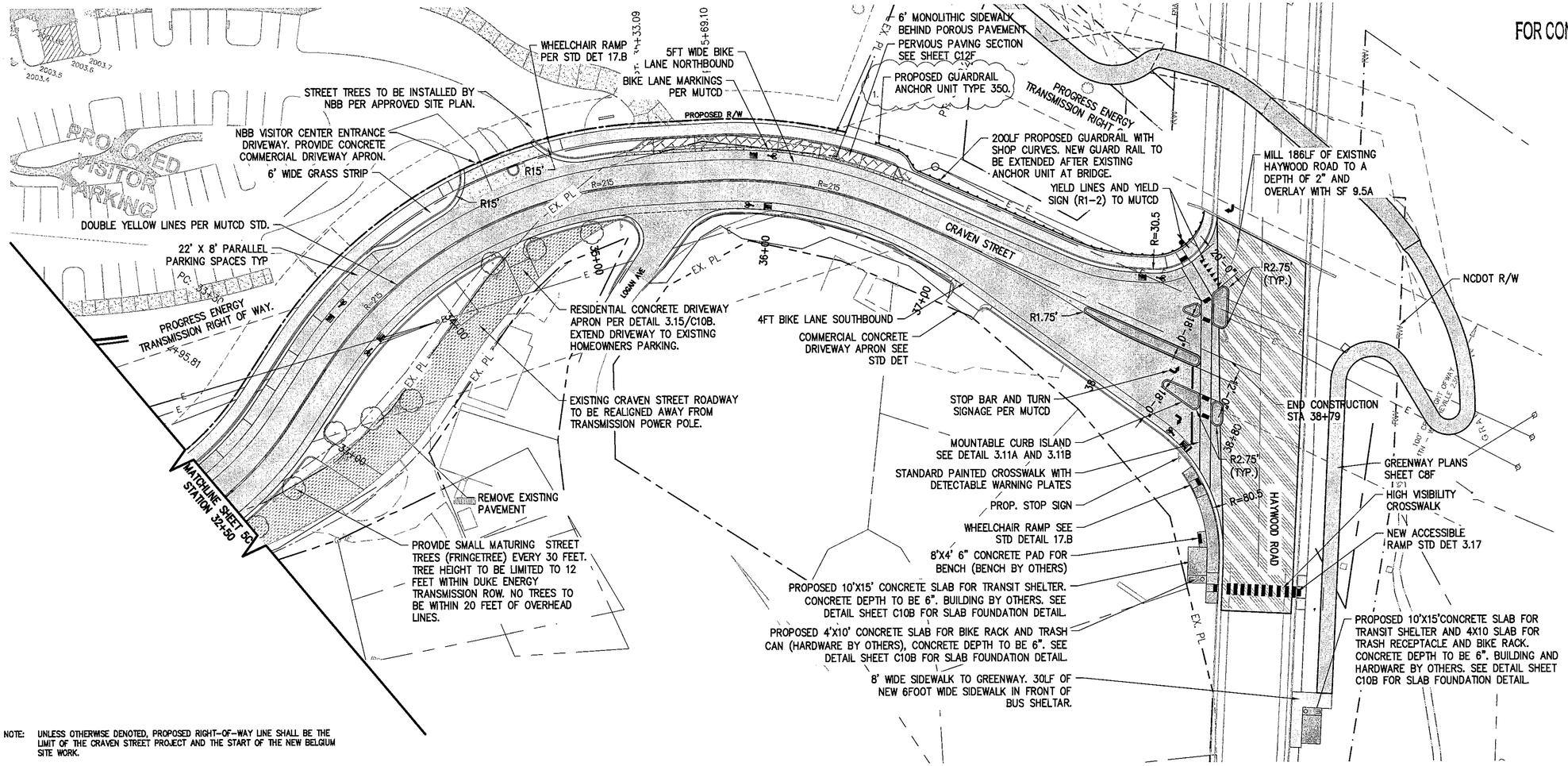
CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS ROAD PLAN AND PROFILE STA 26+00 – 32+50

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C5C

FOR CONSTRUCTION



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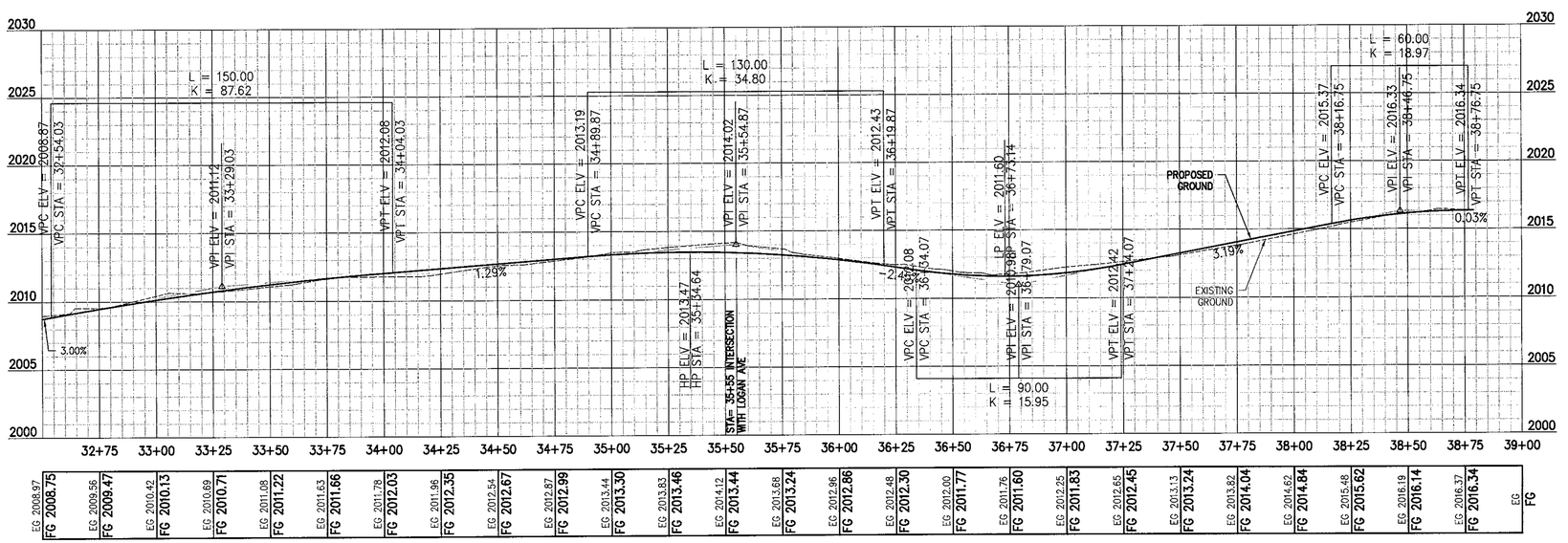


NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 DANIEL S. QUESINBERRY

Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14
1. REVISED GUARDRAIL ANCHOR	7.9.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

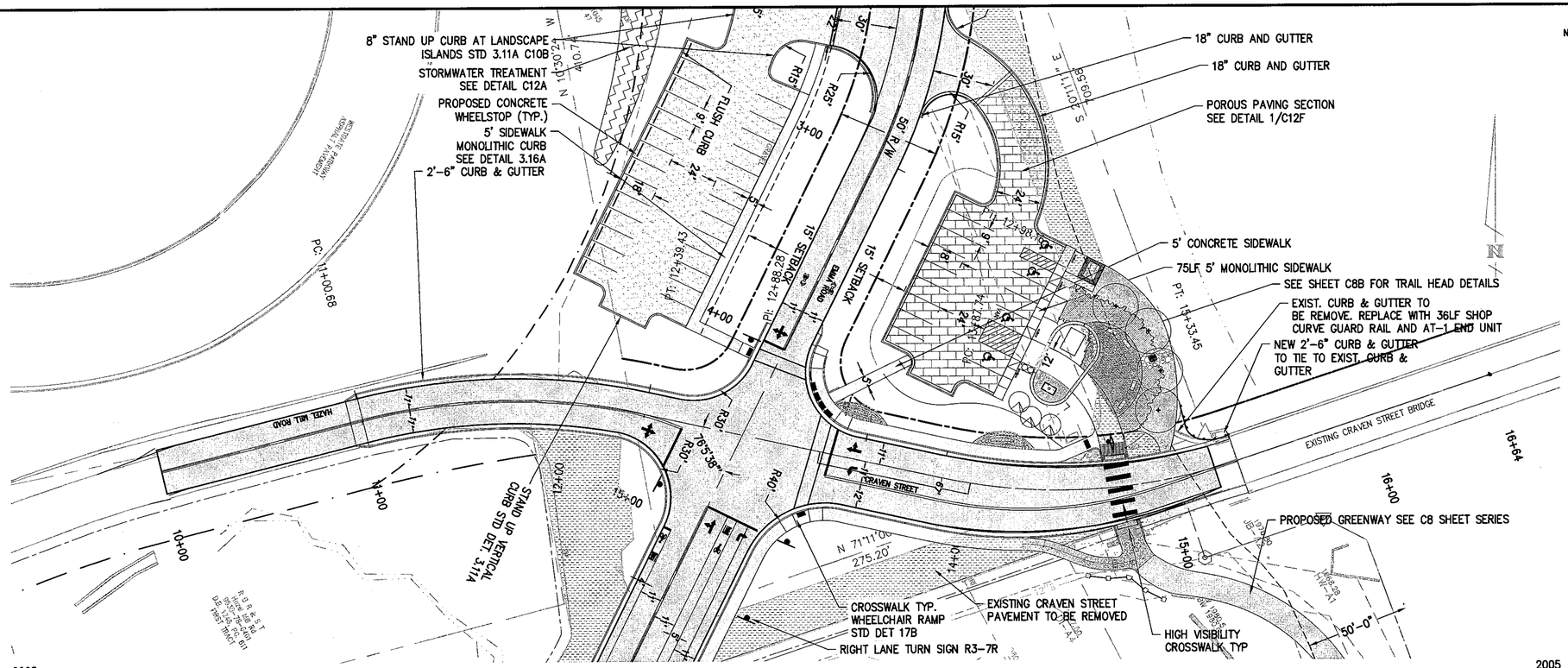
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS ROAD PLAN AND PROFILE STA 32+50 – 38+79.01

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C5D



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FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

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EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

HAZEL MILL ROAD IMPROVEMENTS ROAD PLAN AND PROFILE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'

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Sheet No.: C5E

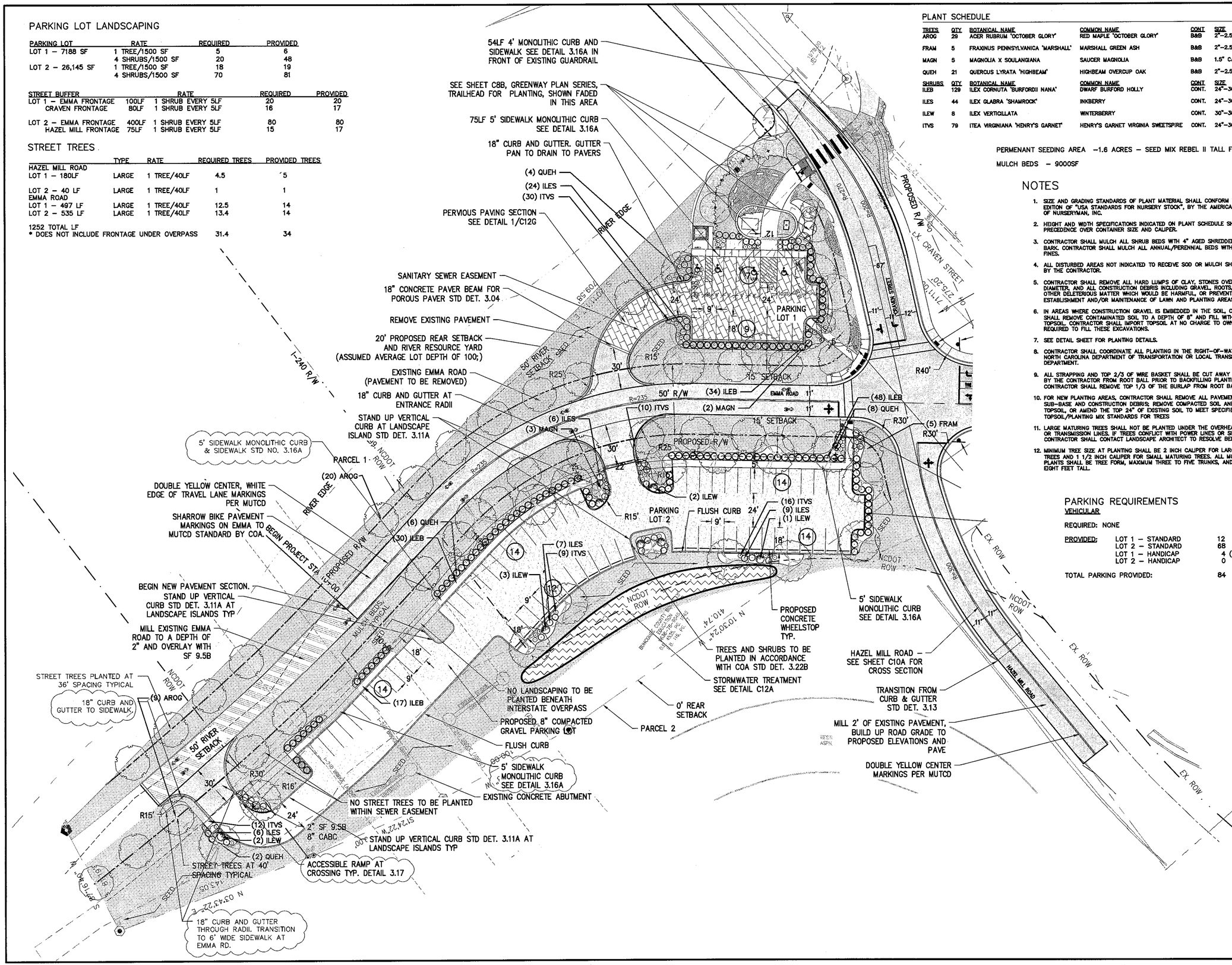
PARKING LOT LANDSCAPING

PARKING LOT	RATE	REQUIRED	PROVIDED
LOT 1 – 7188 SF	1 TREE/1500 SF	5	6
	4 SHRUBS/1500 SF	20	48
LOT 2 – 26,145 SF	1 TREE/1500 SF	18	19
	4 SHRUBS/1500 SF	70	81

STREET BUFFER		RATE	REQUIRED	PROVIDED
LOT 1 – EMMA FRONTAGE	100LF	1 SHRUB EVERY 5LF	20	20
CRAVEN FRONTAGE	80LF	1 SHRUB EVERY 5LF	16	17
LOT 2 – EMMA FRONTAGE	400LF	1 SHRUB EVERY 5LF	80	80
HAZEL MILL FRONTAGE	75LF	1 SHRUB EVERY 5LF	15	17

STREET TREES

	TYPE	RATE	REQUIRED TREES	PROVIDED TREES
HAZEL MILL ROAD				
LOT 1 – 180LF	LARGE	1 TREE/40LF	4.5	5
LOT 2 – 40 LF	LARGE	1 TREE/40LF	1	1
EMMA ROAD				
LOT 1 – 497 LF	LARGE	1 TREE/40LF	12.5	14
LOT 2 – 535 LF	LARGE	1 TREE/40LF	13.4	14
1252 TOTAL LF				
* DOES NOT INCLUDE FRONTAGE UNDER OVERPASS			31.4	34



PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	SIZE	SPAC	REMARKS
AROG	29	ACER RUBRUM 'OCTOBER GLORY'	RED MAPLE 'OCTOBER GLORY'	B&B	2"–2.5" CAL.	A.I.	
FRAM	5	FRAXINUS PENNSYLVANICA 'MARSHALL'	MARSHALL GREEN ASH	B&B	2"–2.5" CAL.	A.I.	
MAGN	5	MAGNOLIA X SOULANGIANA	SAUCER MAGNOLIA	B&B	1.5" CAL	A.I.	
QUEH	21	QUERCUS LYRATA 'HIGHBEAM'	HIGHBEAM OVERCUP OAK	B&B	2"–2.5" CAL.	A.I.	
SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SIZE	SPAC	REMARKS
ILEB	129	ILEX CORNUTA 'BURFORDII NANA'	DWARF BURFORD HOLLY	CONT.	24"–30" HT.	5' O.C.	
ILES	44	ILEX GLABRA 'SHAMROCK'	INKBERRY	CONT.	24"–30" HT.	4' O.C.	
ILEW	8	ILEX VERTICILLATA	WINTERBERRY	CONT.	30"–36" HT.	6'–6" O.C.	
ITVS	79	ITEA VIRGINIANA 'HENRY'S GARNET'	HENRY'S GARNET VIRGINIA SWEETSPIRE	CONT.	24"–30" HT.	3' O.C.	

PERMENANT SEEDING AREA –1.6 ACRES – SEED MIX REBEL II TALL FESCUE

MULCH BEDS – 9000SF

NOTES

1. SIZE AND GRADING STANDARDS OF PLANT MATERIAL SHALL CONFORM TO THE LATEST EDITION OF "USA STANDARDS FOR NURSERY STOCK", BY THE AMERICAN ASSOCIATION OF NURSERYMAN, INC.
2. HEIGHT AND WIDTH SPECIFICATIONS INDICATED ON PLANT SCHEDULE SHALL TAKE PRECEDENCE OVER CONTAINER SIZE AND CALIPER.
3. CONTRACTOR SHALL MULCH ALL SHRUB BEDS WITH 4" AGED SHREDDED HARDWOOD BARK. CONTRACTOR SHALL MULCH ALL ANNUAL/PERENNIAL BEDS WITH 1" PINE BARK FINES.
4. ALL DISTURBED AREAS NOT INDICATED TO RECEIVE SOD OR MULCH SHALL BE SEEDED BY THE CONTRACTOR.
5. CONTRACTOR SHALL REMOVE ALL HARD LUMPS OF CLAY, STONES OVER 1" IN DIAMETER, AND ALL CONSTRUCTION DEBRIS INCLUDING GRAVEL, ROOTS, LIMBS AND OTHER DELETERIOUS MATTER WHICH WOULD BE HARMFUL OR PREVENT PROPER ESTABLISHMENT AND/OR MAINTENANCE OF LAWN AND PLANTING AREAS.
6. IN AREAS WHERE CONSTRUCTION GRAVEL IS EMBEDDED IN THE SOIL, CONTRACTOR SHALL REMOVE CONTAMINATED SOIL TO A DEPTH OF 8" AND FILL WITH CLEAN TOPSOIL. CONTRACTOR SHALL IMPORT TOPSOIL AT NO CHARGE TO OWNER IF REQUIRED TO FILL THESE EXCAVATIONS.
7. SEE DETAIL SHEET FOR PLANTING DETAILS.
8. CONTRACTOR SHALL COORDINATE ALL PLANTING IN THE RIGHT-OF-WAY WITH THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION OR LOCAL TRANSPORTATION DEPARTMENT.
9. ALL STRAPPING AND TOP 2/3 OF WIRE BASKET SHALL BE CUT AWAY AND REMOVED BY THE CONTRACTOR FROM ROOT BALL PRIOR TO BACKFILLING PLANTING PIT. CONTRACTOR SHALL REMOVE TOP 1/3 OF THE BURLAP FROM ROOT BALL.
10. FOR NEW PLANTING AREAS, CONTRACTOR SHALL REMOVE ALL PAVEMENT, GRAVEL SUB-BASE AND CONSTRUCTION DEBRIS; REMOVE COMPACTED SOIL AND ADD 24" NEW TOPSOIL, OR AMEND THE TOP 24" OF EXISTING SOIL TO MEET SPECIFIED TOPSOIL/PLANTING MIX STANDARDS FOR TREES
11. LARGE MATURING TREES SHALL NOT BE PLANTED UNDER THE OVERHEAD DISTRIBUTION OR TRANSMISSION LINES. IF TREES CONFLICT WITH POWER LINES OR SIGNS, CONTRACTOR SHALL CONTACT LANDSCAPE ARCHITECT TO RESOLVE BEFORE PLANTING.
12. MINIMUM TREE SIZE AT PLANTING SHALL BE 2 INCH CALIPER FOR LARGE MATURING TREES AND 1 1/2 INCH CALIPER FOR SMALL MATURING TREES. ALL MULTI-STEM PLANTS SHALL BE TREE FORM, MAXIMUM THREE TO FIVE TRUNKS, AND A MINIMUM EIGHT FEET TALL.

PARKING REQUIREMENTS

VEHICULAR

REQUIRED: NONE

PROVIDED:		
	LOT 1 – STANDARD	12
	LOT 2 – STANDARD	68
	LOT 1 – HANDICAP	4 (VAN ACCESSIBLE: 2)
	LOT 2 – HANDICAP	0
TOTAL PARKING PROVIDED:		84

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY 12/18/13

Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14
REV CURB AT ENTRANCE, ADD SIDEWALK	5.27.14

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSQ

Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

LID PARKING AND TRAIL HEAD PLANTING PLAN

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'

Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C5F

DEVELOPMENT DATA

PROJECT:
CRAVEN STREET AREA IMPROVEMENTS

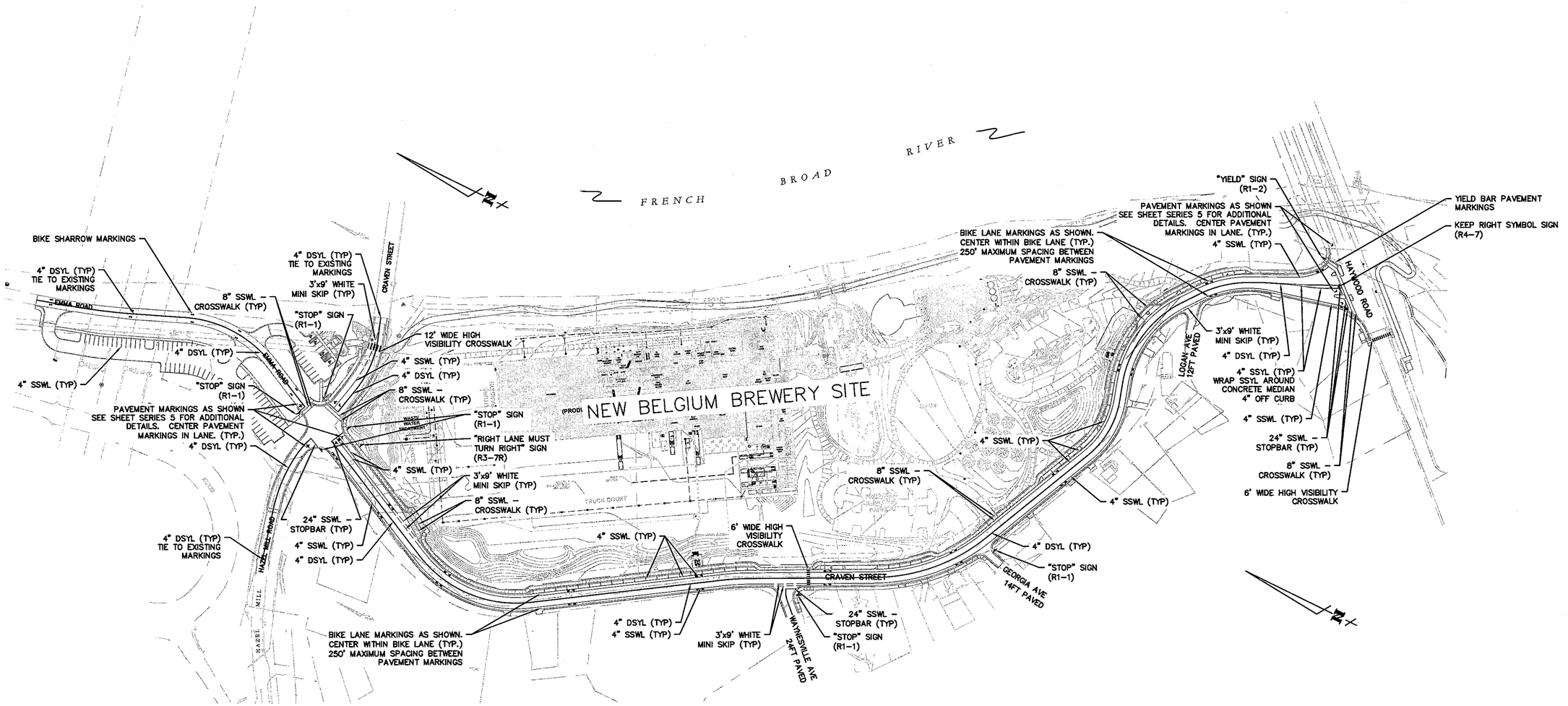
OWNER/DEVELOPER:
CITY OF ASHEVILLE
PUBLIC WORKS DEPT
161 S CHARLOTTE STREET.
ASHEVILLE, NC 28802
(828) 259-5935

ENGINEER
MATTERN & CRAIG
12 BROAD ST.
ASHEVILLE NC 28801
(828) 254-2201

NOTES

1. SEE PLAN SHEET SERIES 5 FOR ADDITIONAL INFORMATION ON PAVEMENT MARKINGS
2. REFER TO "ROADWAY STANDARD DRAWINGS NCDOT" DATED JANUARY 2012, "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2012 AND THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" FOR ADDITIONAL DETAILS ON THE SIGNAGE AND PAVEMENT MARKINGS SHOWN.
3. ALL PAVEMENT MARKINGS SHOULD BE THERMOPLASTIC

FOR CONSTRUCTION



SCALE: 1" = 100'
0 50 100 200

Revisions	Date
Address TRC comments	12.18.13
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
BID SET	3.14.14
RE BID SET, PAVEMENT MARKINGS THERMOPLASTIC	5.27.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Code Jenest & Stone

CRAVEN STREET IMPROVEMENTS
STRIPING PLAN
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale:
Commission Number: 3267
Sheet No.: C5G

EROSION CONTROL – NOTES

SITEWORK SHALL PROCEED IN THE FOLLOWING MANNER:

1) ATTEND PRE CONSTRUCTION MEETING WITH CITY OF ASHEVILLE STAFF.
2) THE CONTRACTOR SHALL INSTALL ALL STABILIZED CONSTRUCTION ENTRANCES AS SHOWN ON THE PLAN.
3) PERIMETER SILT FENCES SHALL BE INSTALLED AS INDICATED. INSTALL TEMPORARY SEDIMENT TRAP AND SKIMMER BASINS AS SHOWN ON THE PLANS. GRADE ALL DIVERSION DITCHES AND INSTALL CHECK DAMS AS SHOWN ON THE PLANS.
4) SOIL STABILIZATION SHALL BE ACHIEVED ON ANY AREA OF A SITE WHERE LAND-DISTURBING ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED ACCORDING TO THE FOLLOWING SCHEDULE:

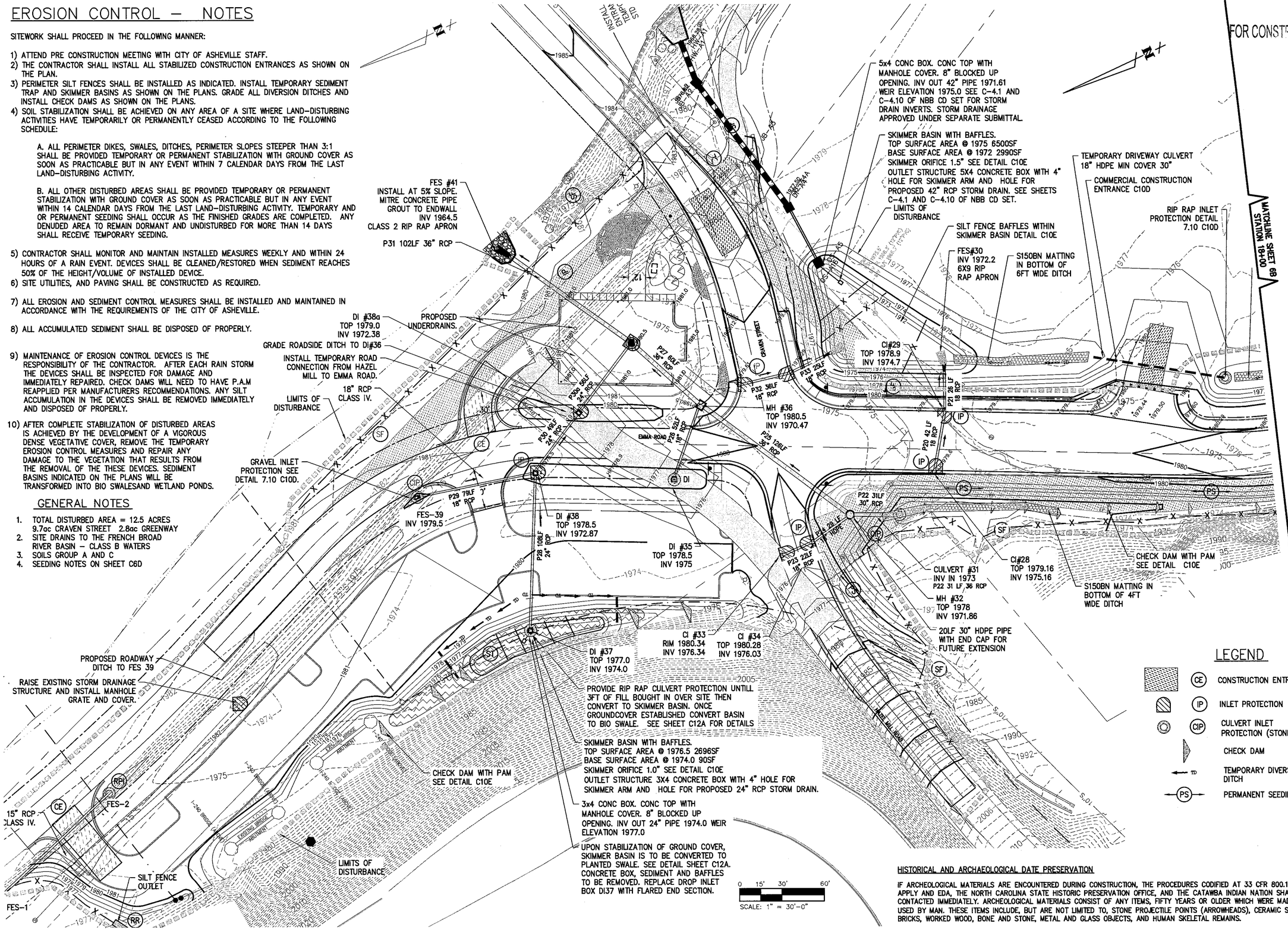
   A. ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES STEEPER THAN 3:1 SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 7 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY.

   B. ALL OTHER DISTURBED AREAS SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 14 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY. TEMPORARY AND OR PERMANENT SEEDING SHALL OCCUR AS THE FINISHED GRADES ARE COMPLETED. ANY DENUDED AREA TO REMAIN DORMANT AND UNDISTURBED FOR MORE THAN 14 DAYS SHALL RECEIVE TEMPORARY SEEDING.

5) CONTRACTOR SHALL MONITOR AND MAINTAIN INSTALLED MEASURES WEEKLY AND WITHIN 24 HOURS OF A RAIN EVENT. DEVICES SHALL BE CLEANED/RESTORED WHEN SEDIMENT REACHES 50% OF THE HEIGHT/VOLUME OF INSTALLED DEVICE.
6) SITE UTILITIES, AND PAVING SHALL BE CONSTRUCTED AS REQUIRED.
7) ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF ASHEVILLE.
8) ALL ACCUMULATED SEDIMENT SHALL BE DISPOSED OF PROPERLY.
9) MAINTENANCE OF EROSION CONTROL DEVICES IS THE RESPONSIBILITY OF THE CONTRACTOR. AFTER EACH RAIN STORM THE DEVICES SHALL BE INSPECTED FOR DAMAGE AND IMMEDIATELY REPAIRED. CHECK DAMS WILL NEED TO HAVE P.A.M REAPPLIED PER MANUFACTURERS RECOMMENDATIONS. ANY SILT ACCUMULATION IN THE DEVICES SHALL BE REMOVED IMMEDIATELY AND DISPOSED OF PROPERLY.
10) AFTER COMPLETE STABILIZATION OF DISTURBED AREAS IS ACHIEVED BY THE DEVELOPMENT OF A VIGOROUS DENSE VEGETATIVE COVER, REMOVE THE TEMPORARY EROSION CONTROL MEASURES AND REPAIR ANY DAMAGE TO THE VEGETATION THAT RESULTS FROM THE REMOVAL OF THE THESE DEVICES. SEDIMENT BASINS INDICATED ON THE PLANS WILL BE TRANSFORMED INTO BIO SWALESAND WETLAND PONDS.

GENERAL NOTES

1. TOTAL DISTURBED AREA = 12.5 ACRES
   9.7ac CRAVEN STREET 2.8ac GREENWAY
2. SITE DRAINS TO THE FRENCH BROAD RIVER BASIN – CLASS B WATERS
3. SOILS GROUP A AND C
4. SEEDING NOTES ON SHEET C6D



HISTORICAL AND ARCHAEOLOGICAL DATE PRESERVATION

IF ARCHEOLOGICAL MATERIALS ARE ENCOUNTERED DURING CONSTRUCTION, THE PROCEDURES CODIFIED AT 33 CFR 800.13(B) WILL APPLY AND EDA, THE NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE, AND THE CATAWBA INDIAN NATION SHALL BE CONTACTED IMMEDIATELY. ARCHEOLOGICAL MATERIALS CONSIST OF ANY ITEMS, FIFTY YEARS OR OLDER WHICH WERE MADE OR USED BY MAN. THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO, STONE PROJECTILE POINTS (ARROWHEADS), CERAMIC SHERDS, BRICKS, WORKED WOOD, BONE AND STONE, METAL AND GLASS OBJECTS, AND HUMAN SKELETAL REMAINS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY 5.27.14

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014
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Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL CONSULTANTS & ENGINEERS
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS PHASE 1 GRADING, DRAINAGE, & EC

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C6A

FOR CONSTRUCTION

LEGEND

- CE — CONSTRUCTION ENTRANCE
- IP — INLET PROTECTION
- CIP — CULVERT INLET PROTECTION (STONE)
- CHECK DAM
- TD — TEMPORARY DIVERSION DITCH
- PS — PERMANENT SEEDING

INSTALL 125 FEET OF S150BN MATTING IN BOTTOM OF 6FT WIDE DITCH

FES#27 INV 1975.0 6X9 RIP RAP APRON

CI#26 TOP 1980.24 INV 1976.0

FES#24 INV 1976.0 6X9 RIP RAP APRON

CI#23 TOP 1981.24 INV 1977.0

CHECK DAM WITH PAM DETAIL C10E

FES#21 INV 1978.0 6X9 RIP RAP APRON

CI#20 TOP 1983.50 INV 1979.25

LIMITS OF DISTURBANCE

FES#18 INV 1980.0 6X9 RIP RAP APRON

CI#17 RIM 1989.38 INV 1985.38

MATCHLINE SHEET 6A STATION 184+00

P19 3 LF 18 RCP

P18 31 LF 18 RCP

P17 37 LF 18 RCP

P15 41 LF 18 RCP

P13 74 LF 18 RCP

P12 37 LF 18 RCP

P16 37 LF 18 RCP

P14 37 LF 18 RCP

CRAVEN STREET

CI#25 TOP 1980.27 INV 1976.27

CI#22 TOP 1981.41 INV 1977.41

435LF PERMANENT DRAINAGE DITCH. START INVERT 1977.3 SLOPE AT 1% TO PIPE P22.

TEMPORARY CONSTRUCTION AND GRADING EASEMENT

INSTALL FILL MATERIAL AND 12" CABC TO CREATE GRAVEL PARKING AREA SLOPING TOWARD CRAVEN STREET

LIMITS OF DISTURBANCE

CI#19 TOP 1983.68 INV 1979.68

CI#16 RIM 1989.7 INV 1985.9

CI#13 TOP 1993.58 INV 1989.83

SEE NOTE #2 THIS SHEET

P11A 78 LF 18 RCP

P10 22 LF 18 RCP

P11 46 LF 18 RCP

MATCHLINE SHEET 6C STATION 286+00

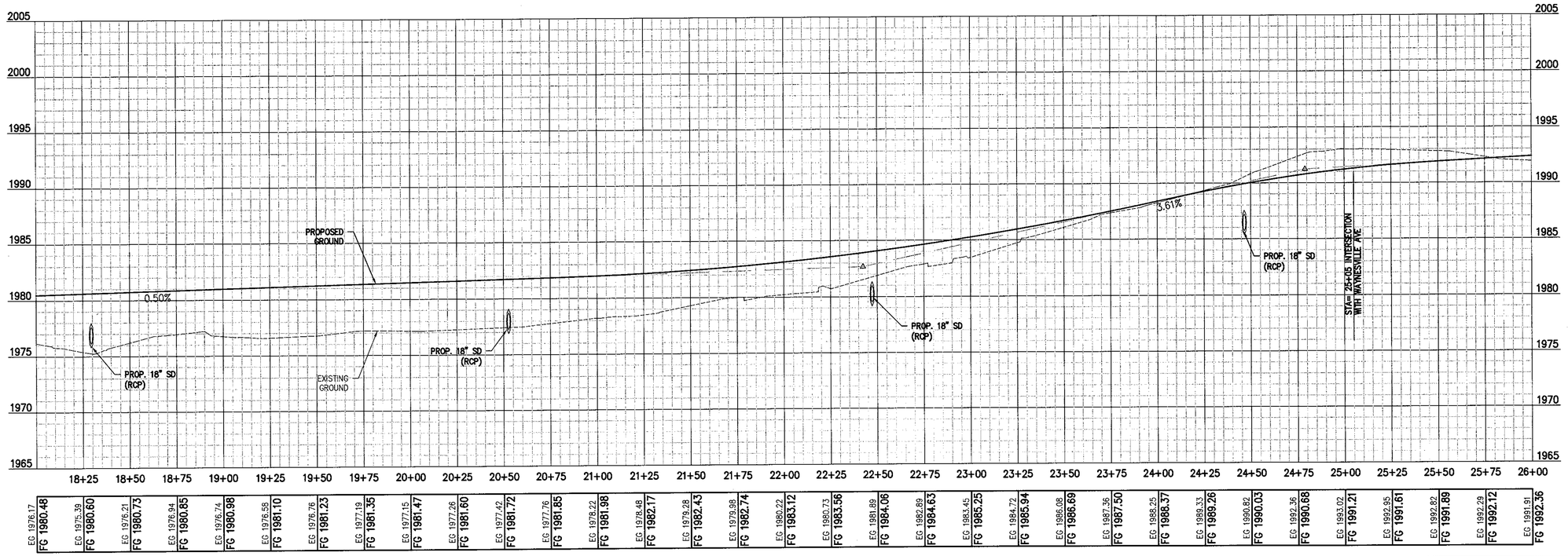
CB#15 TOP 1991.67 INV 1985.0

EXISTING STORM DRAIN TO BE ABANDONED

CB#14 TOP 1993.46 INV 1989.46

WAYNESVILLE AVE

SCALE: 1" = 30'-0"



NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035155 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSQ

Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS PHASE 1 GRADING, DRAINAGE, & EC

CITY OF ASHEVILLE, NORTH CAROLINA

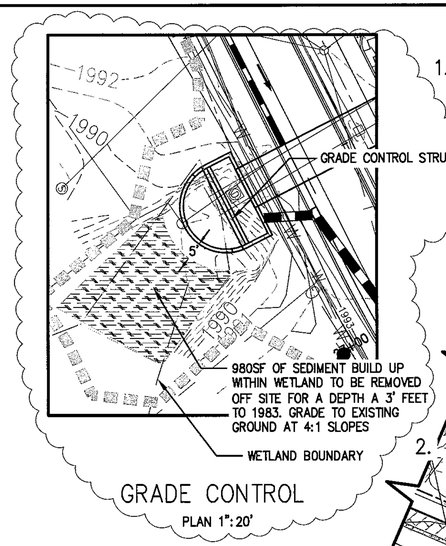
Vertical Scale: 1" = 5'

Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C6B

FOR CONSTRUCTION



GRADE CONTROL

PLAN 1":20'

1. GRADE CONTROL STRUCTURE SEE S5,S6

2. TOP OF FOUNDATION AT ARCH 1982.5

CHECK DAM SEE DETAIL C10E BELOW PUMP AROUND DISCHARGE

LIMITS OF DISTURBANCE

TOP OF FOUNDATION AT 1979.6

TOP OF STREAM MATERIAL 1978.6 SEE ECS PLANS C13K,L,M,N FOR HEADWALL CONSTRUCTION DETAILS

SEE SHEET C10F FOR ARCH CROSS SECTION

SILT FENCE SEE DETAIL 7.01 C10D

AREA TO BE TEMPORARY SEEDED AFTER BACKFILLING

2. 217 LF OF ARCH PIPE OUTSIDE OF COA RIGHT OF WAY CONSTRUCTED UNDER NBB SITE CONTRACT

SEE NBB SITE DRAWINGS FOR INVERT COORDINATION.

63 LF OF ARCH PIPE FROM HEADWALL TO COA RIGHT OF WAY CONSTRUCTED UNDER CRAVEN STREET CONTRACT

16X10X3 TEMP. SEDIMENT TRAP WITH 12" HDPE SLOPE DRAIN TO EXISTING STREAM.

NEW SINGLE GUY SUPPORTED POWER POLE BY DUKE ENERGY

INSTALL JERSEY BARRIERS FOR 25 FEET EITHER SIDE OF POWER POLE. BEHIND PROPOSED CURB. INSTALL ORANGE CONSTRUCTION PERIMETER FENCING 20' FROM EXISTING POLES.

INLET PROTECTION AT EXISTING DROP INLET

INLET PROTECTION AT EXISTING DROP INLET

LIMITS OF DISTURBANCE

MATCHLINE SHEET 6B STATION 26+00

MATCHLINE SHEET 6D STATION 32+50

CI#10 TOP 1995.36 INV 1990.53

CI#7 TOP 2007.0 INV 2003.0

CI#8 TOP 2002.30 INV 1998.3

CI#9 TOP 1998.77 INV 1994.76

CI#11 TOP 1992.6 INV IN 1988. INV OUT 1985.0

P11A 78 LF 18 RCP

P8 153 LF 30" RCP

P7 115 LF 24" RCP

P6 116 LF 24" RCP

P6 155 LF 18 RCP

P4 55 LF 18 RCP

P3 39 LF 18 RCP

PROPOSED R/W

EX. R/W

CRAVEN STREET

GEORGIA AVE

ARV

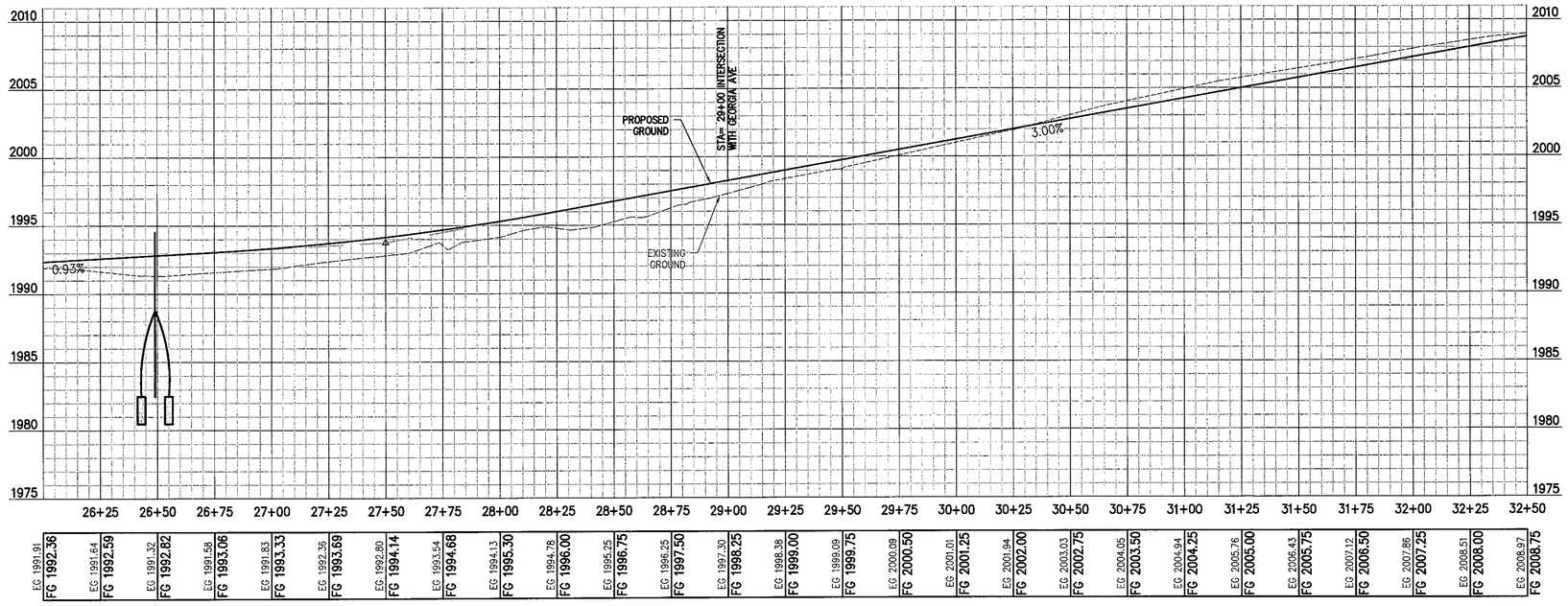
18" DIA CONNECTION TO ARCH AT INVERT 1984.0

CONCRETE GRADE CONTROL STRUCTURE TO HOLD BACK SEDIMENT IN THE CREEK. SEE SHEET S5,S6

INV OUT OF HEADWALL #12 INV 1983.0

0 15' 30' 60'

SCALE: 1" = 30'-0"



LEGEND

- CE — CONSTRUCTION ENTRANCE
- IP — INLET PROTECTION
- CIP — CULVERT INLET PROTECTION
- CHECK DAM
- TD — TEMPORARY DIVERSION DITCH
- PS — PERMANENT SEEDING

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14
1. ADD GRADE CONTROL PLAN	5.27.14
2. ARCH CULVERT LENGTH 280LF	7.14.14

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSQ

Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS + SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS PHASE 1 GRADING, DRAINAGE & EC

CITY OF ASHEVILLE, NORTH CAROLINA

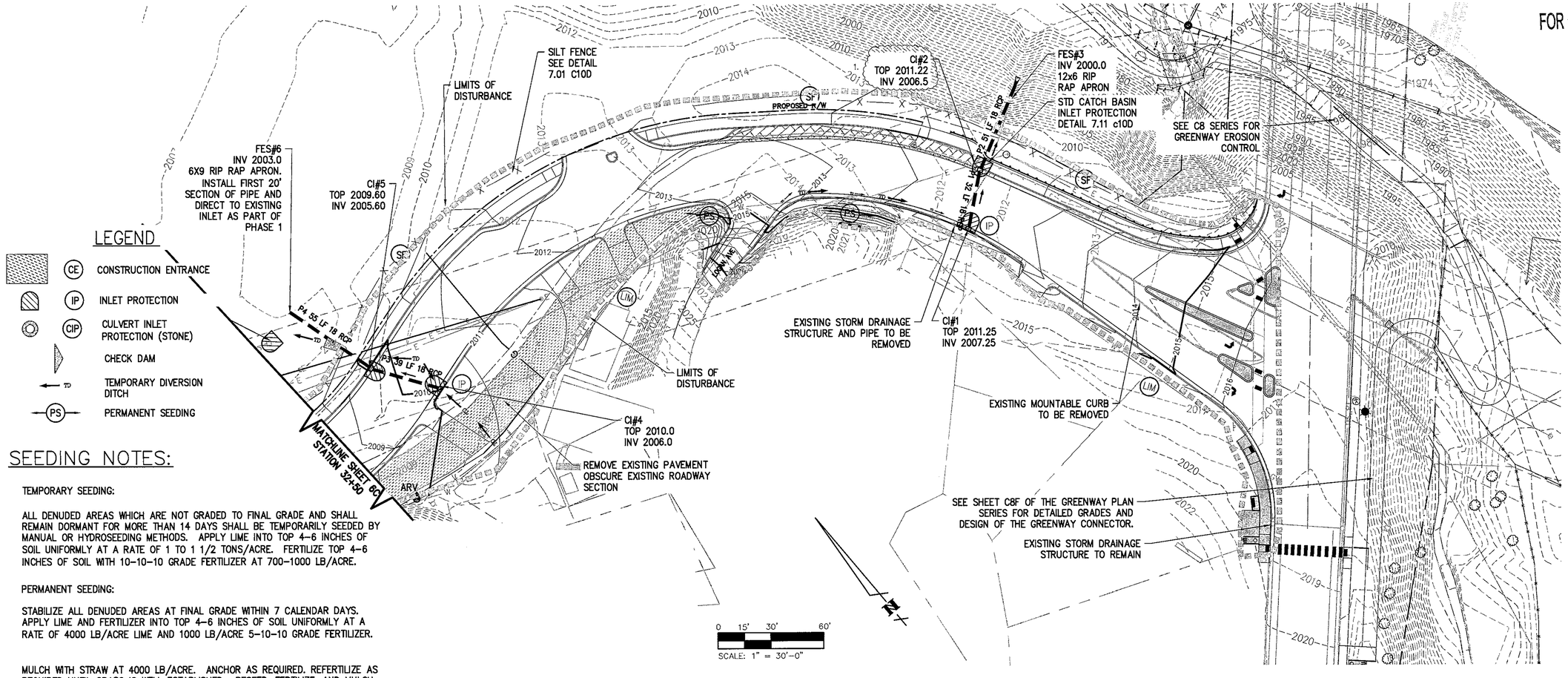
Vertical Scale: 1" = 5'

Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C6C

FOR CONSTRUCTION



SEEDING NOTES:

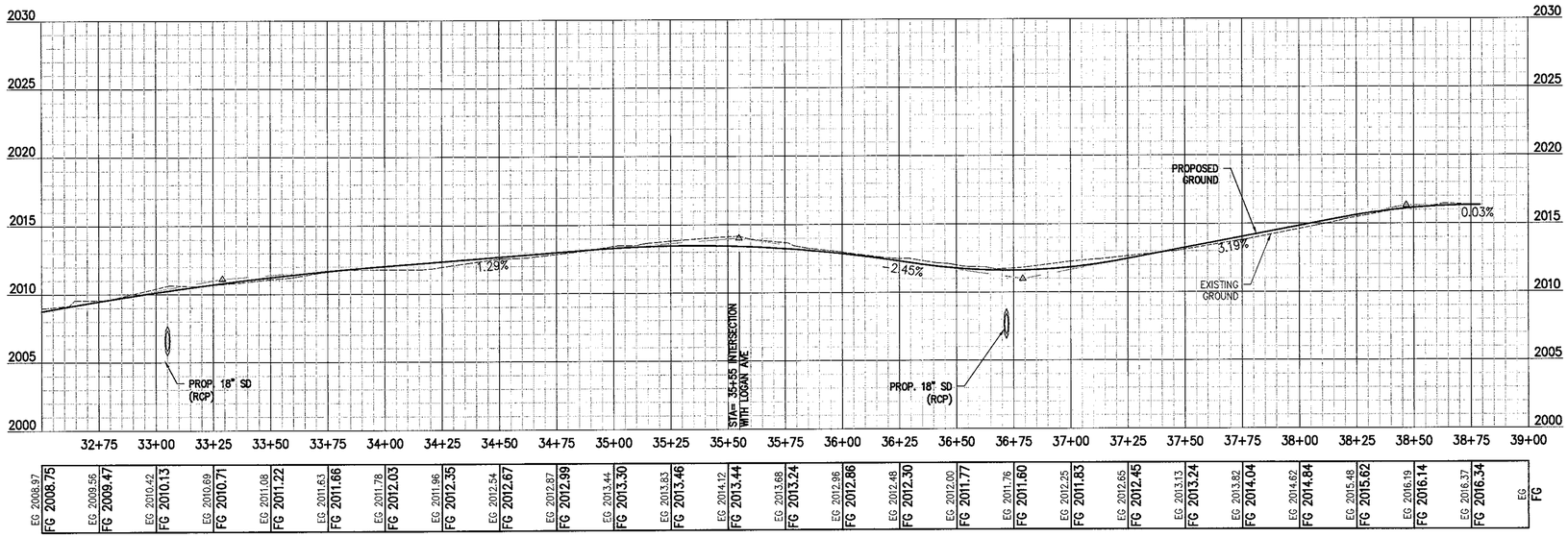
TEMPORARY SEEDING:

ALL DENUDED AREAS WHICH ARE NOT GRADED TO FINAL GRADE AND SHALL REMAIN DORMANT FOR MORE THAN 14 DAYS SHALL BE TEMPORARILY SEEDED BY MANUAL OR HYDROSEEDING METHODS. APPLY LIME INTO TOP 4–6 INCHES OF SOIL UNIFORMLY AT A RATE OF 1 TO 1 1/2 TONS/ACRE. FERTILIZE TOP 4–6 INCHES OF SOIL WITH 10–10–10 GRADE FERTILIZER AT 700–1000 LB/ACRE.

PERMANENT SEEDING:

STABILIZE ALL DENUDED AREAS AT FINAL GRADE WITHIN 7 CALENDAR DAYS. APPLY LIME AND FERTILIZER INTO TOP 4–6 INCHES OF SOIL UNIFORMLY AT A RATE OF 4000 LB/ACRE LIME AND 1000 LB/ACRE 5–10–10 GRADE FERTILIZER.

MULCH WITH STRAW AT 4000 LB/ACRE. ANCHOR AS REQUIRED. REFERTILIZE AS REQUIRED UNTIL GRASS IS WELL ESTABLISHED. RESEED, FERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.



Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	7.9.14
1. CI#2 LOCATION ADJUSTED	

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Date: 5/27/2014

SEAL 035195 ENGINEER GABRIEL S. QUESTINBERRY

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS PHASE 1 GRADING, DRAINAGE & EC

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C6D

FOR CONSTRUCTION

LEGEND

- CE — CONSTRUCTION ENTRANCE
- IP — INLET PROTECTION
- CIP — CULVERT INLET PROTECTION (STONE)
- CHECK DAM
- TD — TEMPORARY DIVERSION DITCH
- PS — PERMANENT SEEDING
- SIDEWALK MONOLITHIC CURB & SIDEWALK STD NO. 3.16A

DI #38a
TOP 1979.0
INV 1972.38

PROPOSED UNDERDRAINS.

GRADE ROADSIDE DITCH TO DI#36

INSTALL TEMPORARY ROAD CONNECTION FROM HAZEL MILL TO EMMA ROAD.

18" RCP CLASS IV.

LIMITS OF DISTURBANCE

GRAVEL INLET PROTECTION SEE DETAIL 7.10 C10D.

FES-39
INV 1979.5

DI #38
TOP 1978.5
INV 1972.87

DI #35
TOP 1978.5
INV 1975

CI #33
RIM 1980.34
INV 1976.34

CI #34
TOP 1980.28
INV 1976.03

DI #37
TOP 1977.0
INV 1974.0

PROVIDE RIP RAP CULVERT PROTECTION UNTILL 3FT OF FILL BOUGHT IN OVER SITE THEN CONVERT TO SKIMMER BASIN. ONCE GROUNDCOVER ESTABLISHED CONVERT BASIN TO BIO SWALE. SEE SHEET C12A FOR DETAILS

SKIMMER BASIN WITH BAFFLES.
TOP SURFACE AREA @ 1976.5 2696SF
BASE SURFACE AREA @ 1974.0 90SF
SKIMMER ORIFICE 1.0" SEE DETAIL C10E
OUTLET STRUCTURE 3X4 CONCRETE BOX WITH 4" HOLE FOR SKIMMER ARM AND HOLE FOR PROPOSED 24" RCP STORM DRAIN.

3x4 CONC BOX. CONC TOP WITH MANHOLE COVER. 8" BLOCKED UP OPENING. INV OUT 24" PIPE 1974.0 WEIR ELEVATION 1977.0

UPON STABILIZATION OF GROUND COVER, SKIMMER BASIN IS TO BE CONVERTED TO PLANTED SWALE. SEE DETAIL SHEET C12A. CONCRETE BOX, SEDIMENT AND BAFFLES TO BE REMOVED. REPLACE DROP INLET BOX DI37 WITH FLARED END SECTION.

CHECK DAM WITH PAM SEE DETAIL C10E

PROPOSED ROADWAY DITCH TO FES 39

RAISE EXISTING STORM DRAINAGE STRUCTURE AND INSTALL MANHOLE GRATE AND COVER.

MULCH BERM TYPICAL

15" RCP CLASS IV.

FES-2

FES-1

SILT FENCE OUTLET

LIMITS OF DISTURBANCE

EXISTING BRIDGE ABUTMENT

I-240 BRIDGE

EMMA ROAD

CRAVEN STREET

HAZEL MILL ROAD

MH #36
TOP 1980.5
INV 1970.47

CI #29
TOP 1978.9
INV 1974.7

CI #28
TOP 1979.16
INV 1975.16

CULVERT #31
INV IN 1973
P22 31 LF, 36 RCP

MH #32
TOP 1978
INV 1971.86

20LF 30" HDPE PIPE WITH END CAP FOR FUTURE EXTENSION

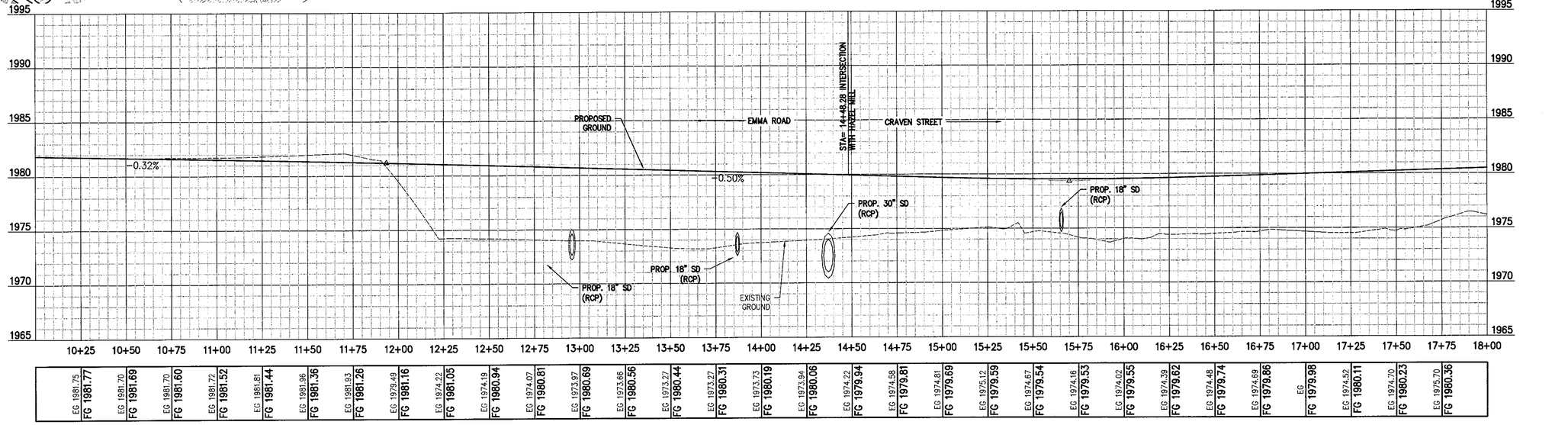
S150BN MATTING IN BOTTOM OF 4FT WIDE DITCH

CHECK DAM WITH PAM SEE DETAIL C10E

MATCHLINE SHEET 6F STATION 18+00

P27 60LF 36" RCP
P38 58LF 24" RCP
P39 49LF 24" RCP
P26 52LF 18" RCP
P25 135LF 18" RCP
P29 79LF 18" RCP
P28 108LF 24" RCP
P32 36LF 18" RCP
P33 23LF 18" RCP
P21 26 LF 18 RCP
P20 42 LF 18 RCP
P22 31LF 30" RCP
P24 29 LF 30" HDPE
P23 22LF 18" RCP

0 15' 30' 60'
SCALE: 1" = 30'-0"



SEAL 035195 12/31/14 ENGINEER GABRIEL S. QUESINBERRY NORTH CAROLINA

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

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Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS GRADING, DRAINAGE, AND E&SC

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
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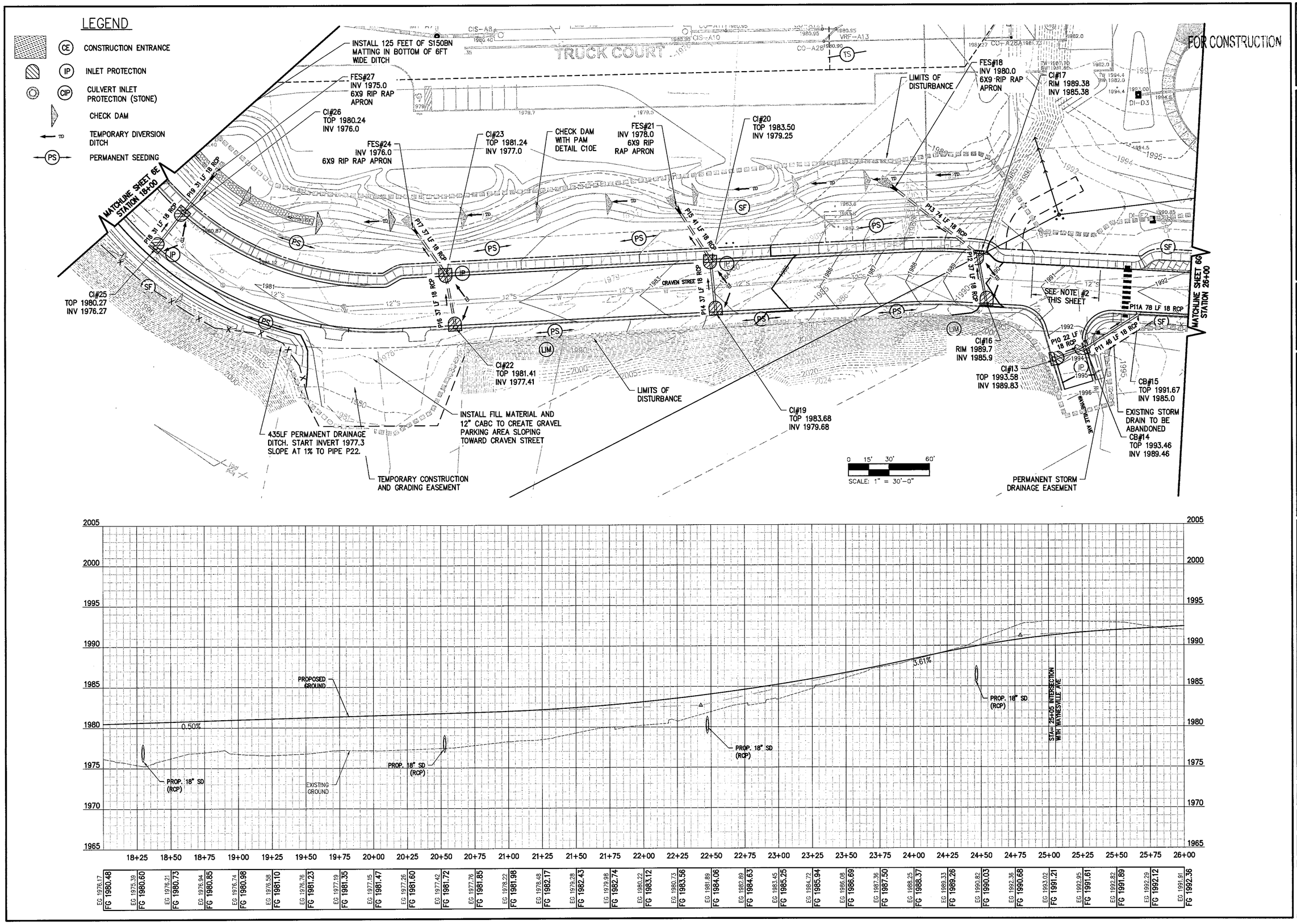
Commission Number: 3267
Sheet No.: C6E



NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14

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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS GRADING, DRAINAGE, AND E&SC

CITY OF ASHEVILLE, NORTH CAROLINA

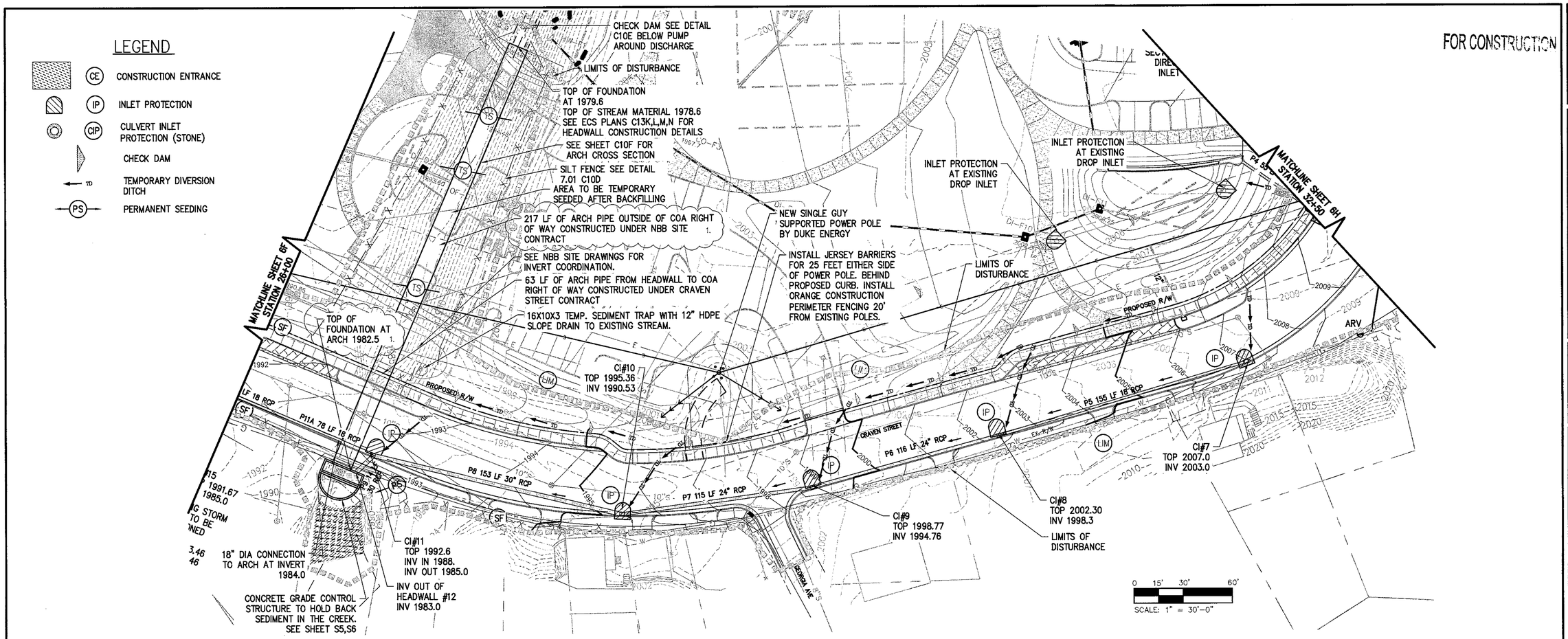
Vertical Scale: 1" = 5'

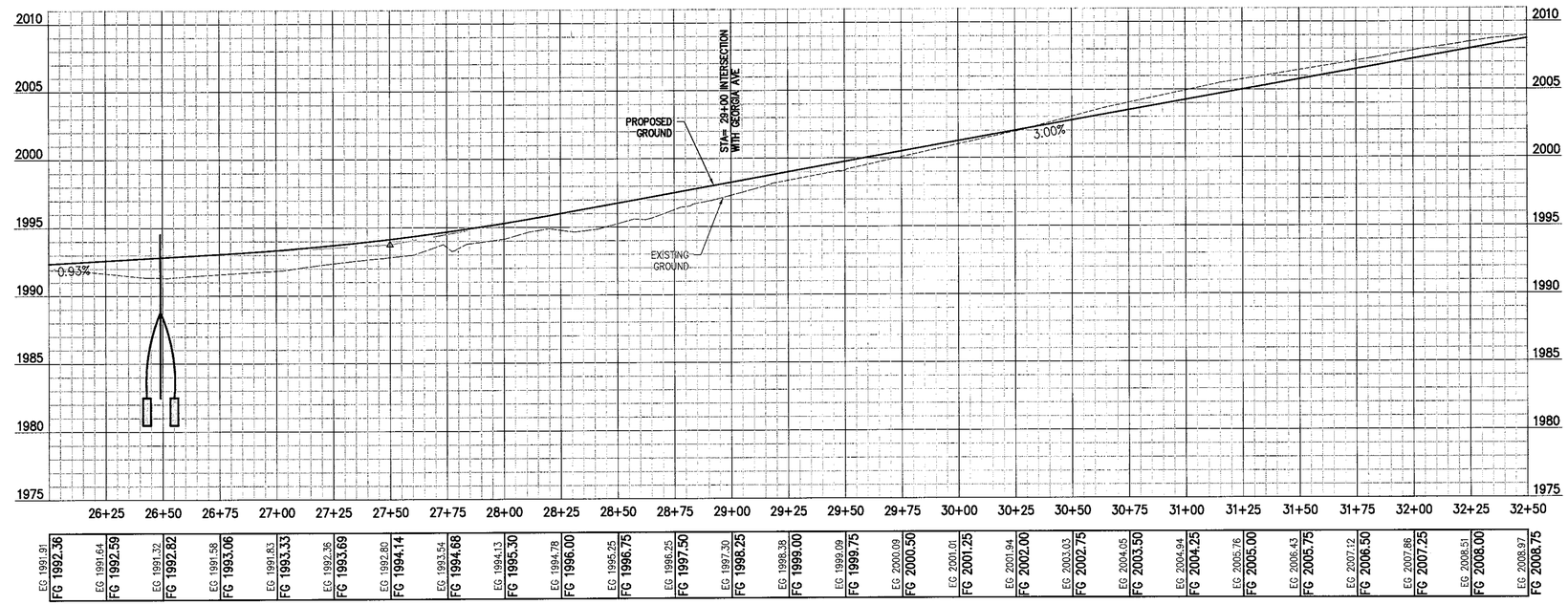
Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C6F

FOR CONSTRUCTION





NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14
1. CI#2 MOVED, ARCH NOTE ADDED	7.14.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

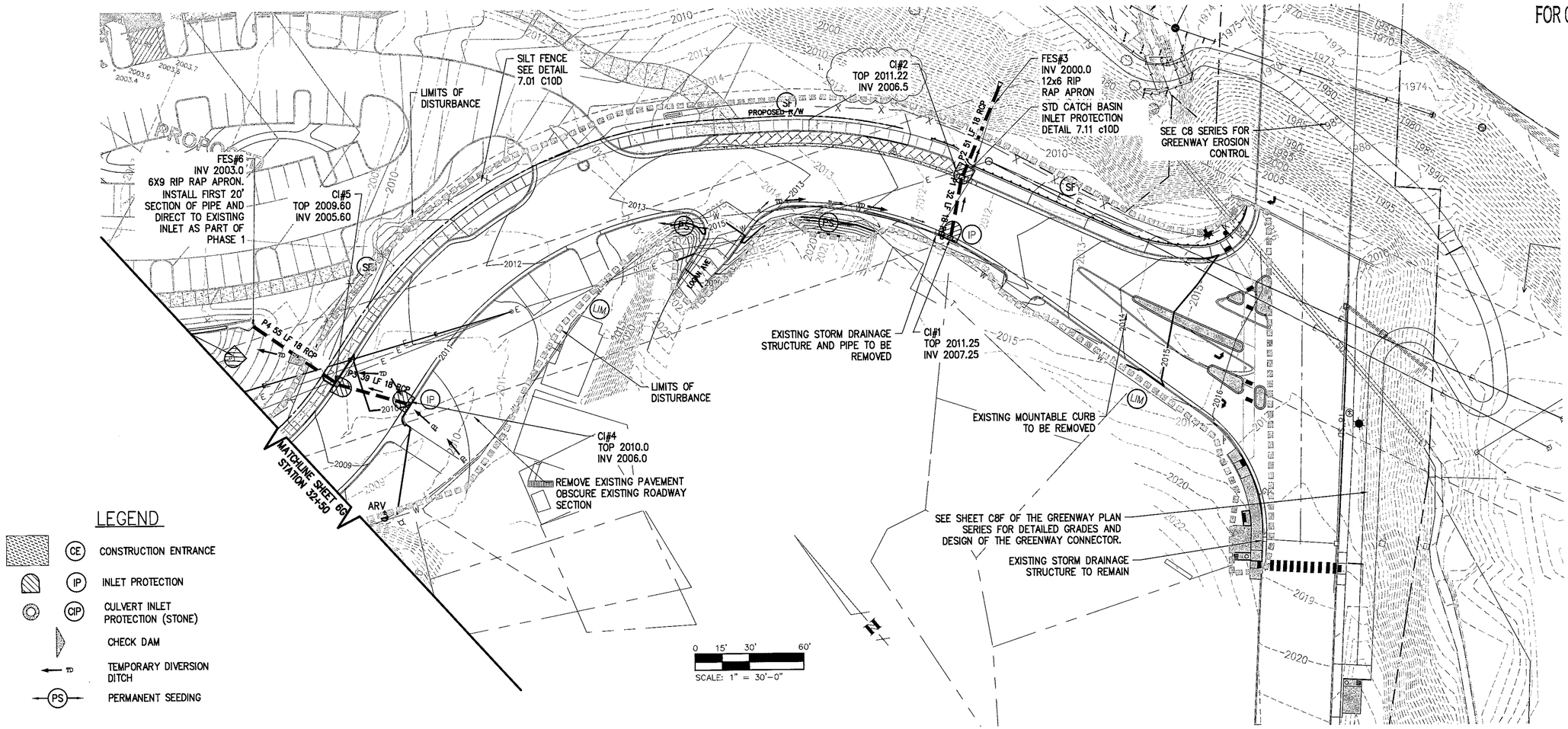
CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS GRADING, DRAINAGE, AND E&SC

CITY OF ASHEVILLE, NORTH CAROLINA

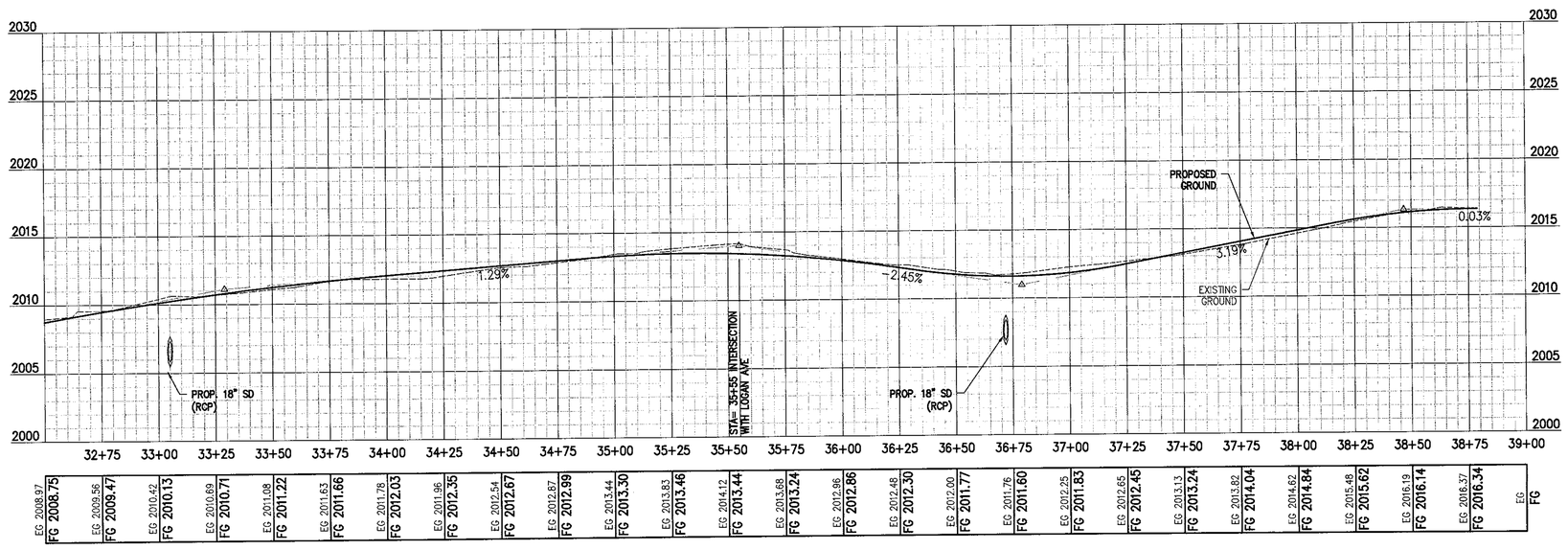
Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C6G

FOR CONSTRUCTION



LEGEND

- CE — CONSTRUCTION ENTRANCE
- IP — INLET PROTECTION
- CIP — CULVERT INLET PROTECTION (STONE)
- CHECK DAM
- TD — TEMPORARY DIVERSION DITCH
- PS — PERMANENT SEEDING



SEAL 035195 7/14/14 ENGINEER GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	7.14.14
C#2 MOVED	

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: CSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS GRADING, DRAINAGE, AND E&SC

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C6H

FOR CONSTRUCTION

Station	EG	FG
10+00	2003.37	
10+25	1999.99	1999.91
10+50	1996.10	1995.70
10+75	1991.84	1991.61
11+00	1987.13	1988.17
11+25	1982.46	1985.44
11+50	1978.60	1983.42
11+75	1975.69	1982.01
12+00	1974.67	1981.01
12+25	1974.37	1980.41
12+50	1974.19	1980.16
12+75	1974.38	1979.95
13+00	1974.29	1979.73
13+25	1974.54	1979.53
13+50	1975.17	1979.59
13+75	1976.09	1979.94
14+00	1977.43	1980.54
14+25	1978.96	1981.16
14+50	1979.89	1981.78
14+75	1981.09	1982.39
15+00	1982.14	1982.94
15+25	1983.03	1983.44
15+50	1969.40	1983.91
15+75		1984.39
16+00		1984.87
16+25		1985.35
16+50		1985.82
16+75		1986.30

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY 5/28/14

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSO

Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS

HAZEL MILL ROAD IMPROVEMENTS GRADING, DRAINAGE, AND E&SC

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'

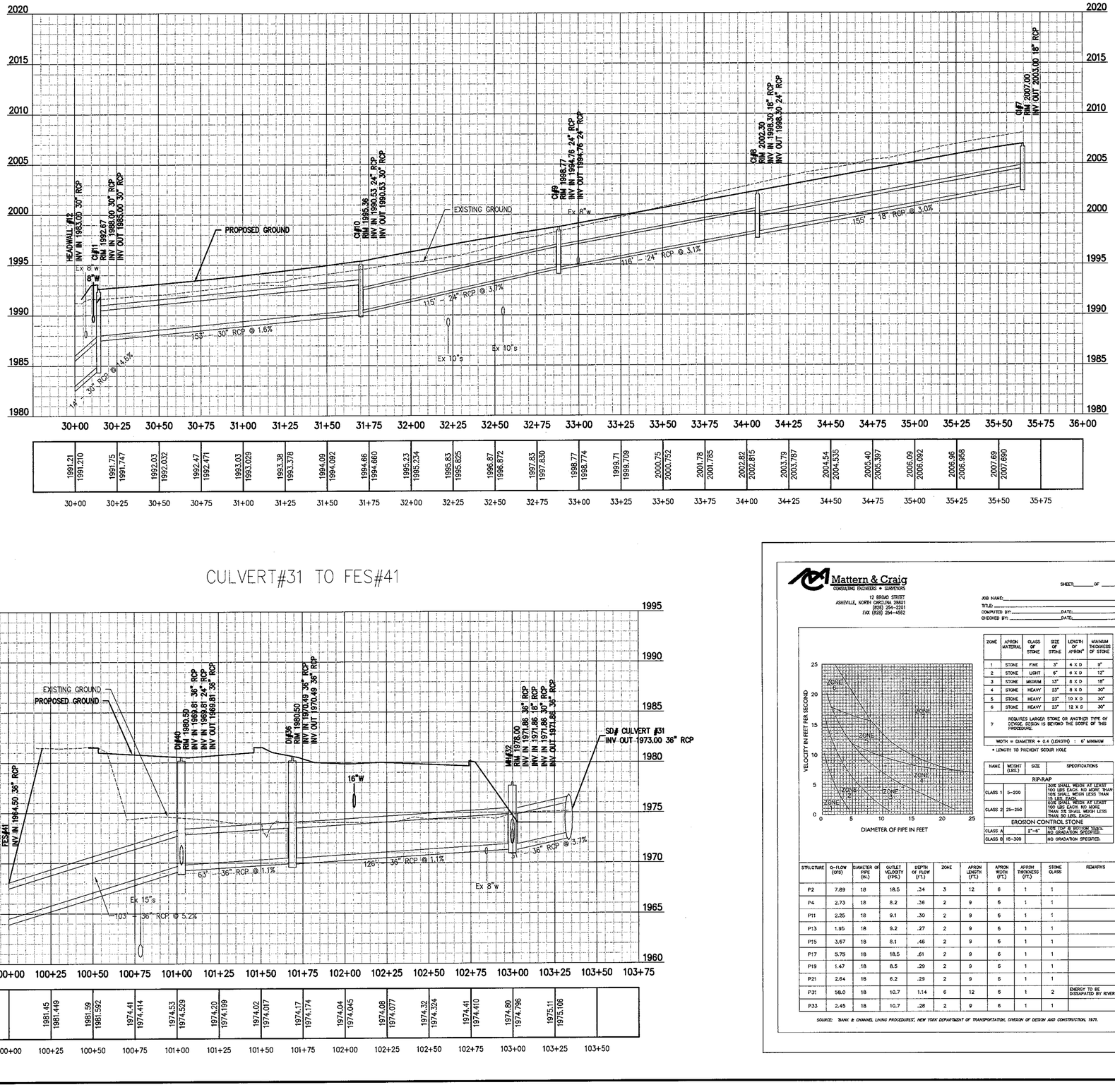
Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C6I

FOR CONSTRUCTION

CI#7 TO FES#12



CULVERT#31 TO FES#41

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
12 BROAD STREET
ASHEVILLE, NORTH CAROLINA 28801
(828) 254-2201
FAX (828) 254-4502

SHEET____ OF ____

JOB NAME:_____
TITLE:_____
COMPUTED BY:_____ DATE:_____
CHECKED BY:_____ DATE:_____

ZONE	APRON MATERIAL	CLASS OF STONE	SIZE OF STONE	LENGTH OF APRON	MINIMUM THICKNESS OF STONE
1	STONE	FINE	3"	4 X D	9"
2	STONE	LIGHT	6"	9 X D	12"
3	STONE	MEDIUM	13"	6 X D	18"
4	STONE	HEAVY	23"	8 X D	30"
5	STONE	HEAVY	23"	10 X D	30"
6	STONE	HEAVY	23"	12 X D	30"
7	REQUIRES LARGER STONE OR ANOTHER TYPE OF DEVICE. DESIGN IS BEYOND THE SCOPE OF THIS PROCEDURE.				

WIDTH = DIAMETER + 0.4 (LENGTH) : 6" MINIMUM
+ LENGTH TO PREVENT SCOUR HOLE

NAME	WEIGHT (LBS.)	SIZE	SPECIFICATIONS
RIP-RAP			
CLASS 1	5-200		30% SMALL MIXED AT LEAST 100 LBS EACH. NO MORE THAN 10% SMALL MIXED LESS THAN 50 LBS. EACH.
CLASS 2	25-250		30% SMALL MIXED AT LEAST 100 LBS EACH. NO MORE THAN 5% SMALL MIXED LESS THAN 50 LBS. EACH.
EROSION CONTROL STONE			
CLASS A		2"-6"	100% TOP & BOTTOM SIZES. NO GRADATION SPECIFIED.
CLASS B	15-300		NO GRADATION SPECIFIED.

STRUCTURE	Q-FLOW (CFS)	DIAMETER OF PIPE (IN.)	OUTLET VELOCITY (FPS.)	DEPTH OF FLOW (FT.)	ZONE	APRON LENGTH (FT.)	APRON WIDTH (FT.)	APRON THICKNESS (FT.)	STONE CLASS	REMARKS
P2	7.89	18	18.5	.34	3	12	6	1	1	
P4	2.73	18	8.2	.36	2	9	6	1	1	
P11	2.25	18	9.1	.30	2	9	6	1	1	
P13	1.95	18	9.2	.27	2	9	6	1	1	
P15	3.67	18	8.1	.46	2	9	6	1	1	
P17	5.75	18	18.5	.61	2	9	6	1	1	
P19	1.47	18	8.5	.29	2	9	6	1	1	
P21	2.64	18	6.2	.29	2	9	6	1	1	
P31	58.0	18	10.7	1.14	6	12	6	1	2	ENERGY TO BE DISSAPATED BY RIVER
P33	2.45	18	10.7	.28	2	9	6	1	1	

SOURCE: "RIPRAP & CHANNEL LINING PROCEDURES", NEW YORK DEPARTMENT OF TRANSPORTATION, DIVISION OF DESIGN AND CONSTRUCTION, 1979.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GREGORY S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

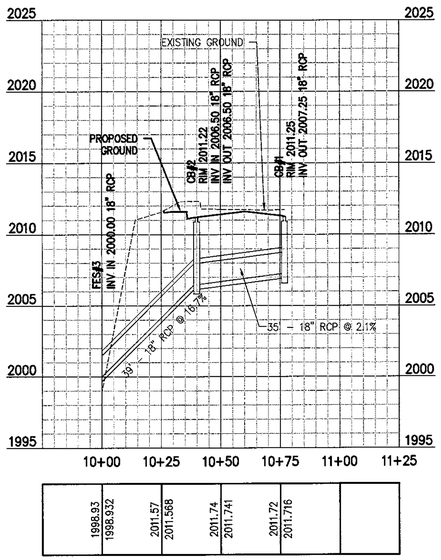
STORM DRAIN PROFILES

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C6J

STRUCTURE #	STRUCTURE TYPE	GRATE ELEVATION	STRUCTURE INVERT	DEPTH
CI 1	CURB INLET	2011.25	2007.25	4.00
CI 2	CURB INLET	2011.22	2006.5	4.72
FES 3	FLARED END SECTION		2000	
CI4	CURB INLET	2010	2006	4.00
CI5	CURB INLET	2009.6	2005.6	4.00
FES 6	FLARED END SECTION		2003	
CI7	CURB INLET	2007.00	2003	4.00
CI8	CURB INLET	2002.3	1998.3	4.00
CI 9	CURB INLET	1998.77	1994.76	4.01
CI 10	CURB INLET	1995.36	1990.53	4.83
CI 11	CURB INLET	1992.6	1985	7.60
HW 12	HEADWALL		1983	
CI 13	CURB INLET	1993.58	1989.83	3.75
CI 14	CURB INLET	1993.46	1988.46	5.00
CI 15	CURB INLET	1991.67	1985	6.67
CI 16	CURB INLET	1989.7	1985.9	3.80
CI 17	CURB INLET	1989.38	1985.38	4.00
FES 18	FLARED END SECTION		1980	
CI 19	CURB INLET	1983.68	1979.68	4.00
CI 20	CURB INLET	1983.5	1979.25	4.25
FES 21	FLARED END SECTION		1978	
CI 22	CURB INLET	1981.41	1977.41	4.00
CI 23	CURB INLET	1981.24	1977	4.24
FES 24	FLARED END SECTION		1976	
CI 25	CURB INLET	1980.27	1976.27	4.00
CI 26	CURB INLET	1980.24	1976	4.24
FES 27	FLARED END SECTION		1975	
CI 28	CURB INLET	1979.16	1975.16	4.00
CI 29	CURB INLET	1978.9	1974.7	4.20
FES 30	FLARED END SECTION		1972.2	
CI 31	CULVERT INLET		1973	
MH 32	MAN HOLE	1978	1971.86	6.14
CI 33	CURB INLET	1980.34	1976.34	4.00
CI 34	CURB INLET	1980.28	1976.03	4.25
DI 35	DROP INLET	1978.5	1975	3.50
MH 36	MAN HOLE	1980.5	1970.47	10.03
DI 37	DROP INLET	1978	1974	4.00
DI 38	DROP INLET	1978.5	1972.87	5.63
DI 38a	DROP INLET	1979	1972.38	6.62
FES 39	FLARED END SECTION		1979.5	
DI 40	DROP INLET INV IN	1980.5	1969.81	10.69
DI 40	DROP INLET INV OUT	1980.5	1969.81	10.69
FES 41	FLARED END SECTION		1964.5	
CI 42	CURB INLET	1979.11	1975.11	4.00
CI 43	CURB INLET	1978.79	1974.54	4.25
FES 44	FLARED END SECTION		1972.2	

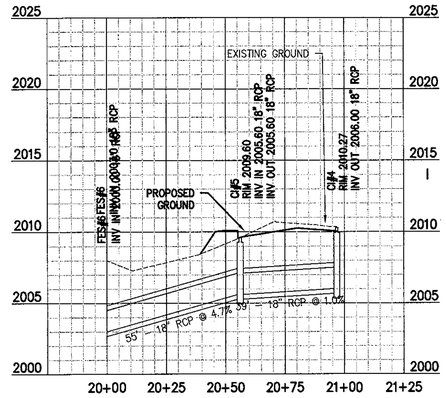
CI#1 TO FES#3



1998.93	2011.57	2011.74	2011.72	
1998.932	2011.568	2011.741	2011.716	

10+00 10+25 10+50 10+75 11+00

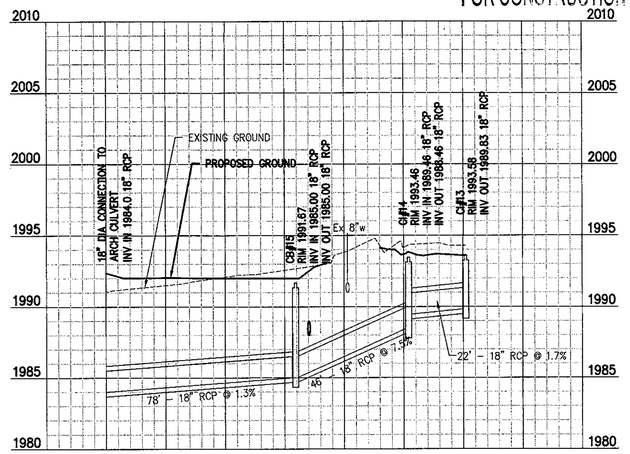
CI#4 TO FES#6



2008.00	2007.86	2009.17	2010.63	
2007.997	2007.857	2009.170	2010.628	

20+00 20+25 20+50 20+75 21+00

CI#13 TO FES#15



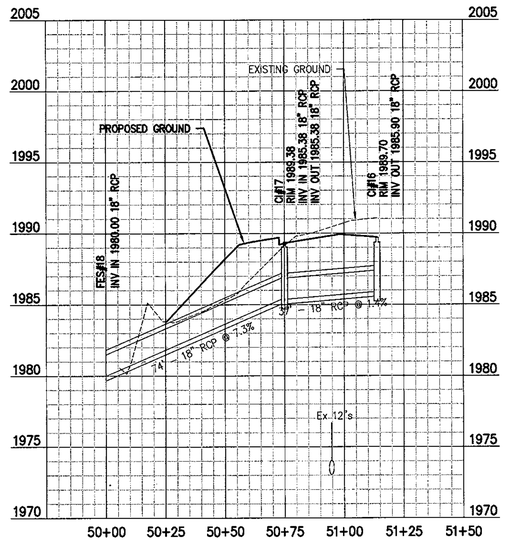
1991.09	1991.51	1992.09	1992.57	1993.83	1994.14	1994.29	
1991.088	1991.510	1992.091	1992.569	1993.826	1994.138	1994.289	

40+00 40+25 40+50 40+75 41+00 41+25 41+50 41+75

PIPE	TYPE	LENGTH	DRAINAGE AREA	RUNOFF COEFF.	TIME OF CONCENTRATION	50 YR RAINFALL INTENSITY	INLET FLOW	TOTAL FLOW	PIPE INVERT ELEVATION		SLOPE	MANNINGS ROUGHNESS	FULL FLOW PIPE SIZE	DESIGN CHOICE	FULL FLOW CAPACITY	DEPTH OF FLOW	VELOCITY	PERCENT FULL
									Upper	Lower								
		(FT)	"A"	"C"		"I"	(CFS)	(CFS)			"%"	"N"	(IN.)	(IN)	(cfs)	(ft)	(ft/s)	%
			(ACRES)															
P1	RCP	35	1.50	0.70	5.00	8.16	8.57	8.57	2007.25	2006.50	2.1	0.013	14.44	18	15.38	0.81	8.87	53.70
P2	RCP	39	0.18	0.95	5.00	8.16	1.40	9.96	2006.50	2000.00	16.7	0.013	10.40	18	42.89	0.39	9.30	26.30
P3	RCP	39	0.36	0.70	5.00	8.16	2.06	2.06	2006.00	2005.60	1.0	0.013	9.71	18	10.64	0.45	4.62	30.00
P4	RCP	55	0.18	0.95	5.00	8.16	1.40	3.45	2005.60	2003.00	4.7	0.013	8.85	18	22.84	0.39	9.30	26.30
P5	RCP	155	2.96	0.70	10.00	5.92	12.27	12.27	2003.00	1998.30	3.0	0.013	15.48	18	18.29	0.90	11.05	60.20
P6	RCP	116	0.80	0.70	10.00	5.92	3.32	15.58	1998.30	1994.76	3.1	0.013	16.91	24	39.52	0.87	11.90	43.40
P7	RCP	115	3.46	0.50	10.00	5.92	10.24	25.82	1994.76	1990.53	3.7	0.013	19.74	24	43.39	1.11	14.44	55.40
P8	RCP	153	1.03	0.70	10.00	5.92	4.27	30.09	1990.53	1988.00	1.7	0.013	24.28	30	52.75	1.34	11.22	53.70
P9	RCP	14	0.50	0.95	10.00	5.92	2.81	32.90	1985.00	1983.00	14.3	0.013	16.76	30	155.04	0.78	25.08	31.30
P10	RCP	22	0.30	0.75	5.00	8.16	1.84	1.84	1989.83	1989.46	1.7	0.013	8.48	18	13.62	0.37	5.40	24.80
P11	RCP	46	0.13	0.95	5.00	8.16	1.01	2.84	1988.46	1985.00	7.5	0.013	7.55	18	28.81	0.32	10.37	21.20
P11a	RCP	78	0.04	0.95	5.00	8.16	0.31	3.15	1985.00	1984.00	1.3	0.013	10.93	18	11.89	0.53	5.71	35.00
P12	RCP	37	0.20	0.75	5.00	8.16	1.22	1.22	1985.90	1985.38	1.4	0.013	7.53	18	12.45	0.32	4.47	21.20
P13	RCP	74	0.16	0.95	5.00	8.16	1.24	2.46	1985.38	1980.00	7.3	0.013	7.20	18	28.32	0.30	9.85	19.90
P14	RCP	37	0.58	0.75	5.00	8.16	3.55	3.55	1979.68	1979.25	1.2	0.013	11.64	18	11.32	0.57	5.73	38.10
P15	RCP	41	0.14	0.95	5.00	8.16	1.09	4.63	1979.25	1978.00	3.0	0.013	10.74	18	18.34	0.52	8.60	34.40
P16	RCP	37	1.01	0.75	5.00	8.16	6.18	6.18	1977.41	1977.00	1.1	0.013	14.46	18	11.06	0.80	6.41	53.60
P17	RCP	41	0.14	0.95	5.00	8.16	1.09	7.27	1977.00	1976.00	2.4	0.013	13.25	18	16.41	0.69	9.09	46.30
P18	RCP	31	0.10	0.95	5.00	8.16	0.78	0.78	1976.27	1976.00	0.9	0.013	6.94	18	9.80	0.28	3.36	18.90
P19	RCP	31	0.14	0.95	5.00	8.16	1.09	1.86	1976.00	1975.00	3.2	0.013	7.54	18	18.87	0.32	6.78	21.20
P20	RCP	42	0.15	0.95	5.00	8.16	1.16	1.16	1975.16	1974.70	1.1	0.013	7.74	18	10.99	0.33	4.05	21.90
P21	RCP	26	0.28	0.95	5.00	8.16	2.17	3.33	1974.70	1972.20	9.6	0.013	7.65	18	32.57	0.32	11.86	21.60
P22	RCP	30	16.80	0.50	10.00	6.50	54.60	54.60	1973.00	1971.86	3.8	0.013	25.98	30	79.96	1.52	17.53	60.60
P23	RCP	22	0.10	0.95	10.00	6.50	0.62	0.62	1976.34	1976.03	1.4	0.013	5.83	18	12.47	0.23	3.66	15.20
P24	RCP	29	0.10	0.95	10.00	6.50	0.62	1.24	1976.03	1971.86	14.4	0.013	4.89	18	39.83	0.18	10.18	12.10
P25	RCP	126	0.00	0.50	10.00	6.50	0.00	55.84	1971.86	1970.47	1.1	0.013	33.03	36	70.06	2.03	10.99	67.60
P26	RCP	52	0.13	0.95	10.00	6.50	0.80	0.80	1975.00	1970.47	8.7	0.013	4.57	18	31.00	0.17	7.49	11.10
P27	RCP	60	0.00	0.75	10.00	6.50	0.00	56.64	1970.47	1969.81	1.1	0.013	33.23	36	69.96	2.05	11.02	68.30
P28	RCP	108	2.36	0.75	10.00	6.50	11.51	11.51	1974.00	1972.87	1.0	0.013	18.45	24	23.14	1.01	7.23	50.50
P29	RCP	82	0.25	0.95	10.00	6.50	1.54	1.54	1979.50	1972.87	8.1	0.013	5.92	18	29.87	0.23	8.89	15.40
P30	RCP	49	0.10	0.95	10.00	6.50	0.62	13.67	1972.87	1972.38	1.0	0.013	19.85	24	22.62	1.12	7.54	56.10
P30a	RCP	56	0.56	0.75	10.00	6.50	2.73	16.40	1972.38	1969.81	4.6	0.013	15.97	24	48.46	0.80	13.94	40.10
P31	RCP	102	0.00	0.50	10.00	6.50	0.00	73.03	1969.81	1964.50	5.2	0.013	27.31	36	152.19	1.46	21.30	48.80
P32	RCP	36	0.20	0.95	5.00	8.16	1.55	1.55	1975.11	1974.54	1.6	0.013	8.05	18	13.22	0.35	5.03	23.10
P33	RCP	25	0.20	0.95	5.00	8.16	1.55	3.10	1974.54	1972.20	9.4	0.013	7.48	18	32.14	0.31	11.52	21.00

Note : Invert Elevations are based on existing survey information and location. Field adjustments may be necessary to accommodate existing conditions and inverts maybe adjusted with the engineers approval.

CI#16 TO FES#18



1983.82	1985.33	1988.16	1990.72	
1983.825	1985.327	1988.163	1990.724	

50+00 50+25 50+50 50+75 51+00 51+25

0 15' 30' 60'

SCALE: 1" = 30'-0"

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 5/29/14 GABRIEL S. QUESNBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS

STORM DRAIN PROFILES

CITY OF ASHEVILLE, NORTH CAROLINA

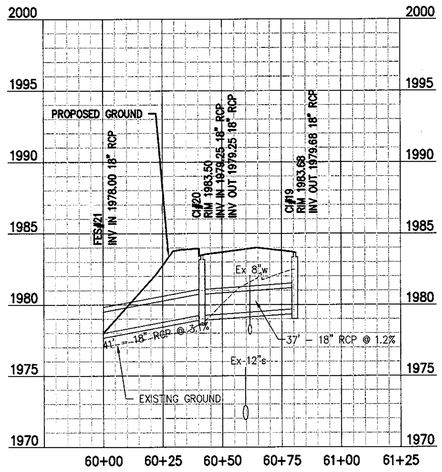
Vertical Scale: 1" = 5'

Horizontal Scale: 1" = 30'

Commission Number: 3267

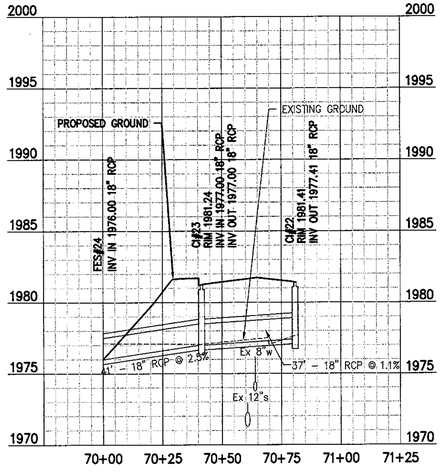
Sheet No.: C6K

CI#19 TO FES#21



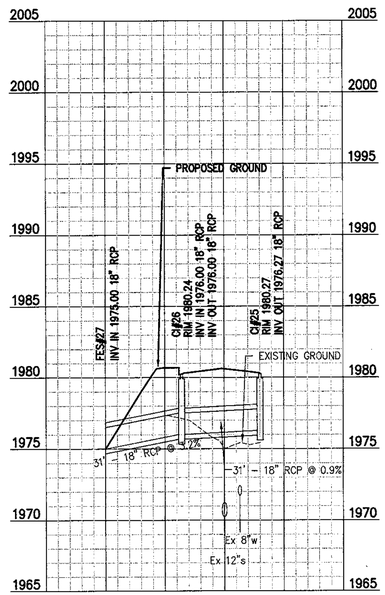
60+00	60+25	60+50	60+75	61+00	61+25
1977.04 / 1977.037	1977.92 / 1977.915	1980.05 / 1980.051	1982.23 / 1982.230		

CI#22 TO FES#24



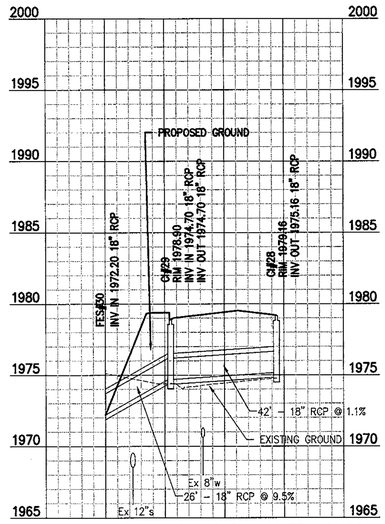
70+00	70+25	70+50	70+75	71+00	71+25
1977.13 / 1977.127	1977.09 / 1977.085	1977.20 / 1977.204	1977.34 / 1977.338		

CI#25 TO FES#27



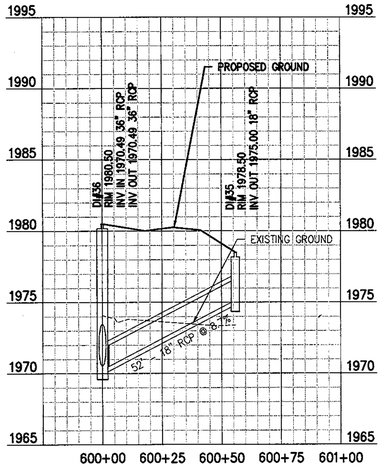
80+00	80+25	80+50	80+75
		1975.08 / 1975.079	

CB#28 TO FES#30



90+00	90+25	90+50	90+75
1975.12 / 1975.122	1974.39 / 1974.394	1974.44 / 1974.437	

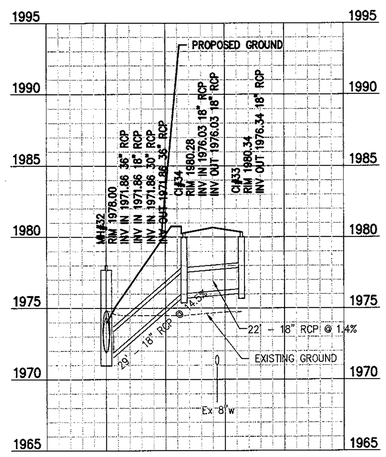
DI#35 TO DI#36



600+00	600+25	600+50	600+75	601+00
1974.07 / 1974.069	1973.63 / 1973.629	1973.35 / 1973.346		

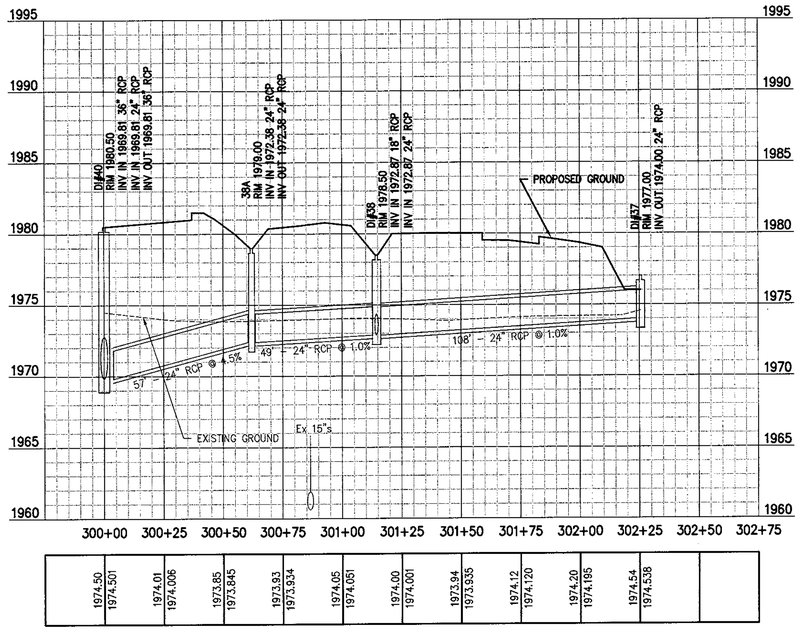
FOR CONSTRUCTION

CI#33 TO MH#32



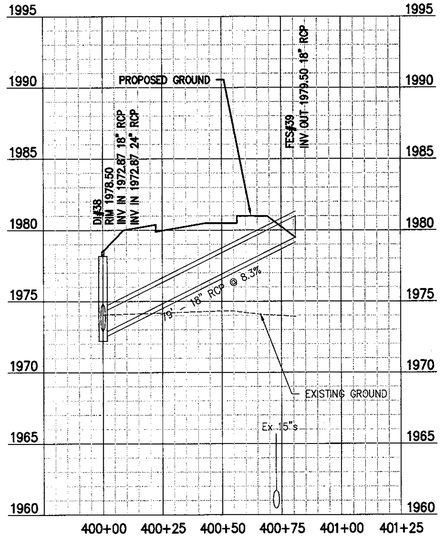
200+00	200+25	200+50	200+75
1974.79 / 1974.792	1974.48 / 1974.477	1974.72 / 1974.718	

DI#37 TO DI#40



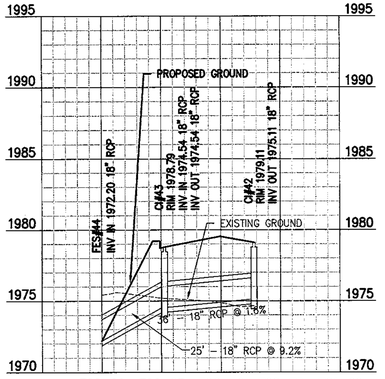
300+00	300+25	300+50	300+75	301+00	301+25	301+50	301+75	302+00	302+25	302+50	302+75
1974.50 / 1974.501	1974.01 / 1974.006	1973.85 / 1973.845	1973.93 / 1973.934	1974.05 / 1974.051	1974.00 / 1974.001	1973.94 / 1973.935	1974.12 / 1974.120	1974.20 / 1974.165	1974.54 / 1974.538		

FES#39 TO DI#38



400+00	400+25	400+50	400+75	401+00	401+25
1974.05 / 1974.054	1974.18 / 1974.185	1974.31 / 1974.312	1974.00 / 1973.998		

CI#42 TO FES#44



700+00	700+25	700+50	700+75
1975.43 / 1975.432	1975.21 / 1975.207	1974.87 / 1974.872	

0 15' 30' 60'

SCALE: 1" = 30'-0"

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014

Drawn By: HPO

Designed By: HPO

Checked By: GSQ

Date: 5/27/2014

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

STORM DRAIN PROFILES

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'

Horizontal Scale: 1" = 30'

Commission Number: 3267

Sheet No.: C6L

CITY OF ASHEVILLE PROJECT #	WPFY-12-13-068
EASEMENT	N/A
ESTOPPEL AGREEMENT	N/A

FOR CONSTRUCTION

STREET TREES PLANTED AT 36' SPACING TYPICAL

18" CURB AND GUTTER TO SIDEWALK

EXISTING 10" MAIN WITHIN EMMA ROAD

PLUG 10" MAIN AND ABANDON LINE THRU COUNTY PARCEL

EXISTING 16" MAIN WITHIN EMMA ROAD

10" TAP AND GATE VALVE ON EXISTING 16" MAIN WITHIN EMMA ROAD. CUT EXISTING 10" WATER MAIN INSTALL 90° BEND AND ONE STICK OF 10" PIPE. CONNECT BEND TO 10" GATE VALVE, AND STICK OF 10" PIPE TO EXISTING 10" WATERLINE.

INSET FOR CONTINUATION OF SHEET BELOW

STREET LIGHT TYP

SEE INSET THIS SHEET FOR CONTINUATION

EXISTING WATER VALVES TO REMAIN

PROPOSED R/W

24"X 24" CUT IN COUPLING WITH 45° ELBOW

24"X 24" CUT IN COUPLING WITH 45° ELBOW

EXISTING 24" WATER MAIN TO BE PLUGGED AFTER NEW LINE PLACED IN SERVICE.

PROPOSED R/W

202LF OF 24" DIP CLASS 350

EMMA ROAD

24" X 24" X 12" TEE
24" BUTTERFLY VALVE WEST
24 X 16 REDUCER
12" BUTTERFLY VALVE SOUTH

PROPOSED FIRE HYDRANT

PROPOSED R/W

EXISTING FIRE HYDRANT TO BE REMOVED

PROPOSED R/W

EXISTING 10" WATER LINE TO BE PLUGGED AND ABANDONED

164 LF OF 16" DIP CLASS 350

EXISTING WALL MAINTAIN MIN. 6 FOOT CLEARANCE.

16" 22° ELBOW RESTRAINED JOINT SEE STD DETAIL C 11A W.22

EXISTING 10" WATER MAIN TO BE ABANDONED

NCDOT R/W

TIE TO EXISTING 16" WATERMAIN WITH RESTRAINED COUPLING. W.22. TIE IN WORK TO BE CARRIED OUT AT NIGHT UNLESS DIRECTED OTHERWISE AT PRECONSTRUCTION MEETING.

PROPOSED R/W

EXISTING PROP LINE

EXISTING WATER SERVICE TO BE ABANDONED

EXIST. WATER LINE EASEMENT SEE DEED BOOK 1262, PAGE 43

CRAVEN STREET

PI: 14+48.28

SSMH
NEW RIM 1980
EX. RIM 1975.5
RAISE 4.5 FEET

PROPOSED GAS MAIN BY PSNC

EXISTING 24" BUTTERFLY VALVE TO BE REMOVED AND GIVEN TO WATER MAINTENANCE DEPARTMENT

PROPOSED R/W

SSMH
NEW RIM 1979.37
EX. RIM 1974.9
RAISE 4.47 FEET

EXISTING WATER SERVICE TO BE ABANDONED

PC: 17+68.01

MAINTAIN 5 FOOT HORIZONTAL CLEARANCE FROM OUTSIDE EDGE OF MANHOLE.

MATCHLINE SHEET 7B STATION 18+00

STA 15+66
WATER CROSSES OVER 8" SEWER

EXIST. WATER LINE EASEMENT SEE DEED BOOK 1262, PAGE 43

955 LF 12" DIP WATER MAIN FROM TEE TO NBB SERVICE CONNECTION

NEW FIRE HYDRANT ASSEMBLY

EXISTING R/W

SSMH
NEW RIM 1979.71
EX. RIM 1974.1
RAISE 5.61 FEET

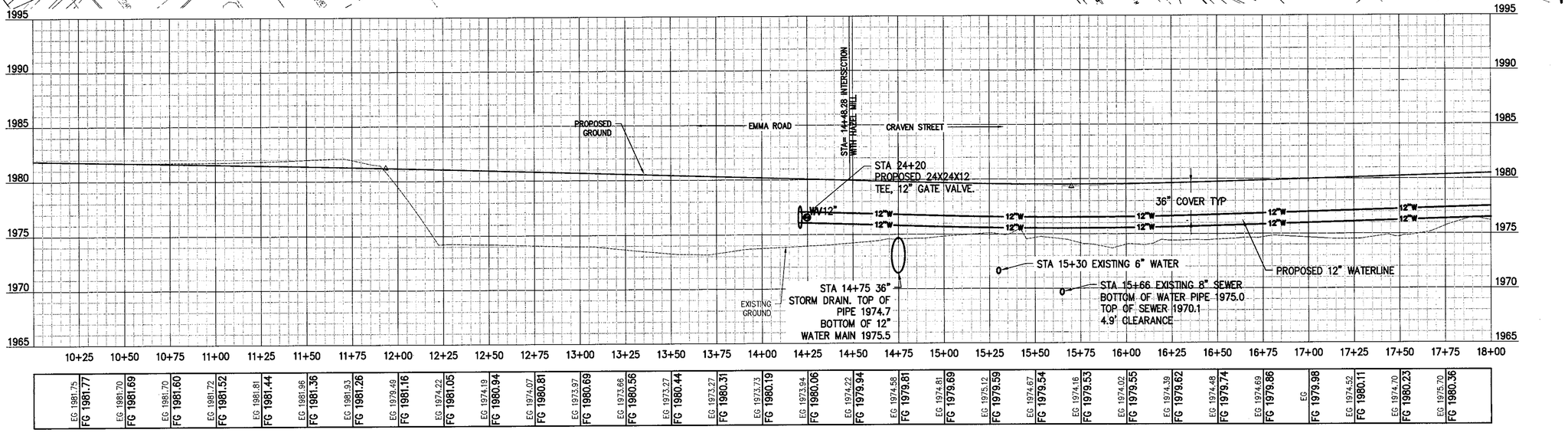
SSMH
NEW RIM 1979.46
EX. RIM 1974.1
RAISE 5.36 FEET

EXISTING R/W

HAZEL MILL ROAD

ARKWAY VEMENT

0 15' 30' 60'
SCALE: 1" = 30'-0"



Revisions	Date
FINAL TRC SUBMITTAL	
WATER SUBMITTAL REVIEW TO COA	
SECOND SUBMITTAL REVIEW TO COA	5.27.14
RE: BID SET	

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig — CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

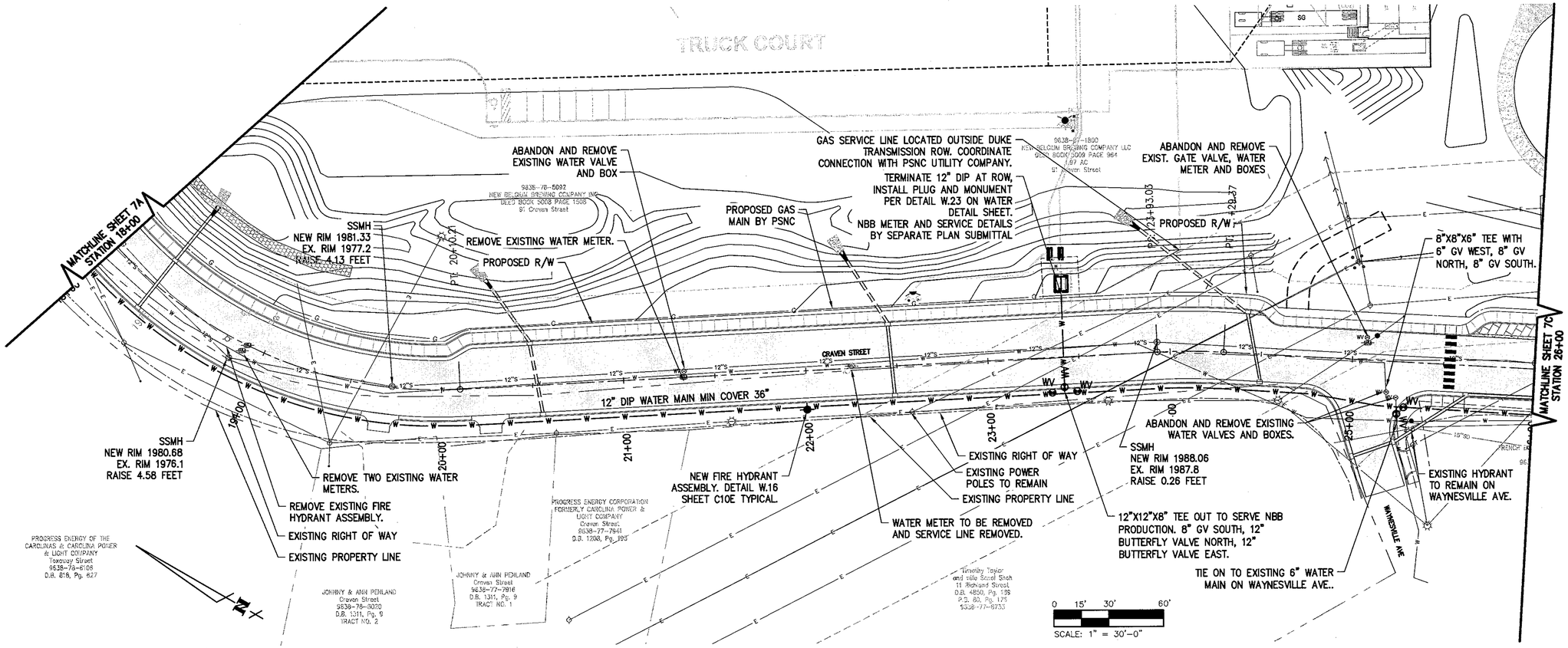
CRAVEN STREET IMPROVEMENTS

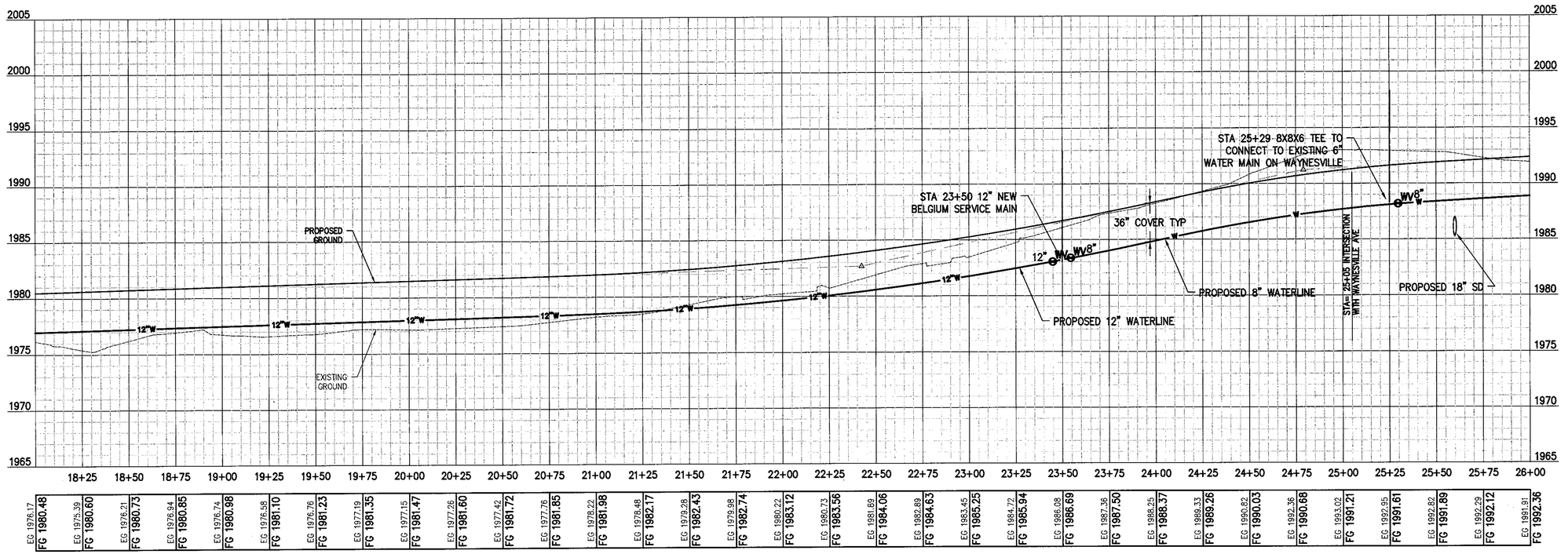
CRAVEN STREET IMPROVEMENTS WATERLINE PLAN AND PROFILE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C7A

FOR CONSTRUCTION





NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 5/27/2014 BRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
WATER SUBMITTAL REVIEW TO COA	
SECOND SUBMITTAL REVIEW TO COA	
RE BID SET	5.27.14

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

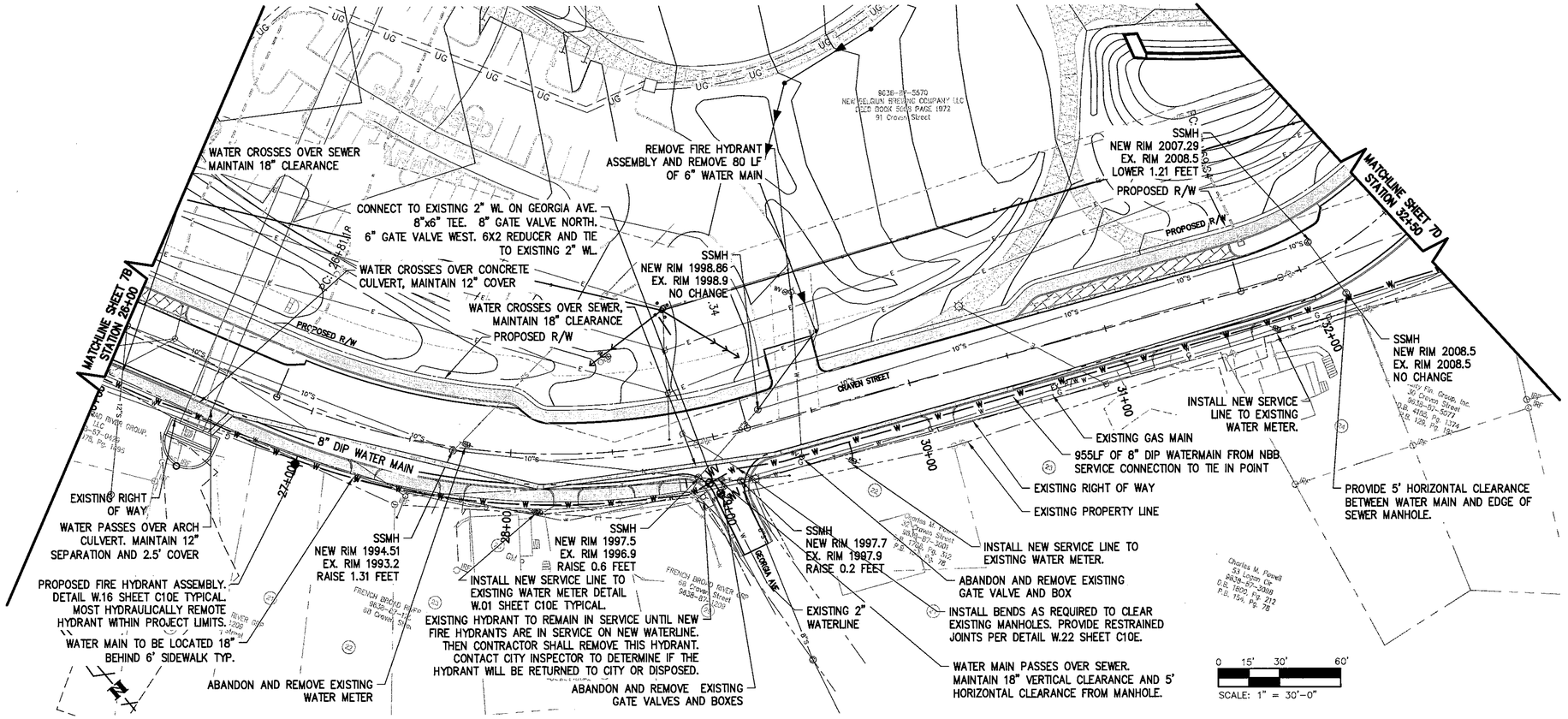
CRAVEN STREET IMPROVEMENTS

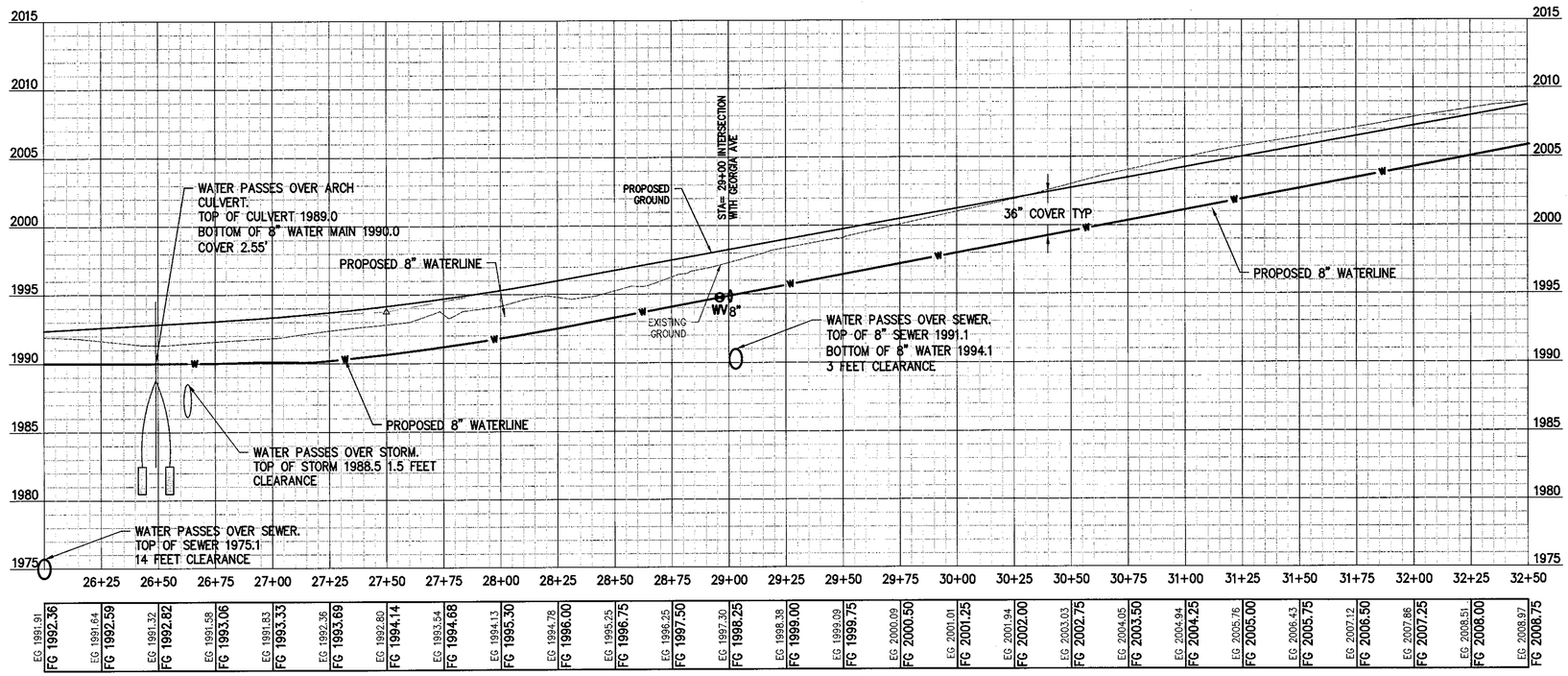
CRAVEN STREET IMPROVEMENTS WATERLINE PLAN AND PROFILE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C7B

FOR CONSTRUCTION





SEAL 035195 ENGINEER GABRIEL S. QUESINBERRY NORTH CAROLINA

Revisions	Date
FINAL TRC SUBMITTAL	
WATER SUBMITTAL REVIEW TO COA	
SECOND SUBMITTAL REVIEW TO COA	
RE BID SET	5.27.14

Issue Date: 5/27/2014
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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

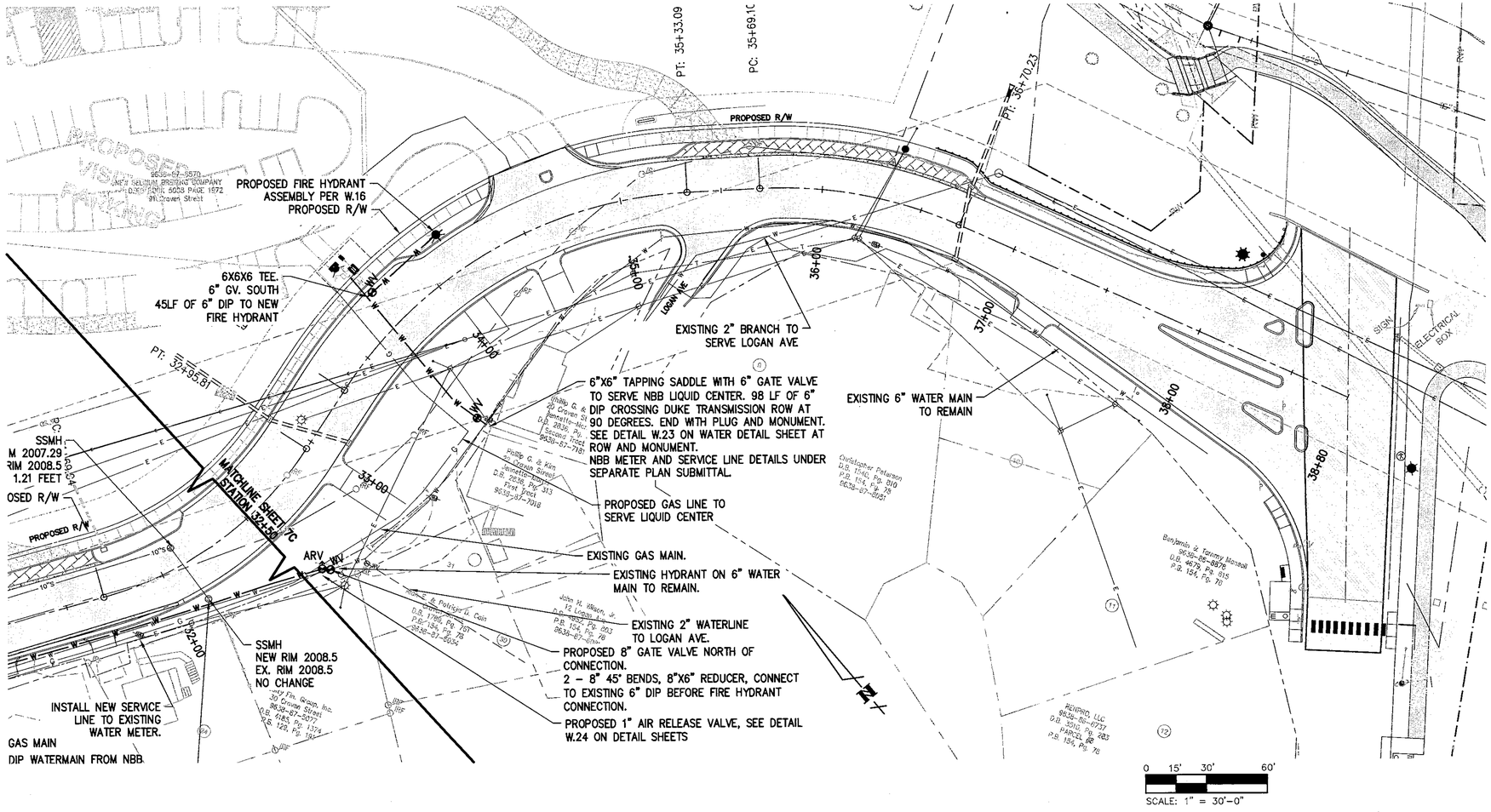
CRAVEN STREET IMPROVEMENTS

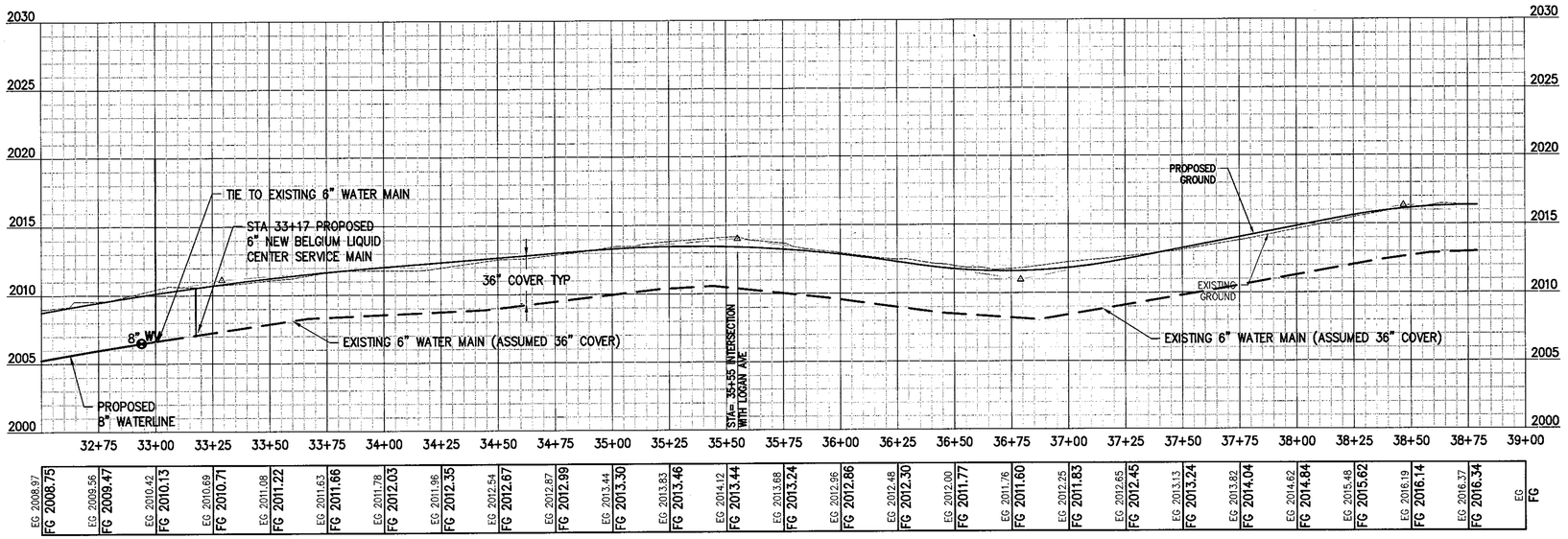
CRAVEN STREET IMPROVEMENTS WATERLINE PLAN AND PROFILE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C7C

FOR CONSTRUCTION





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Cole-Jenest & Stone

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GREGORY BRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
WATER SUBMITTAL REVIEW TO COA	
SECOND SUBMITTAL REVIEW TO COA	5.27.14
RE: BID SET	

Issue Date: 5/27/2014
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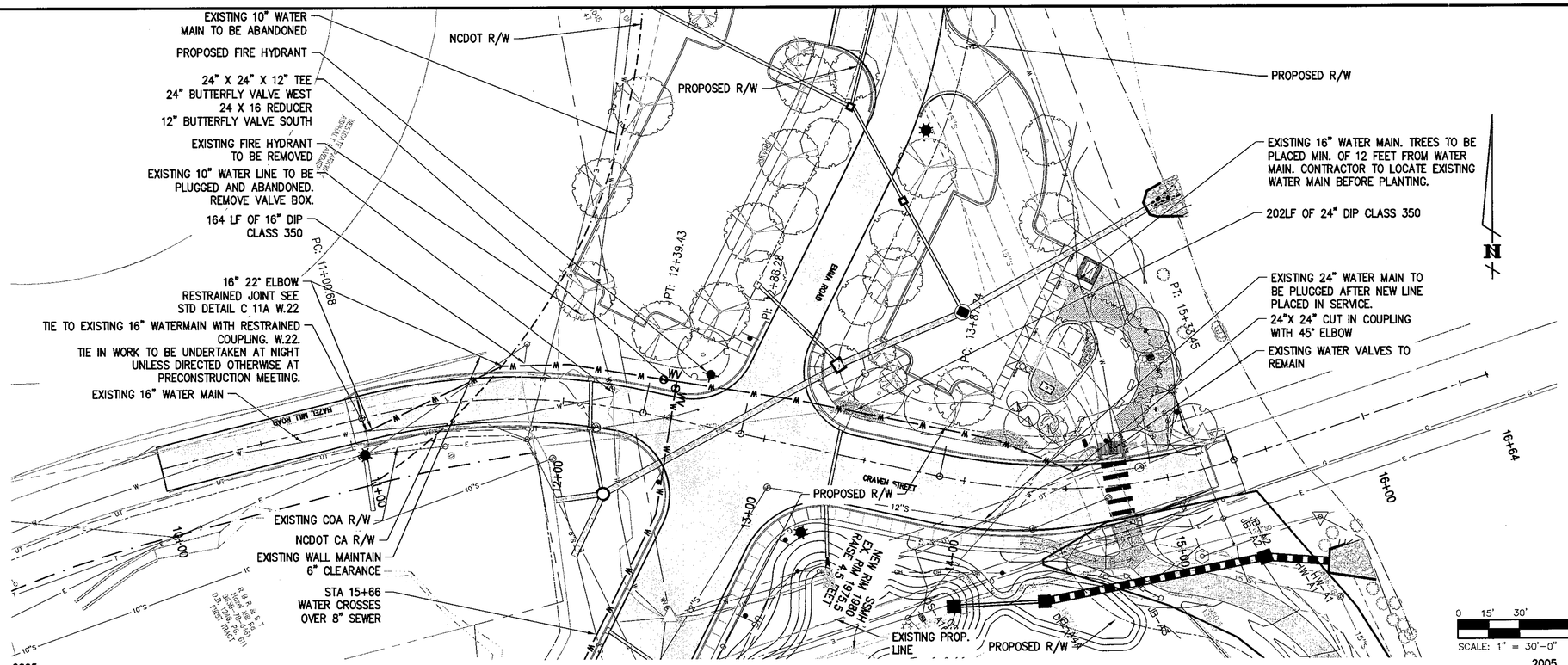
CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS WATERLINE PLAN AND PROFILE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 30'
Commission Number: 3267
Sheet No.: C7D

FOR CONSTRUCTION



NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 5/27/14 GABRIEL S. QUESINBERRY

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CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS WATERLINE PLAN AND PROFILE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
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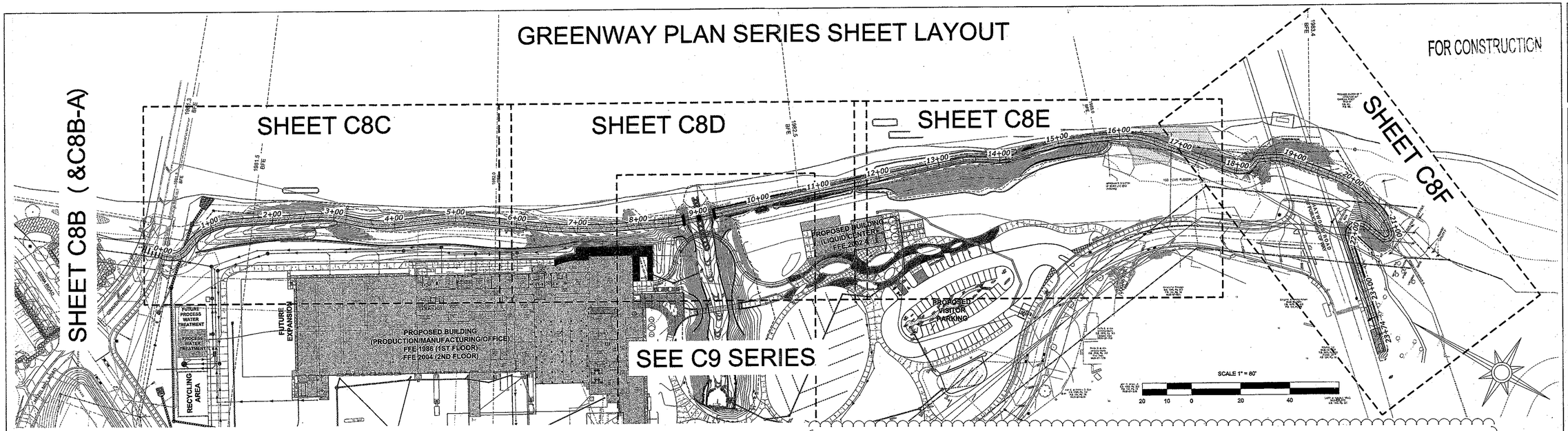
Commission Number: 3267
Sheet No.: C7E

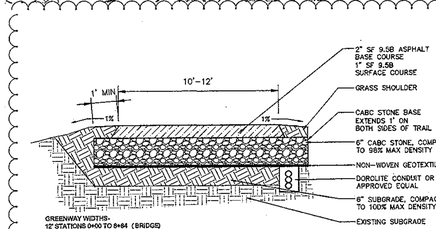
GREENWAY PLAN SERIES SHEET LAYOUT

FOR CONSTRUCTION



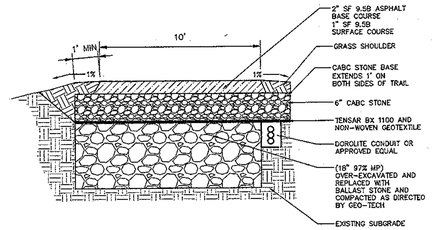
GREENWAY CONSTRUCTION NOTES:

1. TRAIL SHALL BE CONSTRUCTED PER PLANS AND ACCORDING TO ALL OTHER PERTINENT DETAILS AND SPECIFICATIONS.
2. CONTRACTOR SHALL CONFINE CONSTRUCTION ACTIVITY WITHIN LIMITS OF CONSTRUCTION.
3. CONTRACTOR SHALL RETAIN A P.L.S. TO STAKE CENTERLINE OF THE TRAIL AS SHOWN ON THE PLAN. THE TRAIL IS TO BE STAKED AT 50' INTERVALS WITH PT AND PC IN THE FIELD PRIOR TO CONSTRUCTION. STAKED CENTERLINE OF THE TRAIL IS TO BE APPROVED BY THE CITY OF ASHEVILLE & LANDSCAPE ARCHITECT.
4. ERECT TREE PROTECTION FENCE ALONG LIMIT OF CONSTRUCTION FOR INSPECTION BY THE CITY OF ASHEVILLE SITE INSPECTOR.
5. INSTALL REQUIRED EROSION CONTROL MEASURES PRIOR TO CONSTRUCTION.
6. ALL DISTURBED AREAS SHALL BE SEEDED OR RE-VEGETATED PER PLAN AND SPECIFICATIONS.
7. CONTRACTOR TO CALL FOR UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
8. ALL TRAILS, REGARDLESS OF WIDTH SHALL MAINTAIN A 12" WIDE GRASS SHOULDER WITH A 2% CROSS SLOPE. AN EXCEPTION TO THIS ARE EXTENDED GRAVEL SHOULDERS ADJACENT TO RETAINING WALLS - SEE PLAN FOR WALL LOCATIONS.
9. PROPOSED PAVEMENT SHALL MEET EXISTING PAVEMENT FLUSH.
10. SIDE SLOPES SHALL BE 3:1 MAXIMUM AND 2% MINIMUM SLOPE EXCEPT WHERE OTHERWISE NOTED.
11. GRADE SIDE SLOPES AND ADJACENT TERRAIN FOR POSITIVE DRAINAGE. ENSURE THAT THERE IS NO STANDING WATER ON THE UPHILL SIDE OF THE TRAIL. INSTALL DIVERSION DITCH AS NEEDED TO DIRECT WATER TO CULVERTS.
12. ADDITIONAL CULVERTS MAY BE ADDED AS NEEDED DURING CONSTRUCTION TO PREVENT EROSION AND SLICK SPOTS ON GREENWAY TRAIL BY CONTRACTOR.
13. DRAINAGE CULVERTS SHALL BE HDPE. RIVER ROCK EQUIVALENT TO A CLASS B RIP-RAP DISSIPATER WITH FILTER FABRIC SHALL BE INSTALLED AT THE PIPE OUT-FLOW. NO EXCESS FILTER FABRIC; SEE EROSION CONTROL PLAN.
14. BOULDERS UNEARTHED DURING GRADING ALONG THE GREENWAY CORRIDOR SHALL BE STOCKPILED AND RELOCATED ALONG THE GREENWAY BY THE CITY OF ASHEVILLE OR PROJECT LANDSCAPE ARCHITECT.
15. LARGE CONCRETE COLUMNS ALONG THE GREENWAY CORRIDOR SHALL BE STOCKPILED FOR RE-USE FOR BENCHES OR OTHER USES. ALL CONCRETE PIECES THAT ARE 3"-8" THICH AND RANGE IN SIZE FROM 2'-8' SQUARE SHALL BE STOCKPILED FOR USE AS A CAIRN SCULPTURE AT THE GREENWAY TRAILHEAD OR FOR OTHER USES.
16. TREES SHALL BE LIMBED UP A VERTICAL DISTANCE OF 9 FEET FROM THE FOREST FLOOR, WITHIN 5 FEET FROM THE OUTSIDE EDGE OF THE TRAIL. REMOVE DANGEROUS TREE LIMBS HANGING OVER TRAIL AS DIRECTED BY THE CITY OF ASHEVILLE OR PROJECT LANDSCAPE ARCHITECT. DEAD TREES THAT PRESENT A DANGER TO PEDESTRIANS UTILIZING THE TRAIL SHALL BE REMOVED DURING CONSTRUCTION. ALL TREES OVER 6" DBH TO BE REMOVED WILL REQUIRE APPROVAL FROM THE CITY OF ASHEVILLE OR PROJECT LANDSCAPE ARCHITECT.
17. REMOVE OR TREAT INVASIVE VINES FROM ALL TREES WITHIN 30' OF THE EDGE OF THE GREENWAY TRAIL ON BOTH SIDES AT MINIMUM 4 TIMES, ONCE EACH IN THE SPRING AND FALL.
18. REMOVE OR TREAT INVASIVE EXOTIC PLANTS ALONG THE GREENWAY CORRIDOR INCLUDING TREE OF HEAVEN, HONEYSUCKLE, ENGLISH IVY, JAPANESE KNOTWEED, PRIVET, AND PRINCESS TREE AT MINIMUM 4 TIMES, ONCE EACH IN THE SPRING AND FALL. INVASIVE EXOTIC PLANT REMOVAL SHALL BE CONDUCTD BY A CERTIFIED PESTICIDE APPLICATOR.
19. THE CONTRACTOR SHALL PROOF ROLL THE GREENWAY TRAIL PRIOR TO PLACEMENT OF CRUSHED STONE. THE TRAIL SHALL ALSO BE PROOF ROLLED PRIOR TO PAVING. A MINIMUM OF 97% COMPACTION TO A DEPTH OF 18" IS REQUIRED.
20. FINISHED PAVING SURFACE SHALL BE A SMOOTH AND PROPERLY COMPACTED PAVEMENT. FINISHED SURFACE COARSE TO BE APPLIED TO GREENWAY ONLY AFTER ALL CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.
21. ALL INTERSECTIONS WITH A ROAD SHALL HAVE A 6" CURB, A DRIVEWAY APRON OR HC RAMP, AND A CITY OF ASHEVILLE TRUNCATED DOME.
22. ALL TRAILS THAT INTERSECT WITH ROADS OR PARKING LOTS SHALL BE SECURED WITH STANDARD WOOD BOLLARDS AS SPECIFIED BY THE CITY OF ASHEVILLE. BOLLARDS SHOULD BE COLLAPSIBLE/REMOVABLE. SEE PLAN FOR BOLLARD LOCATIONS AND SPECIFICATIONS.
23. WHEN THE TRAIL INTERSECTS WITH A ROAD CROSSING THERE SHALL BE A 10' APRON (OR AS SPECIFIED ON THE PLAN) OF CONCRETE STARTING AT THE EDGE OF ROAD.
24. THE EDGES OF PAVED TRAILS SHALL HAVE A MINIMUM CLEARANCE ZONE OF 4' TO THE EDGE OF RAISED MANHOLES. WHERE MANHOLES ARE WITHIN THE PAVED TRAIL THEY SHOULD BE FLUSH WITH THE FINISHED TRAIL SURFACE AND NO CLOSER THAN 4" FROM THE EDGE OF THE PAVEMENT.
25. NO TREE PLANTINGS ARE ALLOWED WITHIN THE MSD EASEMENT.
26. THE CONTRACTOR SHALL ENSURE THAT ALL ACCESS POINTS LEADING TO THE TRAIL ARE POSTED WITH SIGNS DURING CONSTRUCTION THAT READ, "TRAIL CLOSED FOR CONSTRUCTION".
27. THE DOWNHILL SIDE OF THE GREENWAY SHOULD NOT EXCEED A 30 INCH ELEVATION CHANGE WITHIN 36 INCHES HORIZONTAL FROM THE ASPHALT SURFACE. SPECIAL CONSIDERATION SHOULD BE TAKEN IN ALL AREAS ADJACENT TO RAILING SO THAT FINE GRADING ENSURES THESE CONDITIONS ARE MET. IF THESE CONDITIONS CAN NOT BE MET, RAILING SHOULD BE EXTENDED (AS REQUIRED BY NORTH CAROLINA BUILDING CODE, SECTION 1013) UNTIL THE POINT THAT THESE CONDITIONS ARE MET.
28. MAXIMUM LONGITUDINAL SLOPE OF THE GREENWAY CANNOT EXCEED 4.99%.



TYPICAL GREENWAY TRAIL CROSS SECTION

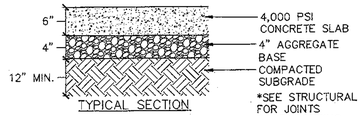
NOT TO SCALE



TO BE USED FOR WET AREAS INCLUDING (BUT NOT LIMITED TO) STATIONS 16+12 THROUGH 17+85 TO BE OVEREXCAVATED 18" AND TENSAR BX 1100 USED

GREENWAY CROSS SECTION FOR WET SOILS

NOT TO SCALE



CONCRETE, TYP.
CROSS SECTION

NOT TO SCALE

GREENWAY STORM DRAINAGE PIPE SCHEDULE

PIPE #	SIZE	LENGTH	INLET STRUCTURE	START INVERT	OUTLET STRUCTURE	END INVERT	SLOPE	NOTES
G1	15"Dia.	30 LF	FES	1967.5	FES	1967.0	2.0%	
G2	18"Dia.	27 LF	HEADWALL	1965.0	HEADWALL	1964.5	2.0%	NCDOT STD. 838.08
G3	18"Dia.	20 LF	MSE	19632.8	MSE	1962.4	2.0%	NCDOT STD. 838.08
G4	18"Dia.	20 LF	FES	1967.7	HEADWALL	1967.2	2.5%	
G5	18"Dia.	30 LF	FES	1971.5	HEADWALL	1970.9	2.0%	NCDOT STD. 838.08
G6	18"Dia.	50 LF	G-DI 1	INV IN: 2002 INV OUT: 2001	HEADWALL	1995.0	12.0%	NCDOT STD. 838.08 COA STD 8.03

NOTE: ALL PIPES TO BE HIGH DENSITY POLYETHELENE (HDPE) UNLESS OTHERWISE SPECIFIED

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions		Date
1	MSD ADJUSTMENT	5/9/14
2	SHOULDER ADJUSTMENT	5/23/14
3	RE-BID	5/27/14

Issue Date: 12/06/2013
Drawn By: FG
Designed By: FG
CHECKED BY: DT
Date: 12/06/2013

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Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS
GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 1"=80'
Commission Number: 3267
Sheet No.: C8A

GREEN ROOF PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size*	Comments
Perennials/Forbs					
ALC	Allium cernuum	Nodding onion	15	2" Cont. or bulb	6"-8" O.C.
ALP	Aster alpinus	Dwarf aster	10	2" Cont.	6"-8" O.C.
LYC	Lycopodiopsida sp. (local specimens ok)	Clubmoss	25	2" Cont.**	See Detail**
SAL	Sisyrinchium angustifolium 'Lucerne	Lucerne blue eyed grass	20	2" Cont.	6"-8" O.C.
SAP	Sedum album var. purpureum	Purple sedum	30	2" Cont.	6"-8" O.C.
SFW	Sedum floriferum 'Weihenstephaner Gold'	Gold sedum	30	2" Cont.	6"-8" O.C.
SPU	Sedum pulchellum	Seastar sedum	30	2" Cont.	6"-8" O.C.
SRB	Sedum reflexum 'Blue Spruce'	Blue spruce sedum	30	2" Cont.	6"-8" O.C.
STL	Sedum ternatum 'Larinem Park'	Stonecrop sedum	30	2" Cont.	6"-8" O.C.
SVJ	Sedum 'Vera Jamison'	Vera Jamison sedum	20	2" Cont.	6"-8" O.C.
VIV	Sempervivum spp. (mixed species)	Hens and chicks, houseleeks	15	2" Cont.	6" O.C.

Notes:

** Container depth to not exceed 4" (max. green roof media)*

*** Clubmoss to be planted next to Sempervivum spp. (VIV) to help stabilize and anchor plantings along peak of roof (Group 1 only). Material can be locally harvested (does not need to be nursery grown).*

Plants can be acquired from Emory Knoll Ferms 410-452-5880 and North Creek Nurseries (610) 255-0100.

TRAILHEAD PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
CL	Chasmanthium latifolium	River oats	520	Plug	18" O.C.
SH	Sporobolus heterolepis	Prairie dropseed	645	Plug	15" O.C.
BG	Bouteloua gracilis 'Blonde Ambition'	Blue gama grass	154	1 Gallon	Spacing as shown
Shrubs					
AC	Amelanchier arborea	Common Serviceberry	3	6' Hei, Multi-stem	Spacing as shown
Trees					
BN	Betula nigra 'Heritage'	River birch	4	10' Hei., 3 or 5 stem	Spacing as shown
Seed Mix					
GRASS	Creeping Red Fescue and Kentucky Bluegrass (equal parts)		30 lbs/acre		Permanent Seed Mix
SOD			795 ft_2		

FOR CONSTRUCTION

TRAILHEAD PARKING
STAND UP CURB (SEE CIVIL)
SOD
ADA ACCESSIBLE PICNIC TABLE (MUST HAVE 3' CLEARING ON THREE SIDES)
MULCH ALL BEDS, TYP.
PLANTINGS FOR BUFFER REQUIREMENTS (SEE SHEET CF5)
METAL EDGING ALONG PATH (EXCEPT FOR EDGE ALONG PAVERS)
POROUS PAVERS IN 45° HERRINGBONE PATTERN WITH SOLDIER COURSE EDGE ALONG PARKING BORDER
PLANTING AREA FOR BUFFER REQUIREMENTS (SEE SHEET C5F)
645-SH
HANDICAP PARKING SIGN, TYP. (SEE SHEET C10B)
520-CL
PROPOSED SIDEWALK ACCESS
PAVERS & EDGING, TYP.
CONCRETE EDGING WITH CONTROL JOINTS, TYP.
DOGIPOT PET LITTER STATION
TRASH AND RECYCLING RECEPTACLES ON GRAVEL BASE
32-BG
SOD
CONCRETE SEAT WALL, TYP. (12 / C8Q)
GRASS SEED MIX ON ALL DISTURBED AREAS NOT PLANTED OR MULCHED, TYP.
PLANTING BED, TYP.
ALL PLANTING BEDS TO BE MULCHED, TYP.
GRASS SEED MIX
BIKE REPAIR STATION (11 / C8Q)
CLEARANCE AREA FOR BIKE REPAIR STATION
3-AC
67-BG
55-BG
1' HIGH GRASS BERMS FOR BUFFER REQUIREMENTS
CONCRETE SIDEWALK- 6' WIDE
EXISTING WATER DEPT. ABOVE GROUND ENCLOSURE
TRUNCATED DOME (10 / C8Q)
MONUMENT (5 / C8Q)
SEWER LINE
WATER LINE - W
SEWER EASEMENT (20')
SEWER EASEMENT (20')
HIGH VISIBILITY CROSSWALK
EXISTING GUARD RAIL (RE-ALIGN COLD ROLL AND POSTS)
SIDEWALK ALIGNMENT
TRUNCATED DOME, TYP. (10 / C8Q)
APPROX. 45' SPLIT LOCUST "WORM STYLE" FENCING 42" HEIGHT
ASPHALT GREENWAY (12' WIDE) BEGINS
MULCH BED

(1 / C80) CONCRETE PAVERS, TYP.- (SAND BED USED INSTEAD OF CONCRETE)
DECOMPOSED GRANITE, COMPACTED TO ADA STANDARDS
(2 / C80) 3 BIKE RACKS SET INTO 12'X7.5' CONCRETE PAD
(3 / C80) CONCRETE BENCH, TYP.
(1 / C80) CONCRETE PAVERS, DETAIL FOR EDGING
(7 / C8P) KIOSK WITH GREEN ROOF
(4 / C80) CAIRN SCULPTURE (APPROX. 4'x4'x6'), DONE BY LOCAL ARTIST FROM RECYCLED CONCRETE, TO BE LOCATED ON SITE WITH LANDSCAPE ARCHITECT
3" FLAGSTONE SET IN SAND- WITH PEA GRAVEL IN BETWEEN JOINTS
RIVER ROCK WITH METAL EDGING - FILL VOIDS WITH GRANITE FINES OVER FILTER FABRIC TO 3" DEPTH
MULCH PLANTING BED
4-BN
(6 / C80) MONUMENT WITH SIGN
GRASS SEED MIX, TYP.
SHOVEL EDGING, TYP.
(8 / C8P) STANDARD CITY OF ASHEVILLE WOODEN REMOVABLE BOLLARD WITH ATTACHMENT
12' CONCRETE GREENWAY TRAIL, TYP.
STOP SIGN
(5 / C80) MONUMENT
PEDESTRIAN STOP SIGN
(8 / C8P) STANDARD CITY OF ASHEVILLE WOODEN REMOVABLE BOLLARD WITH ATTACHMENT
(5 / C80) MONUMENT WITH SIGN

SCALE 1" = 10'
10 5 0 10 20 30

SEATING & OVERLOOK AREAS PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
SEATING AREA					
LN	Lysimachia nummularia 'Aurea'	Loosestrife, Gold Moneywort	14	Plug	18" O.C.
CA	Carex appalachia	Appalachian Sedge	24	Plug	12" O.C.
OVERLOOK AREA					
LN	Lysimachia nummularia 'Aurea'	Loosestrife, Gold Moneywort	31	Plug	18" O.C.
CA	Carex appalachia	Appalachian Sedge	45	Plug	12" O.C.

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions	Date
3 RE-BID	5/27/14

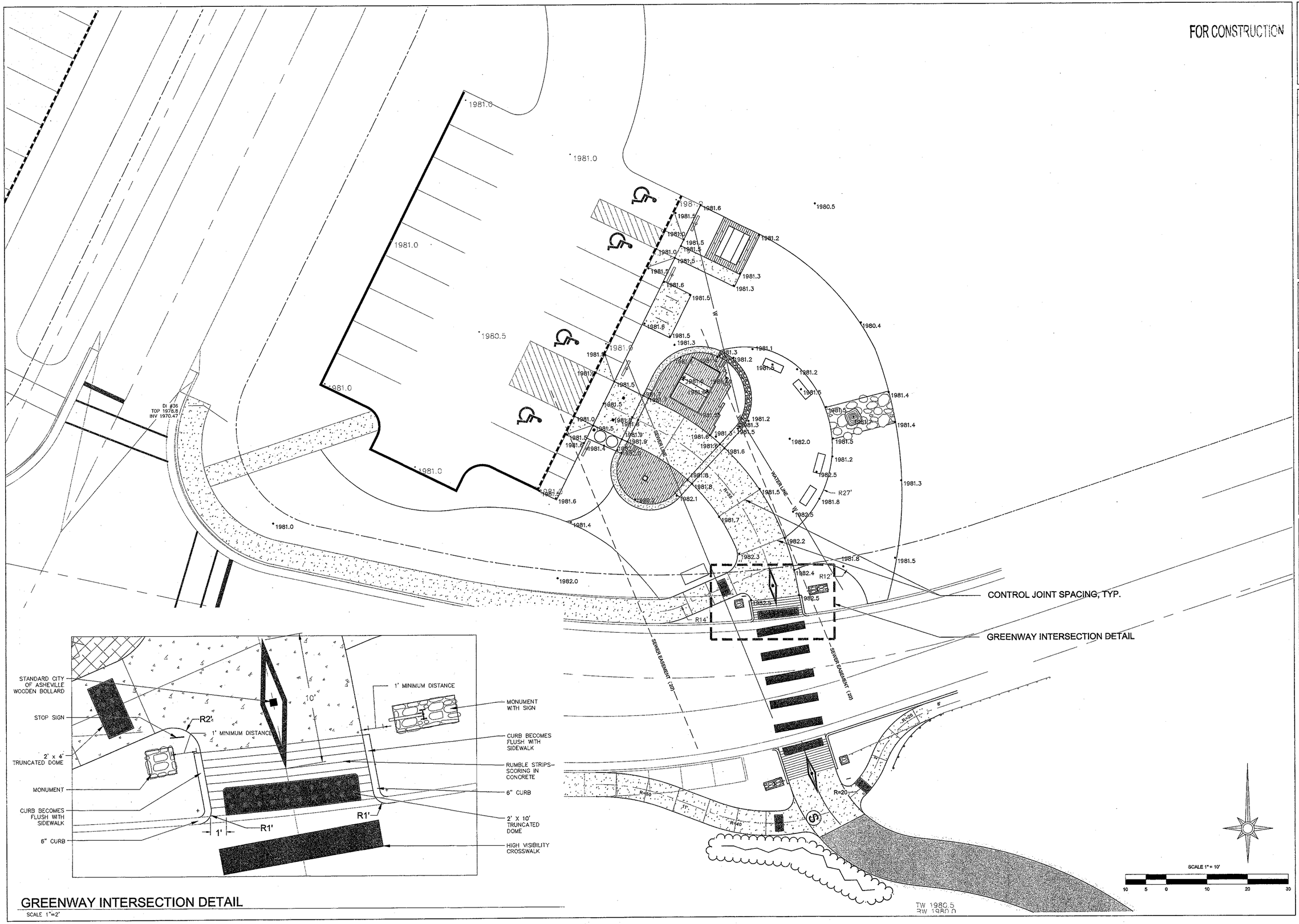
Issue Date: 08/19/2013
Drawn By: EE
Designed By: EE
CHECKED BY: DT
Date: 11/8/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX SUSTAINABLE
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS
TRAILHEAD GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 10'
Commission Number: 3267
Sheet No.: C8B

FOR CONSTRUCTION



GREENWAY INTERSECTION DETAIL

SCALE 1"=2'

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions	Date
3 RE-BID	5/27/14

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Designed By: EE

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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

TRAILHEAD GREENWAY PLAN SERIES

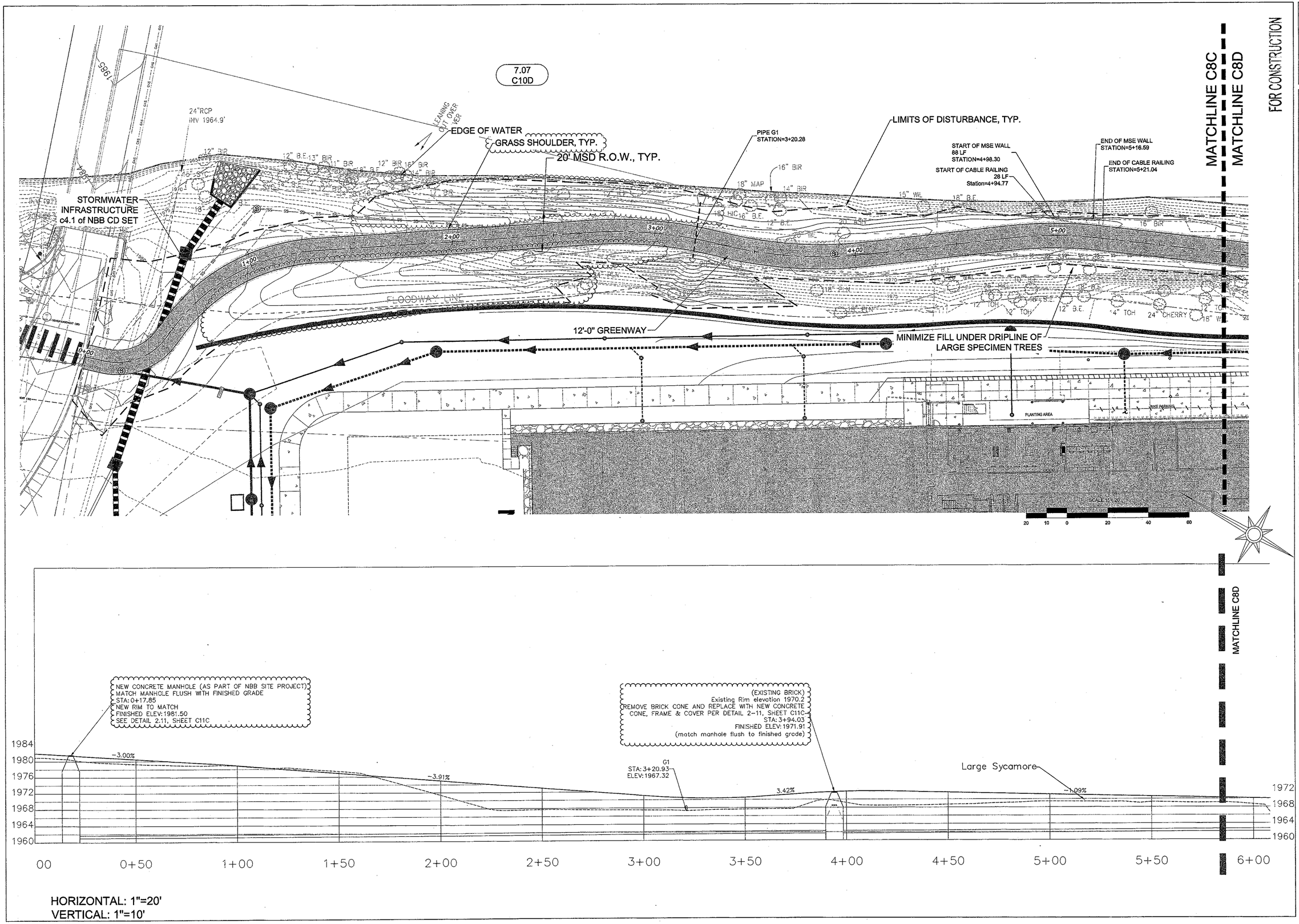
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A

Horizontal Scale: 10'

Commission Number: 3267

Sheet No.: C8B-A



FOR CONSTRUCTION

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions		Date
1	MSD ADJUSTMENT	5/9/14
2	SHOULDER ADJUSTMENT	5/23/14
3	RE-BID	5/27/14

Issue Date: 12/06/2013
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Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS
GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 10'
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C8C

BROAD

MATCHLINE C8C

MATCHLINE C8D

BEGIN 10' GREENWAY SECTION AFTER BRIDGE

BRIDGE (S1, S2, S3)

TRANSITION FROM 12'-0" WIDE GREENWAY TRAIL
STREAM RESTORATION GRADING (C9 SERIES)

BEGIN SEWER REPLACEMENT PROJECT. SEE C8R

CABLE RAILING
8 LF
STATION=8+64.73

P-MANHOLE
(SEE C8R)
STATION=8+52.21

P-MANHOLE
STATION=7+89.91

PIPE G2
STATION=6+15.52

20' MSD R.O.W.

AREA NEEDS TO BE COORDINATED WITH NBB SITE

PLANTING AREA

CABLE RAILING
8 LF
STATION=8+68.16

BEGINNING OF CABLE RAILING
273 LF
STATION=9+26.37

BRIDGE ABUTMENT
STATION=9+26.90

M.S.E.
WALL SYSTEM
(SEE GEOTECH)

14
C8Q
SEATING AREA

PIPE G2
15" HDPE
STATION=11+64.40

SOIL NAIL WALL SYSTEM
(SEE GEOTECH)

LIMITS OF DISTURBANCE, TYP.

STREAM RESTORATION GRADING (C9 SERIES)

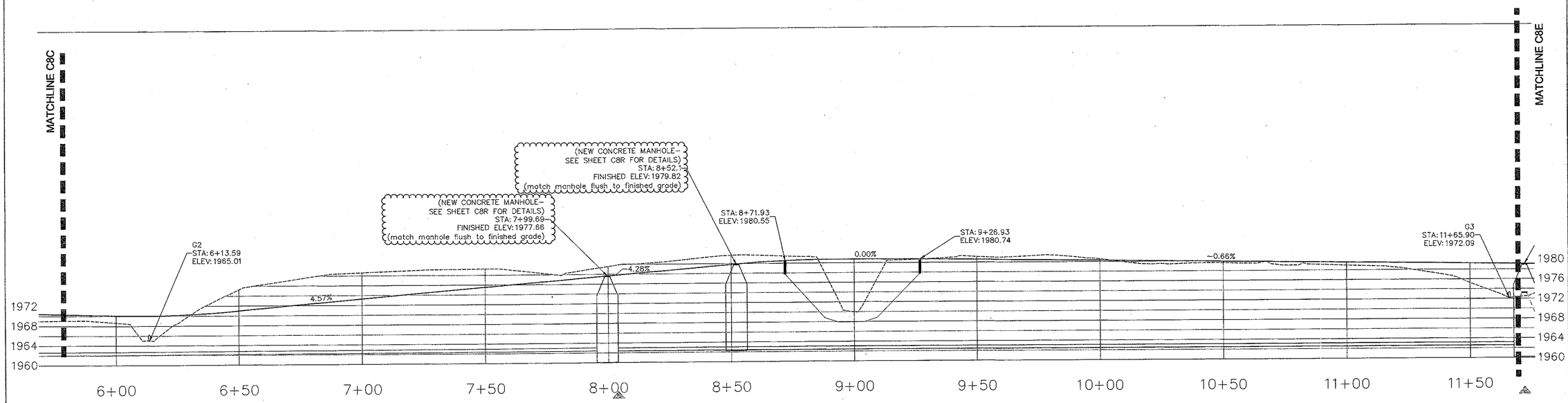
SOIL NAIL
WALL
SHIFTED

CABLE RAILING
35 LF
STATION=14+50.25

PROPOSED
(LIQUID
FFE 2002.4

SCALE 1" = 20'

FOR CONSTRUCTION



HORIZONTAL: 1"=20'
VERTICAL: 1"=10'

SEE CR8 & C11C
FOR SEWERLINE REPLACEMENT

NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL
DAVID P. TUCH

Revisions	Date
1 MSD ADJUSTMENT	5/9/14
3 RE-BID	5/27/14

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CRAVEN STREET IMPROVEMENTS

GREENWAY PLAN SERIES

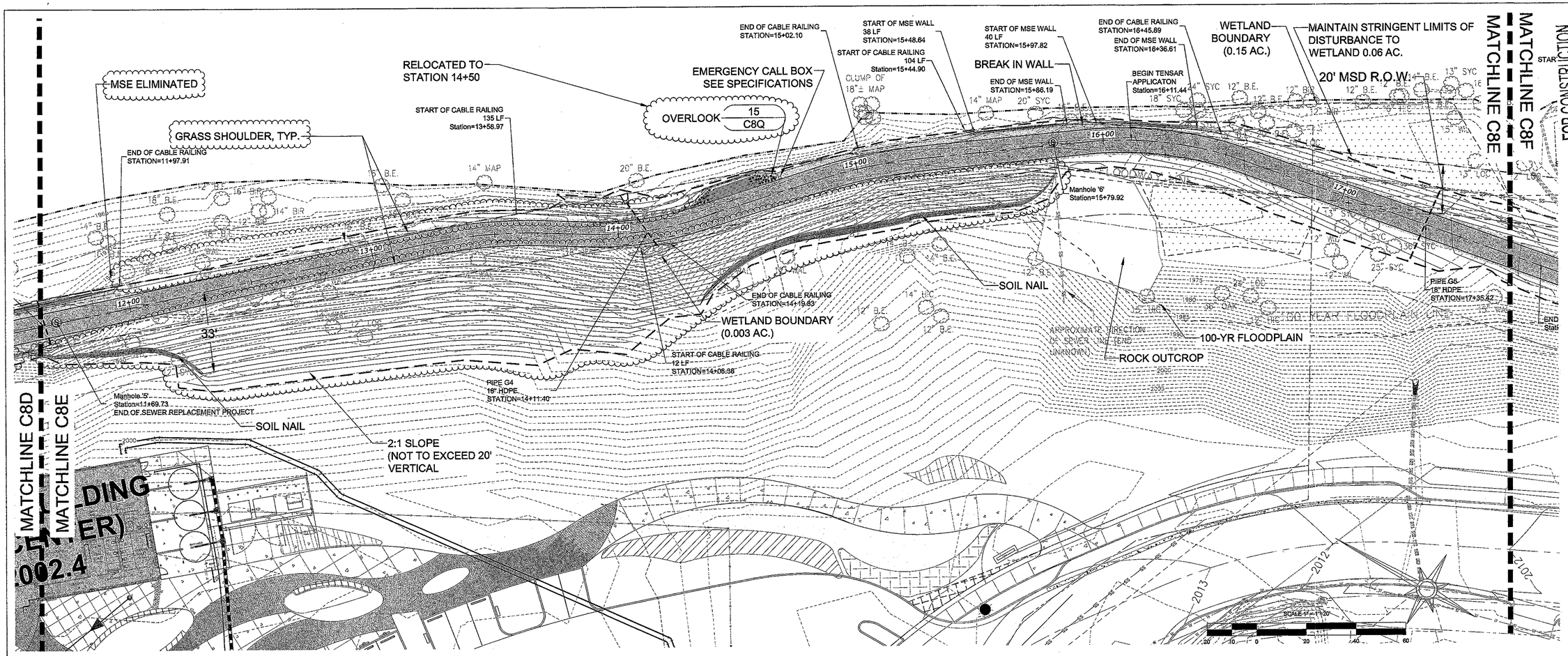
CITY OF ASHEVILLE, NORTH CAROLINA

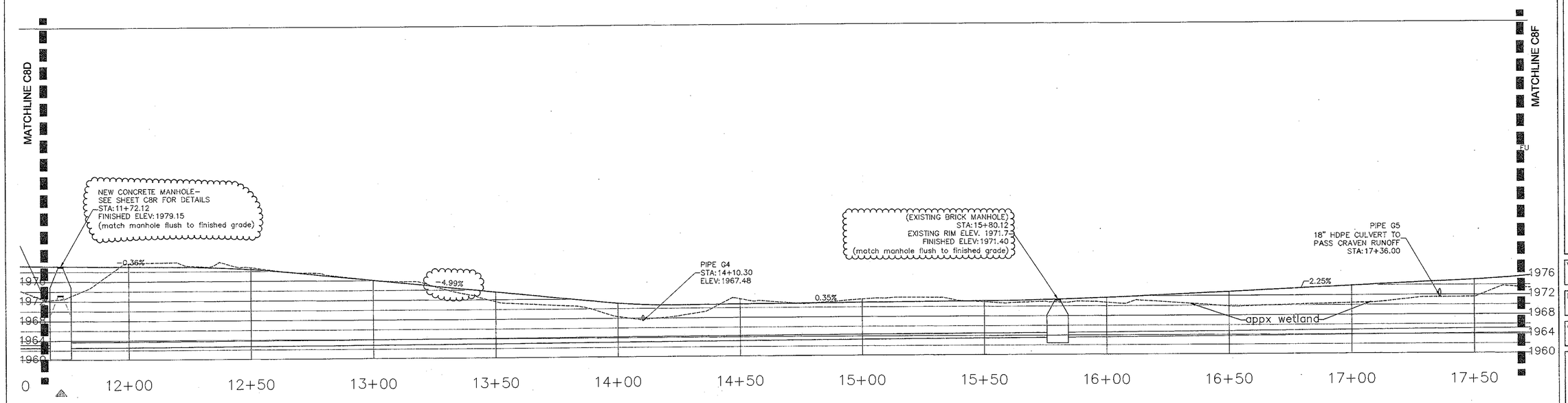
Vertical Scale: N/A

Horizontal Scale: 20'

Commission Number: 3267

Sheet No.: C8D





FOR CONSTRUCTION

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1	MSD ADJUSTMENT	5/9/14
2	SHOULDER ADJUSTMENT	5/23/14
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Designed By:
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Date: 12/06/2013

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CRAVEN STREET IMPROVEMENTS
GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 10'
Horizontal Scale: 20'
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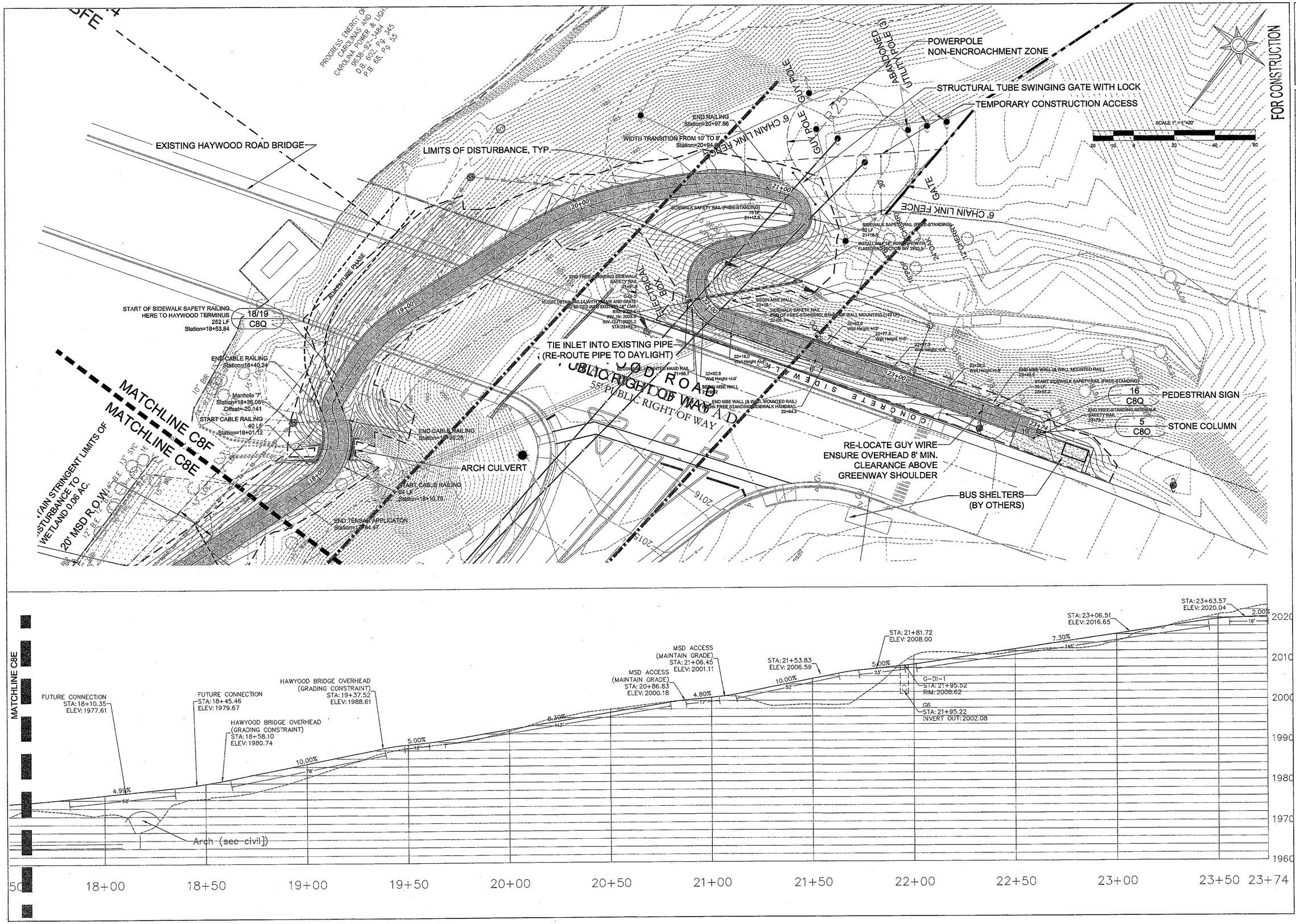
Sheet No.: C8E



Revisions		Date
1	MSD ADJUSTMENT	5/9/14
3	RE-BID	5/27/14

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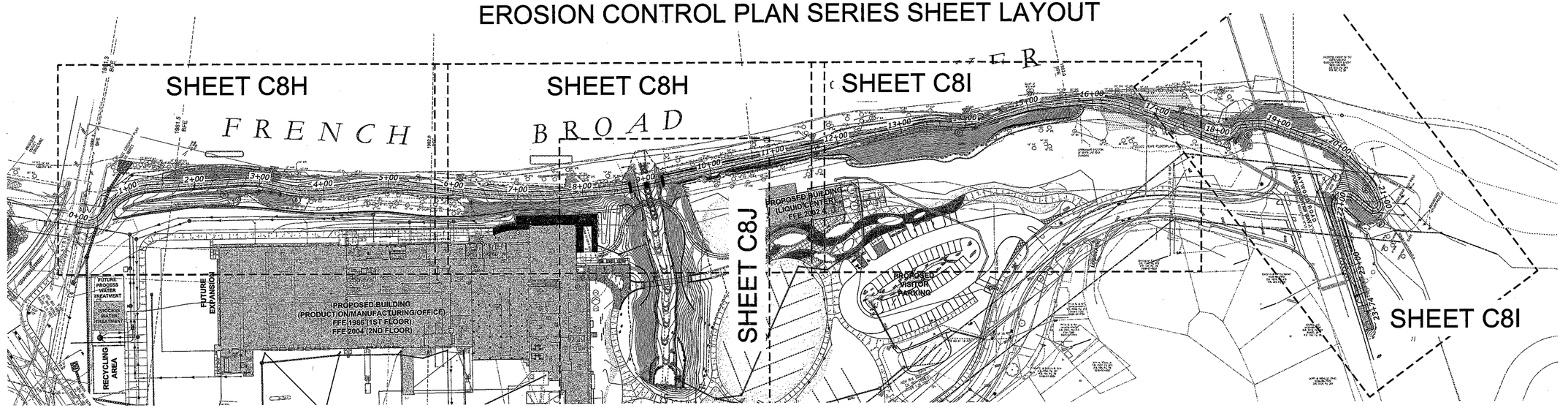
GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 10
Horizontal Scale: 20
Commission Number: 3267
Sheet No.: C8F

GREENWAY & STREAM RESTORATION
EROSION CONTROL PLAN SERIES SHEET LAYOUT

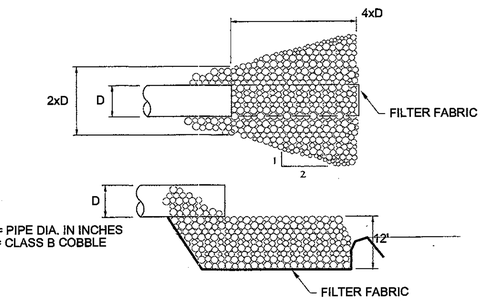
FOR CONSTRUCTION



PERMANENT DITCH SCHEDULE

DITCH	SLOPE	SIDE SLOPE	BOTTOM WIDTH	DEPTH	LENGTH	MATTING	CHECK DAM QTY
A	4.4%	2:1	3' TYP.	1'	230'	S150BN	6
B	5.7%	2:1	0.5'	1'	60'	S150BN	0
C	6.0%	2:1	0.5'	1'	200'	S150BN	4
D	5.7%	2:1	0'	1'	176'	S150BN	1
E	50%	2:1	0'	1'	260'	S150BN	9
F	50%	2:1	0'	1'	50'	S150BN	1
G	50%	2:1	0'	1'	30'	S150BN	1

Calculations:
1. All systems designed for a 10 yr, 2 hr. storm event, with rainfall intensity (i) of 1.37.
2. Matting S150BN is a jute/straw matrix (by North American Green) and has 12-mo. durability for medium flow velocities. Equivalent matting may be used with approval.



1 OUTLET PROTECTION
NOT TO SCALE

TEMPORARY SEEDING SCHEDULE FOR EROSION CONTROL

TEMPORARY SEEDING SCHEDULE

TEMPORARY SEEDING MUST OCCUR WHEN DENUDED AREAS WILL NOT BE BROUGHT TO FINAL GRADE WITHIN 7 CALENDAR DAYS (SEE NOTE 3 ABOVE).

SUMMER

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
GERMAN MILLET	40
PARTRIDGE PEA	10

A small-stemmed sudangrass may be substituted for Partridge Pea at a rate of 50 lb/acre.

SEEDING DATES: May 15-Aug 15

WINTER & EARLY SPRING

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
ANNUAL (WINTER) RYE GRASS	60
PARTRIDGE PEA	10

A small-stemmed sudangrass may be substituted for Partridge Pea at a rate of 50 lb/acre.

SEEDING DATES: Feb 1-May 15

FALL

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
ANNUAL (WINTER) RYE GRASS	60
PARTRIDGE PEA	10

A small-stemmed sudangrass may be substituted for Partridge Pea at a rate of 50 lb/acre.

SEEDING DATES: Aug 15-Dec 30

GENERAL

SOIL AMENDMENTS:
Follow recommendation of soil tests. Use only amendments safe for riparian areas.

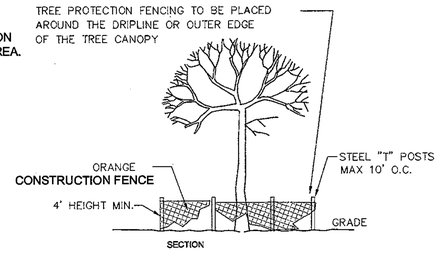
MULCH:
Apply 4,000 lb/acre straw. Anchor straw by tacking.

MAINTENANCE:
Refertilize if growth is not fully adequate. Topdress with 50 lb/acre of nitrogen in March (if applicable). If it is necessary to extend temporary cover beyond June 15th overseed with mixes provided. Reseed, re-fertilize and mulch immediately following erosion or other damage.

1. SEE CRAVEN STREET PLANTING & REVEGETATION SPECIFICATIONS FOR MORE INFORMATION ON SEED APPLICATION AND ESTABLISHMENT.
2. CONTRACTOR TO KEEP RECORD OF SEED PURCHASE AND APPLICATION RATES FOR FINAL INSPECTION (BAGS & RECEIPTS).
3. GROUND STABILIZATION REQUIRED IN (7) SEVEN DAYS ON PERIMETER AREAS AND SLOPES GREATER THAN 3:1, AND GROUND STABILIZATION IN (14) DAYS ON OTHER AREAS

* TOTAL AREA TO REQUIRE RESTABILIZATION AND SEEDING IS APPROX. 2.0 ACRES FOR THE GREENWAY & APPROXIMATELY 1 AC. FOR THE STREAM RESTORATION.

1. PRIOR TO COMMENCING SITE CONSTRUCTION OR CLEARING (THE LAND DISTURBANCE AREA) TREES TO BE PRESERVED SHALL BE FLAGGED WITH BLUE RIBBON ENCIRCLING THE TRUNK AND A FOUR FOOT HIGH BARRIER SUFFICIENTLY PROMINENT VISUALLY TO PREVENT ENCROACHMENT BY PEOPLE AND VEHICLES SHALL BE ERECTED AROUND TREES TO REMAIN. BARRIERS SHALL BE PLACED AT THE DRIP LINE OF THE TREE WHERE PRACTICAL BUT NO LESS THAN FIVE FEET FROM THE TRUNK OF THE TREE. THIS ENCLOSED AREA SHALL BE THE TREE PROTECTION ZONE OR AREA. USE OF ORANGE POLYETHYLENE SAFETY FENCING OR SIMILAR MATERIAL IS RECOMMENDED FOR THE BARRIER MATERIAL. THE RIBBONS AND BARRIERS SHALL REMAIN IN PLACE UNTIL ALL CONSTRUCTION AND GRASSING OPERATIONS ARE COMPLETE.
2. PASSIVE FORMS OF TREE PROTECTION - SUCH AS CONTINUOUS ROPE OR FLAGGING MAY BE UTILIZED TO MARK TREE SAVE AREAS WHICH ARE REMOTE FROM AREAS OF LAND DISTURBANCE.
3. NO BUILDING MATERIALS, DIRT, DEBRIS, OILS, PAINTS, OR ANY OTHER MATERIALS, EQUIPMENT, OR VEHICLES SHALL BE PLACED OR DEPOSITED WITHIN THE PROTECTION AREA NOR SHALL ANY TRENCHING OR PAVING BE DONE WITHIN THE PROTECTION AREA.
4. NO CHANGE IN GRADE SHALL BE PERMITTED WITHIN THE TREE PROTECTION ZONE EXCEPT FOR A TWO (2") FILL OF TOPSOIL OR MULCH.
5. UNDERGROUND UTILITY LINES SHALL BE ROUTED AROUND AND AWAY FROM TREE PROTECTION ZONES. NECESSARY INSTALLATION THROUGH PROTECTION ZONES SHALL BE ACCOMPLISHED THROUGH TUNNELING RATHER THAN CUTTING OPEN TRENCHES.
6. NO EQUIPMENT SHALL PASS OR BE PARKED WITHIN TREE PROTECTION ZONES TO PROTECT TREE ROOTS FROM EXCESSIVE COMPACTION DURING CONSTRUCTION.



2 TREE PROTECTION
NOT TO SCALE

NORTH CAROLINA DAVID P. TUCH

Revisions	Date
3 RE-BID	5/27/14

Issue Date: 12/06/2013
Drawn By: FG
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Date: 12/06/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
RATLINOFF ENGINEERING
Cole Jenest & Stone

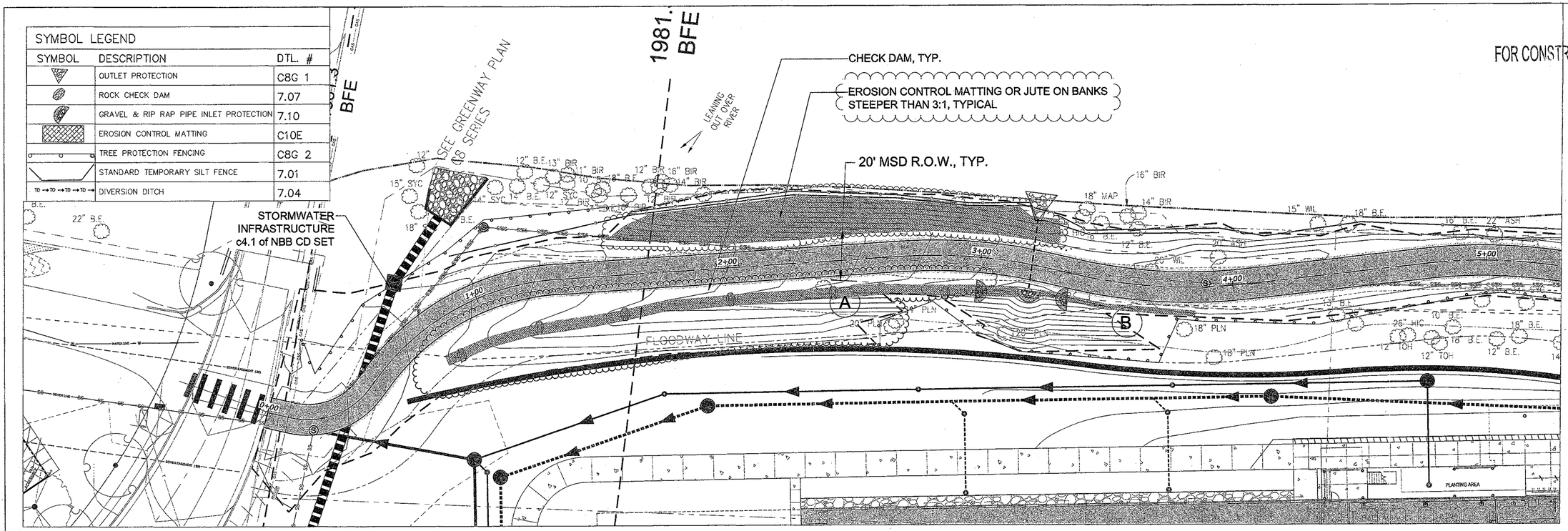
CRAVEN STREET IMPROVEMENTS
CRAVEN STREET – GREENWAY
EROSION CONTROL PLAN
CITY OF ASHEVILLE, NORTH CAROLINA

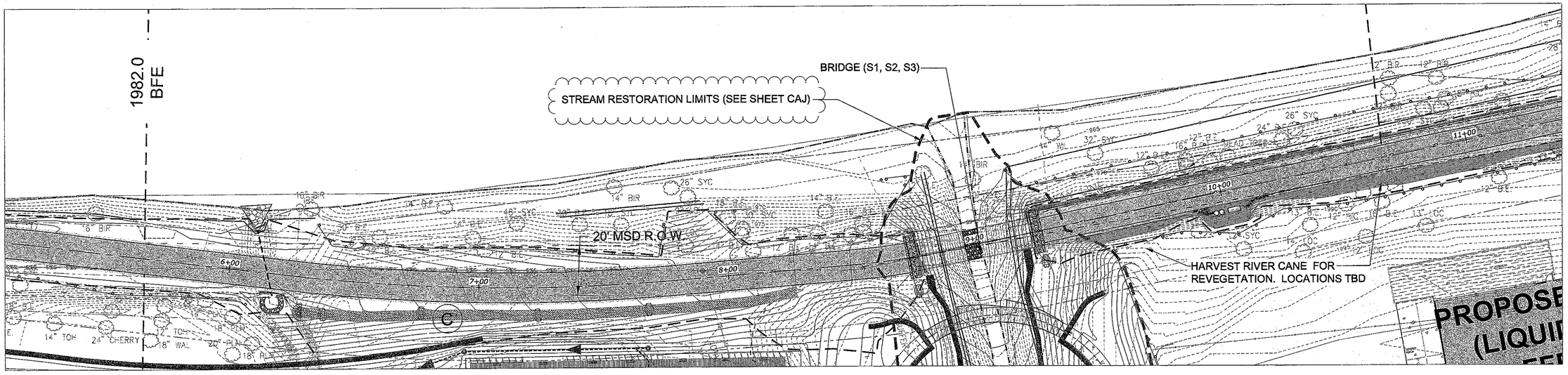
Vertical Scale: 10'
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C8G

FOR CONSTRUCTION

SYMBOL LEGEND

SYMBOL	DESCRIPTION	DTL. #
	OUTLET PROTECTION	C8G 1
	ROCK CHECK DAM	7.07
	GRAVEL & RIP RAP PIPE INLET PROTECTION	7.10
	EROSION CONTROL MATTING	C10E
	TREE PROTECTION FENCING	C8G 2
	STANDARD TEMPORARY SILT FENCE	7.01
TD → TD → TD → TD →	DIVERSION DITCH	7.04





NORTH CAROLINA
DAVID P. TUCH

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CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET – GREENWAY
EROSION CONTROL PLAN

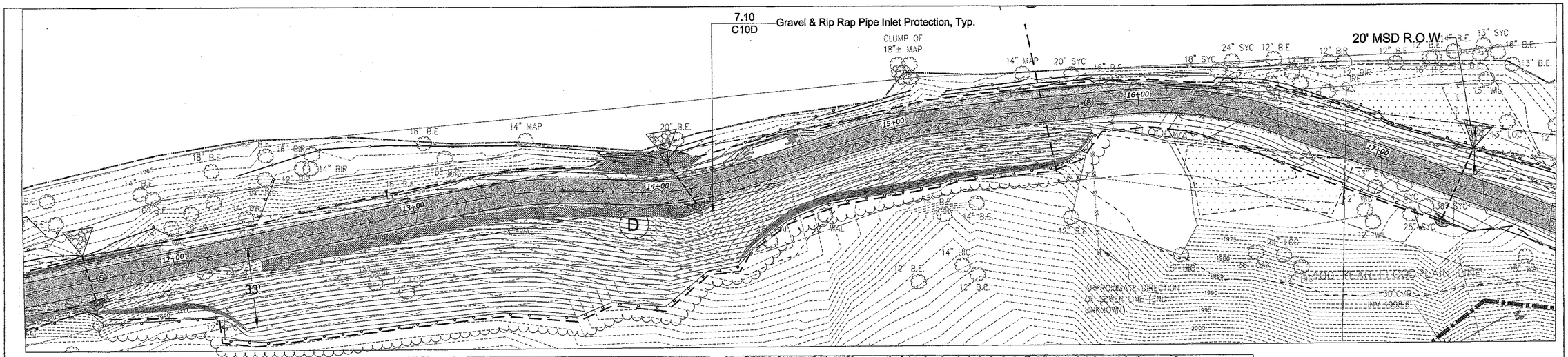
CITY OF ASHEVILLE, NORTH CAROLINA

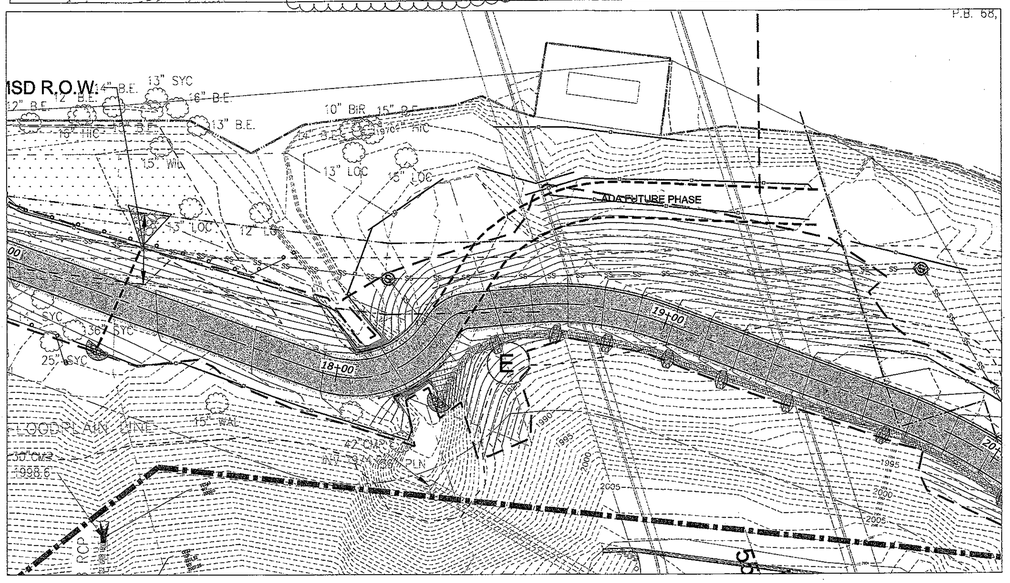
Vertical Scale: 10'

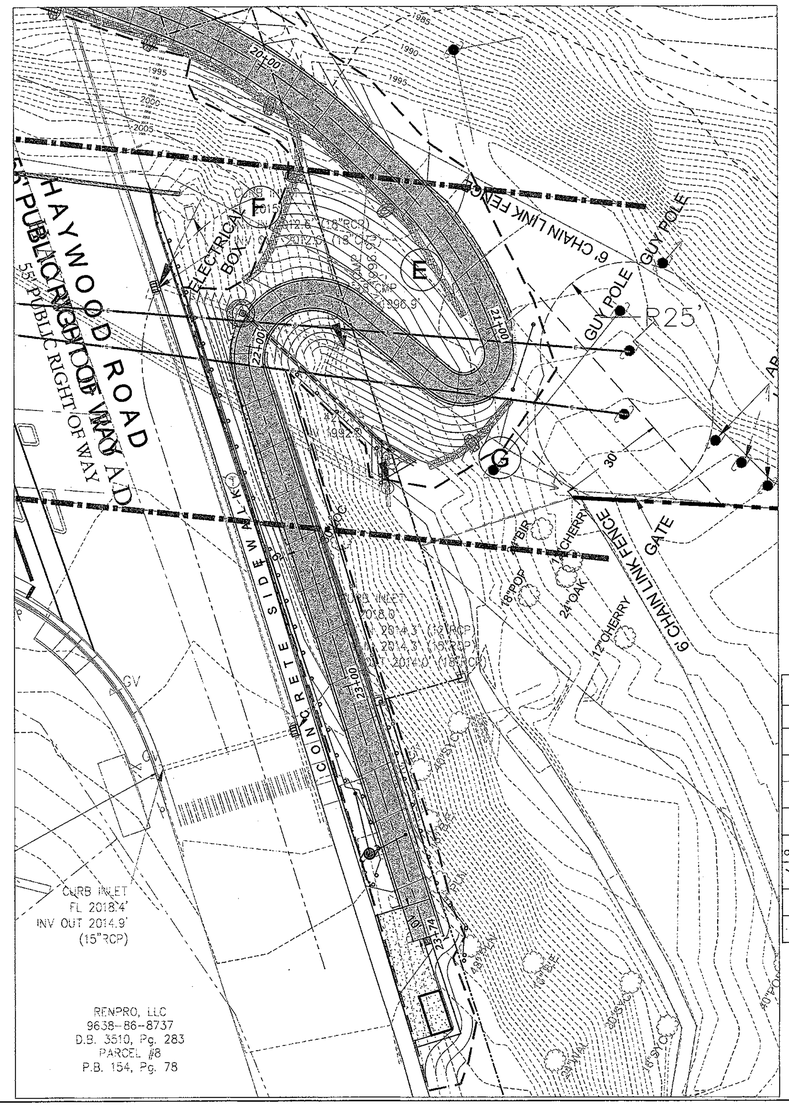
Horizontal Scale: 20'

Commission Number: 3267

Sheet No.: C8H







FOR CONSTRUCTION

SYMBOL LEGEND

SYMBOL	DESCRIPTION	DTL. #
	OUTLET PROTECTION	C8G 1
	ROCK CHECK DAM	7.07
	GRAVEL & RIP RAP PIPE INLET PROTECTION	7.10
	EROSION CONTROL MATTING	C10E
	TREE PROTECTION FENCING	C8G 2
	STANDARD TEMPORARY SILT FENCE	7.01
	DROP INLET PROTECTION	7.01
TD → TD → TD → TD →	DIVERSION DITCH	7.04

SCALE 1" = 1"=20'

20 10 0 20 40 60

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions		Date
3	RE-BID	5/27/14
		5/9/14

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CONSULTING ENGINEERS • SURVEYORS

EQUINOX ENVIRONMENTAL

Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET – GREENWAY
EROSION CONTROL PLAN

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A

Horizontal Scale: 20'

Commission Number: 3267

Sheet No.: C8I

SYMBOL LEGEND		
SYMBOL	DESCRIPTION	DTL. #
	OUTLET PROTECTION	C8G 1
	ROCK CHECK DAM	7.07
	GRAVEL & RIP RAP PIPE INLET PROTECTION	7.10
	EROSION CONTROL MATTING	C10E
	TREE PROTECTION FENCING	C8G 2
	STANDARD TEMPORARY SILT FENCE	7.01
TD → TD → TD → TD →	DIVERSION DITCH	7.04

BRIDGE (S1, S2, S3)

STREAM RESTORATION LIMITS (SEE SHEET CAJ)

20' MSD R.O.W.

HARVEST RIVER CANE FOR REVEGETATION. LOCATIONS TBD

PROPOSED BUILDING (LIQUID CENTER) FFE 2002.4

STREAM RESTORATION GRADING

STREAM RESTORATION

BANKS TO BE REVEGETATED WITH NATIVE RIPARIAN SPECIES

IN-STREAM STRUCTURES

PROPOSED SMALL WALL

LAWN

ENERGY DISSIPATING POOL

UNDERGROUND SECTION OF STREAM

STREAM RESTORATION LIMITS OF DISTURBANCE (0.92 AC)

PIPE

SCALE 1" = 1"=20'

20 10 0 20 40 60

FOR CONSTRUCTION

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions		Date
3	RE-BID	5/27/14
		5/9/14

Issue Date: 12/06/2013

Drawn By: FG

Designed By: FG

CHECKED BY: DT

Date: 12/06/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

BOUTINOX ARCHITECTURE

ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET – STREAM RESTORATION EROSION CONTROL PLAN

CITY OF ASHEVILLE, NORTH CAROLINA

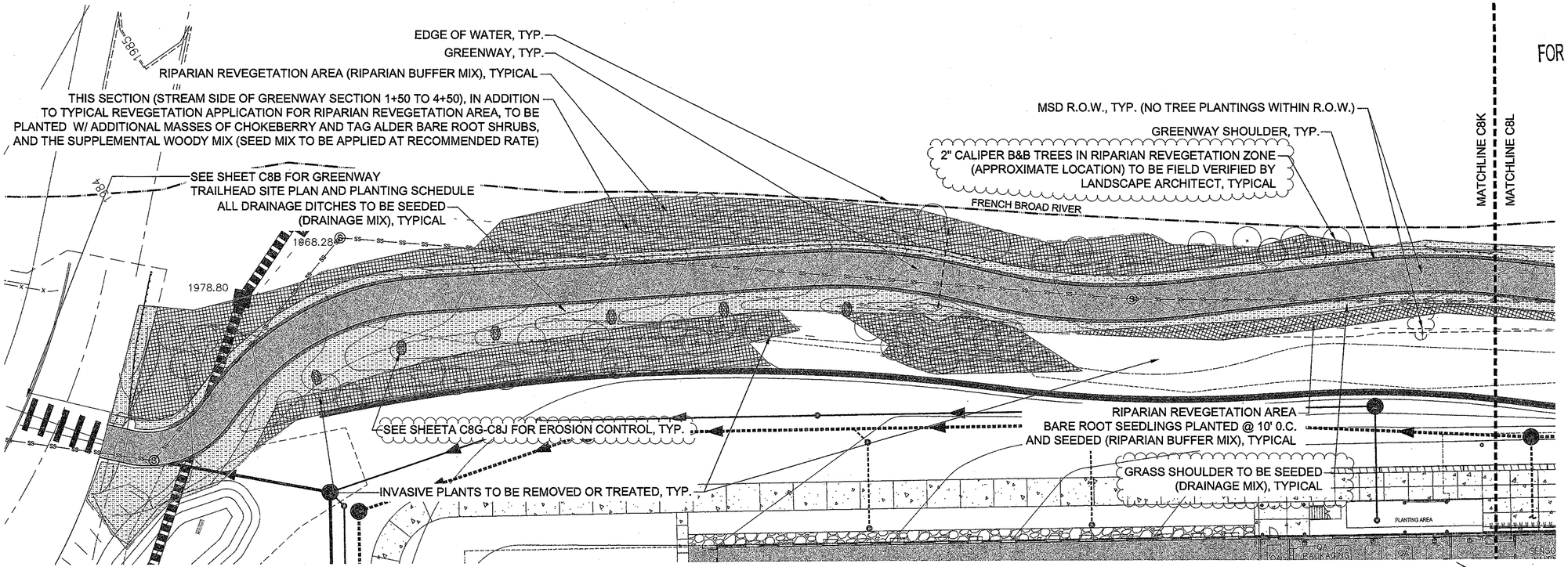
Vertical Scale: N/A

Horizontal Scale: 20'

Commission Number: 3267

Sheet No.: C8J

FOR CONSTRUCTION



REVEGETATION LEGEND

SYMBOL	REVEGETATION ZONE DESCRIPTION
	Riparian Revegetation Zone (24,800 sf or 0.6 acres) - This zone includes temporary seeding, permanent seeding (Riparian Buffer Mix), bare root tree seedlings planted in a 'triangular pattern' at 10' o.c. spacing, and 2" caliper trees to be placed in field by Landscape Architect.
	Wetland Enhancement Zone (4,727 sf or 0.11 acres) - This zone includes temporary seeding, permanent seeding (NC Mountains Wetland Mix), and bare root shrub seedlings at 3'-0" o.c. spacing, typical.
	Grass Zone (29,844 sf or 0.7 acres) - This zone includes the greenway shoulder and all drainage ditches/swales, as well as some areas with sightline concerns. This zone includes seeding (Drainage Mix).

REVEGETATION AT WALLS

(SEE GEOTECH SHEETS FOR WALL LOCATIONS)

WALL DESCRIPTION & TREATMENT
Soil Nail Wall - All revegetation above soil nail walls (from top of wall to extent of disturbance boundary; 5' width minimum) to be planted with permanent seed mix (Riparian Buffer Mix) supplemented with additional "Woody Mix" to stabilize soil.
M.S.E. (Verti-Block) Wall - All revegetation below retaining walls (from wall to extent of disturbance boundary) to be planted with permanent seed mix (Riparian Buffer Mix) to stabilize soil.

Planting Notes:

- Wetland plants to be planted in naturalized masses, concentrating around the perimeter of the wetland. Open water and the interior of the wetland should remain open and free of shrub or plug plantings.
- No trees to be planted in the MSD R.O.W.
- For greenway trailhead planting plan, see sheet C8B.
- For general planting specifications, see sheet C12H and Craven Street Stream & Revegetation Specifications.

RIPARIAN REVEGETATION SCHEDULE

SPECIES	COMMON NAME	BARE ROOT SEEDLINGS	2" CALIPER B&B TREES
Alnus serrulata	Common alder	40	
Aronia melanocarpa	Chokeberry	40	
Betula nigra	River birch	20	12
Carpinus caroliniana	Hophornbeam	30	
Carya glabra	Pignut hickory	15	
Cornus florida 'Appalachian Spring'	Flowering dogwood	20	10
Liriodendron tulipifera	Tulip poplar	30	20
Nyssa sylvatica	Black gum		9
Oxydendrum arboreum	Sourwood	15	
Platanus occidentalis	Sycamore	30	15
Quercus shumardii	Shumard Oak		10
Quercus phellos	Willow oak	20	10
Total Stems		**260**	**86**

WETLAND ENHANCEMENT SCHEDULE

SPECIES	COMMON NAME	PLUGS	BARE ROOT SEEDLINGS (36" HEI. MIN.)
Shrubs			
Sambucus canadensis	Elderberry		15
Aronia melanocarpa	Chokeberry		15
Lindera benzoin	Spicebush		15
Perennials			
Carex vulpinoidea	Fox Sedge	30	
Juncus effusus	Soft Rush	30	
Iris virginica	Blue Flag Iris	30	

CUT ENHANCEMENT SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Shrubs					
FG	Fothergilla 'Mt. Airy'	Fothergilla	12	3 Gallon	As shown
RC	Rhododendron catawbiense	Catawba rhododendron	12	3 Gallon	As shown
Trees					
AR	Acer rubrum	Red maple	8	2" Cal.	As shown
AA	Amelanchier 'Autumn Brilliance'	Serviceberry	17	1" Cal.	As shown
CR	Cercis canadensis	Redbud	12	1" Cal.	As shown
CF	Cornus florida 'Appalachian Spring'	Dogwood	8	1" Cal.	As shown
IJ	Ilex opaca 'Jersey Knight'	American holly pollinator	2	8' - 10' Height	As shown
IO	Ilex opaca 'Satyr Hill'	American holly	9	8' - 10' Height	As shown
LT	Liriodendron tulipifera	Tulip poplar	9	2" Cal.	As shown
PS	Pinus strobus	White Pine	5	8' - 10' Height	As shown
QS	Quercus shumardii	Shumard oak	3	2" Cal.	As shown

** Multi-stem specimens can vary from this caliper, but should be at minimum 10' in height.*

*** Multi-stems to be 3-5 stems only.*

HAYWOOD CONNECTOR SCHEDULE

SPECIES	COMMON NAME	3 GALLON CONTAINER
Shrubs		
Cornus sericea	Red stem dogwood	14

SCALE 1" = 1'=20'

20 10 0 20 40 60

GREENWAY SEEDING SCHEDULE

1. SEE CRAVEN STREET PLANTING & REVEGETATION SPECIFICATIONS FOR MORE INFORMATION ON SEED APPLICATION AND ESTABLISHMENT.
2. CONTRACTOR TO KEEP RECORD OF SEED PURCHASE AND APPLICATION RATES FOR FINAL INSPECTION (BAGS & RECEIPTS).
3. GROUND STABILIZATION REQUIRED IN (7) SEVEN DAYS ON PERIMETER AREAS AND SLOPES GREATER THAN 3:1, AND GROUND STABILIZATION IN (14) DAYS ON OTHER AREAS

TEMPORARY SEEDING SCHEDULE

TEMPORARY SEEDING MUST OCCUR WHEN DENUDED AREAS WILL NOT BE BROUGHT TO FINAL GRADE WITHIN 7 CALENDAR DAYS (SEE NOTE 3 ABOVE).

SUMMER

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
GERMAN MILLET	40
PARTRIDGE PEA	10

A small-stemmed sudangrass may be substituted for Partridge Pea at a rate of 50 lb/acre.

SEEDING DATES: May 15-Aug 15

WINTER & EARLY SPRING

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
ANNUAL (WINTER) RYE GRASS	60
PARTRIDGE PEA	10

A small-stemmed sudangrass may be substituted for Partridge Pea at a rate of 50 lb/acre.

SEEDING DATES: Feb 1-May 15

FALL

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
ANNUAL (WINTER) RYE GRASS	60
PARTRIDGE PEA	10

A small-stemmed sudangrass may be substituted for Partridge Pea at a rate of 50 lb/acre.

SEEDING DATES: Aug 15-Dec 30

GENERAL

SOIL AMENDMENTS:
Follow recommendation of soil tests. Use only amendments safe for riparian areas.

MULCH:
Apply 4,000 lb/acre straw. Anchor straw by tacking.

MAINTENANCE:
Refertilize if growth is not fully adequate. Topdress with 50 lb/acre of nitrogen in March (if applicable). If it is necessary to extend temporary cover beyond June 15th overseed with mixes provided. Reseed, re-fertilize and mulch immediately following erosion or other damage.

PERMANENT SEEDING SCHEDULE

PERMANENT SEEDING MUST OCCUR WITHIN 14 CALENDAR DAYS OF FINAL GRADING. COVER CROPS (TEMPORARY SEEDING) TO BE ADDED TO PERMANENT SEEDING MIXES IF NO TEMPORARY SEEDING HAS BEEN PLACED PREVIOUSLY.

REVEGETATION SEEDING MIXES:	RATE (LB/ACRE)
*"RIPARIAN BUFFER MIX" (ERNMX #178):	35
*"NC MOUNTAINS WETLAND MIX" (ERNMX #305):	30
*"DRAINAGE MIX" (CUSTOM):	120
*"WOODY MIX" (CUSTOM):	1*

** Supplemental mix to be added at a rate of 1 lb./acre to additional permanent seed mix at suggested rate shown above.*

- The seed mixes above are available at ERNST CONSERVATION SEEDS (800.873.3321). Local sources of similar seed mix may be used (to be approved by Equinox in writing).
- See Planting & Revegetation Specifications for seed mix information.

SOIL AMENDMENTS: Physically or chemically treat all exotic invasive plants before amending soil. Apply lime and fertilizer according to soil tests or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 5-10-10 fertilizer.

SOIL PREPARATION: Soil impacted by construction must be loosened prior to seeding by means of disking or raking. Seedbed shall be well-pulverized, loose, and uniform. All stones larger than three (3) inches, sticks, roots, and other extraneous materials shall be removed. Apply seed uniformly with a cyclon seeder, drop-type spreader, drill or hydro-seeder. Cover broadcast seed by lightly raking, then firm surface with roller or cultipacker. Cut or disc temporary seeding cover crop prior to seeding.

SEED PREPARATION:
If banks exceed 4:1, apply seed, lime, and apply mulch.

MULCH:
Apply 4,000-5,000 lb/acre grain straw or equivalent cover of another suitable, weed-free mulching material. Use a spray-on growth (mulch) matrix (Flexterra FGM or equal) for slope embankments that exceed 3:1 slopes.

MAINTENANCE:
Mow or cut back no more than once a year. Refertilize in the second year unless growth is fully adequate. Reseed, fertilize, and mulch damaged areas immediately. Weed during first 2 years of establishment.

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

Revisions	Date
MSD ADJUSTMENT	5.9.14
RE BID	5.27.14

Issue Date: 5/27/2014
Drawn By: EE
Designed By: EE
CHECKED BY: DT
Date: 12/16/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS
REVEGETATION PLAN
GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale:
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C8K

REVEGETATION LEGEND

SYMBOL	REVEGETATION ZONE DESCRIPTION
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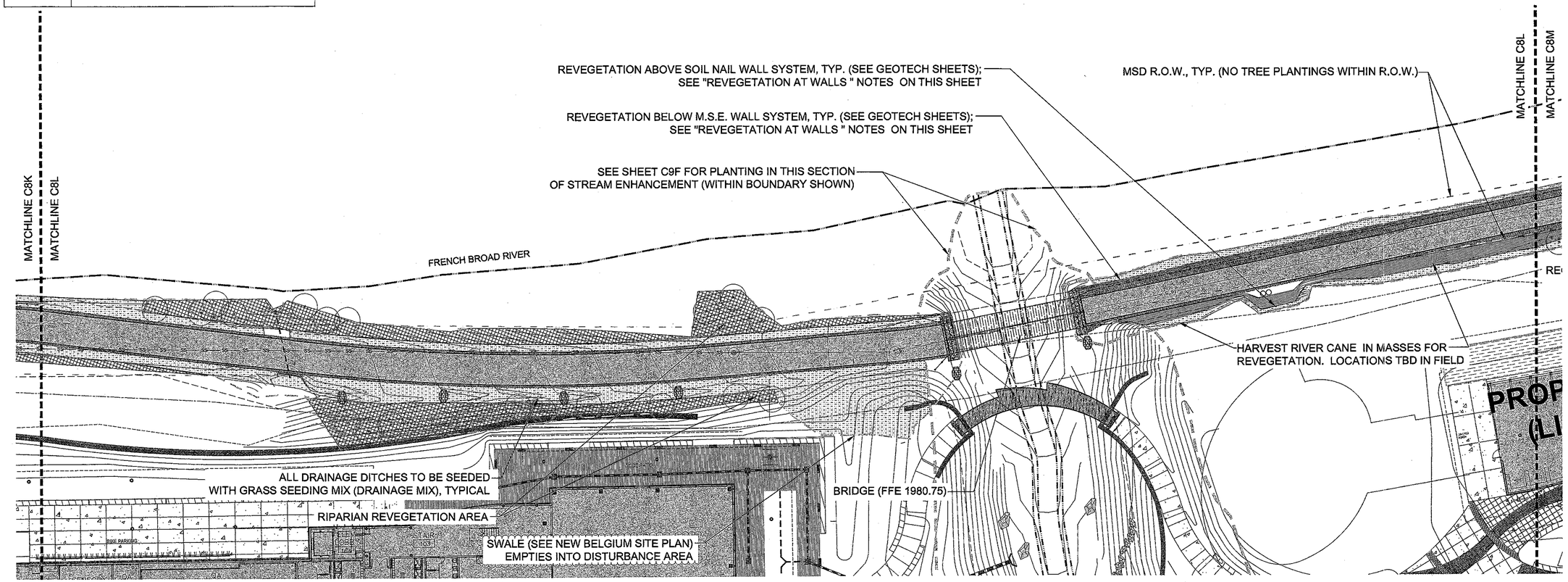
FOR CONSTRUCTION



SCALE 1" = 1'=20'
20 10 0 20 40 60

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RE BID	5.27.14

Issue Date: 5/27/2014
Drawn By: EE
Designed By: EE
CHECKED BY: DT
Date: 12/6/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
ColeJenest & Stone

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Juncus effusus	Soft Rush	30	
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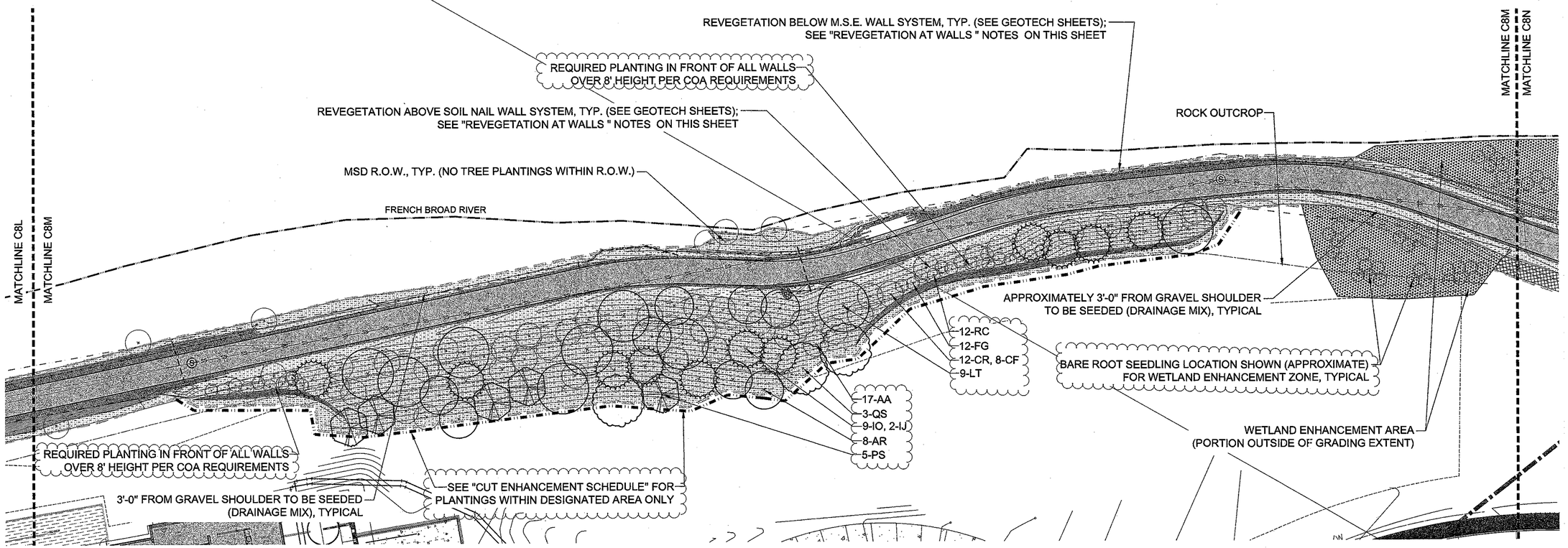

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20 10 0 20 40 60

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GREENWAY PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale:
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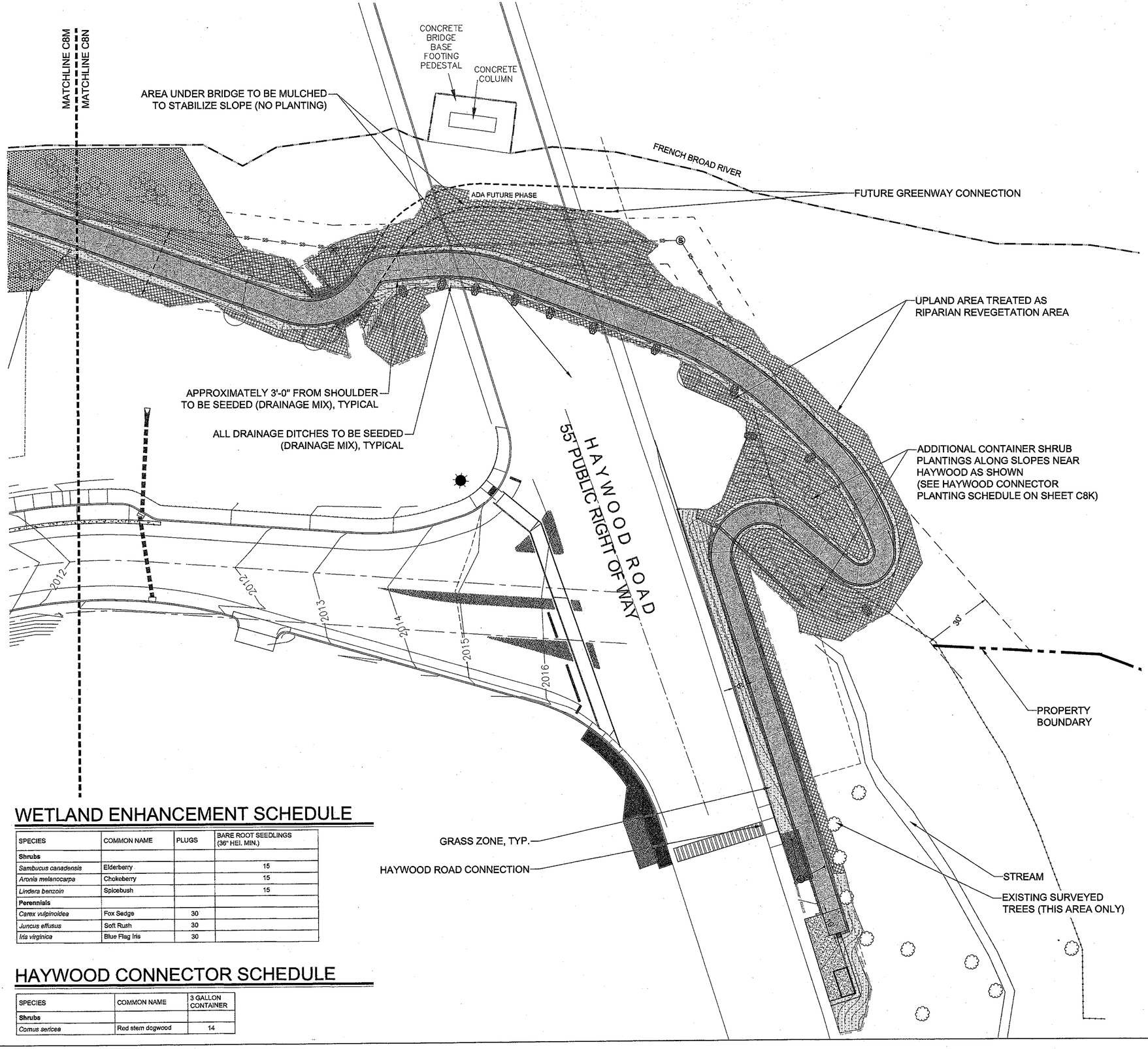
FOR CONSTRUCTION



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HAYWOOD CONNECTOR SCHEDULE

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Shrubs		
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NORTH CAROLINA 1542 DAVID P. TUCH

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CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale:
Horizontal Scale: 20
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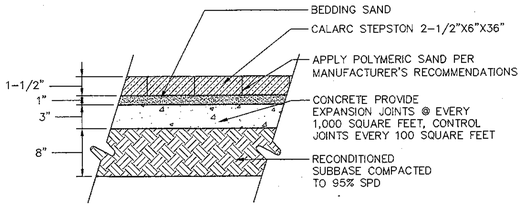
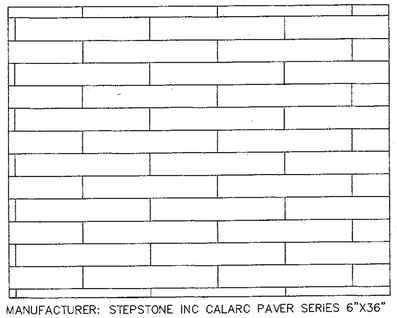
Sheet No.: C8N



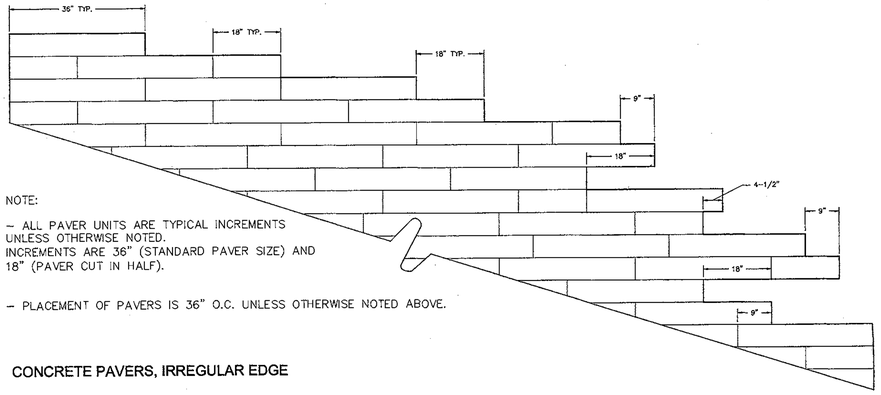
NOTE: REFER TO CURRENT GEO-TECH REPORT FOR SUBGRADE DESIGN. COLORS OF CALARC STEPSTONE AND POLYMERIC STONE TO BE SELECTED BY LANDSCAPE ARCHITECT. CONTRACTOR IS TO PROVIDE SAMPLES FOR CALARC PAVERS, INCLUDING THESE COLORS: FRENCH GREY 1404, CARMEL 1410, AND PORCELAIN 1413

CONCRETE PAVERS, TYPICAL



MANUFACTURER: STEPSTONE INC CALARC PAVER SERIES 6"X36"
COLORS: TBD
PATTERN: RUNNER BOND STYLE

CONCRETE PAVERS, TYPICAL



NOTE:

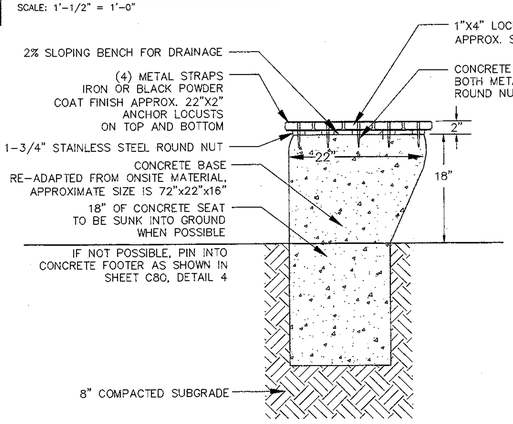
- ALL PAVER UNITS ARE TYPICAL INCREMENTS UNLESS OTHERWISE NOTED. INCREMENTS ARE 36" (STANDARD PAVER SIZE) AND 18" (PAVER CUT IN HALF).

- PLACEMENT OF PAVERS IS 36" O.C. UNLESS OTHERWISE NOTED ABOVE.

CONCRETE PAVERS, IRREGULAR EDGE

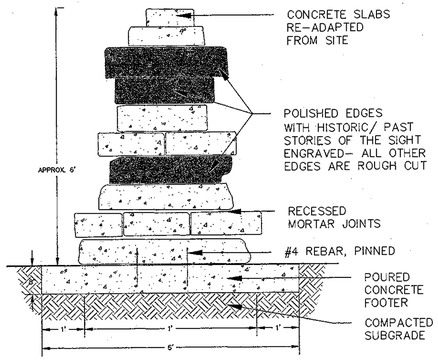
1 CONCRETE PAVERS, TYPICAL

SCALE: 1'-1/2" = 1'-0"



NOTE: IF CONCRETE FROM SITE IS NOT AVAILABLE FOR BENCHES ALTERNATE BENCH IS: ULTRA PLAY SYSTEMS- IN-GROUND BENCH WITH BACK 940S-R6

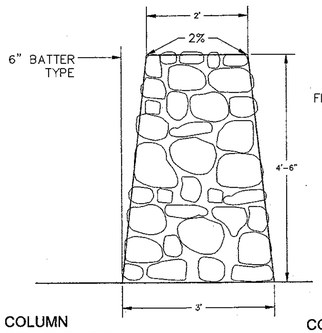
NOTE: ALL CONCRETE SLABS TO BE STOCKPILED FOR RE-USE FOR BENCHES



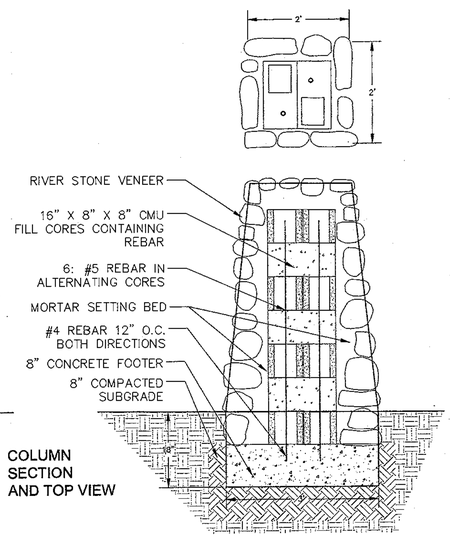
NOTE: TO BE BUILT BY A LOCAL ARTIST. ALL CONCRETE PIECES THAT ARE 3"-8" THICK AND RANGE IN SIZE FROM 2'-8' SHALL BE STOCKPILED FOR USE AS A CAIRN SCULPTURE AT GREENWAY TRAILHEAD

3 CONCRETE BENCH, TYPICAL

NOT TO SCALE



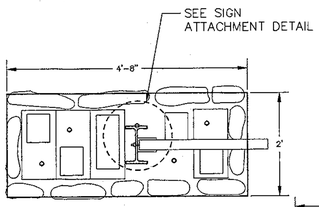
COLUMN SIDE ELEVATION

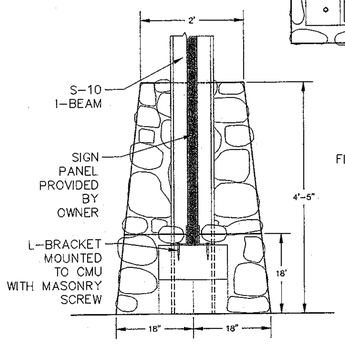


COLUMN SECTION AND TOP VIEW

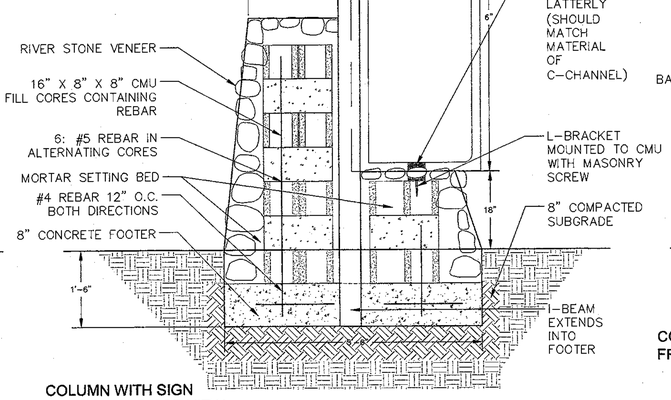
4 CAIRN SCULPTURE

NOT TO SCALE

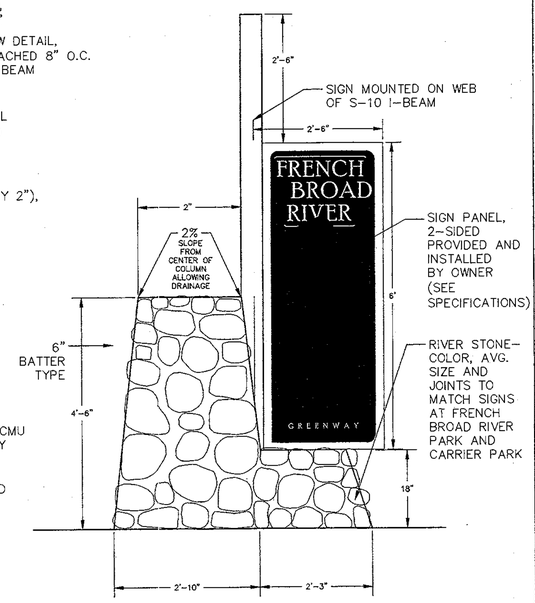




COLUMN WITH SIGN SIDE ELEVATION



COLUMN WITH SIGN SECTION AND TOP VIEW

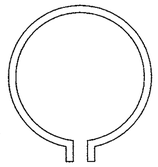


COLUMN WITH SIGN FRONT VIEW

2 BIKE RACK DETAIL

NOT TO SCALE

FOR CONSTRUCTION



MANUFACTURER:
LANDSCAPE FORMS

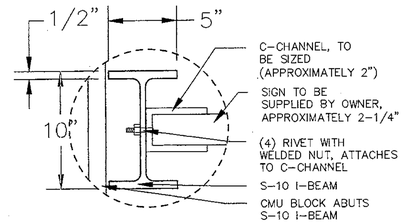
STYLE: RING

MOUNTING: EMBEDDED

FINISH: STAINLESS STEEL

DIMENSIONS:
1.5" X 25" X 27"

INSTALL BIKE RACKS IN WITH MANUFACTURER'S RECOMMENDED INSTRUCTIONS.



SIGN ATTACHMENT DETAIL

5 MONUMENT

NOT TO SCALE

6 MONUMENT WITH SIGN

NOT TO SCALE

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TICH

Revisions	Date
3 RE-BID	5/27/14

Issue Date: 12/6/2013
Drawn By: DC
Designed By: FG
CHECKED BY: DT
Date: 12/6/2013

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
ROUNDS0 ENGINEERING
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS

GREENWAY DETAILS

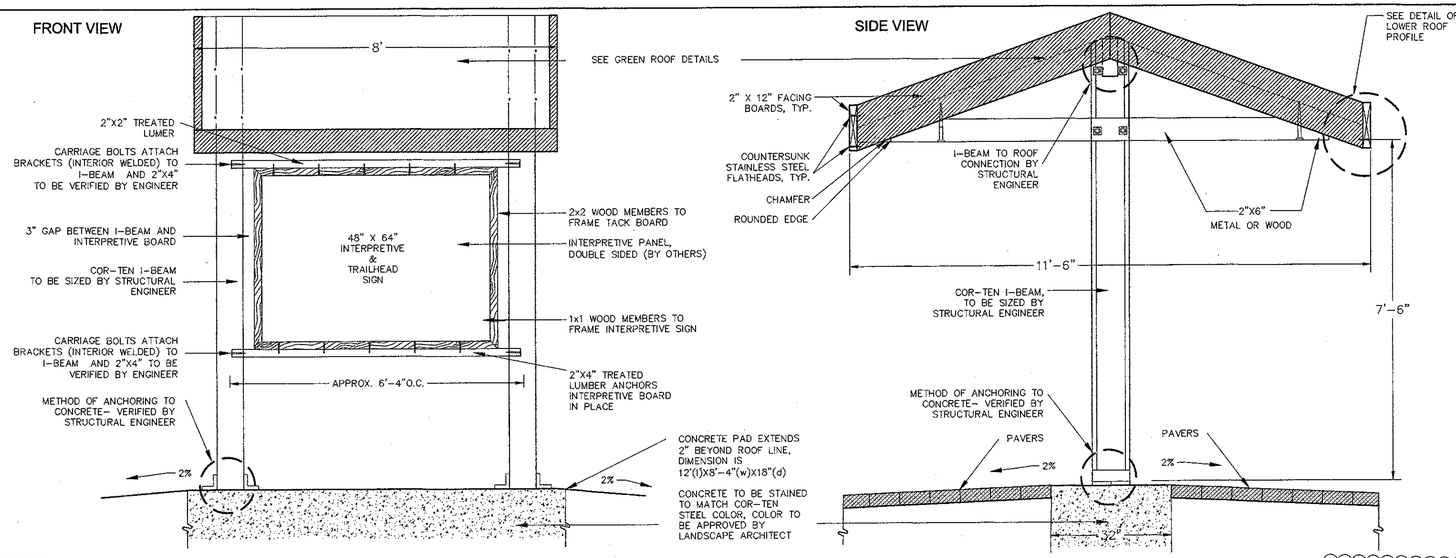
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A

Horizontal Scale: N/A

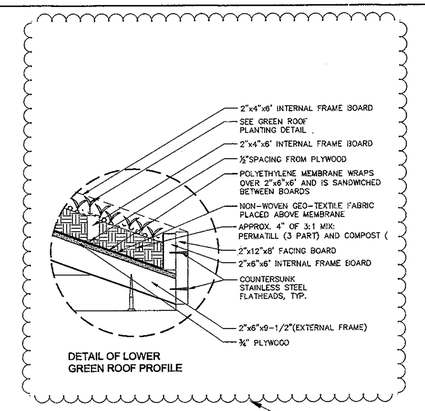
Commission Number: 3267

Sheet No.: C80



7 GREENROOF KIOSK- ELEVATION VIEW (CONCEPT DESIGN- NOT FOR CONSTRUCTION)

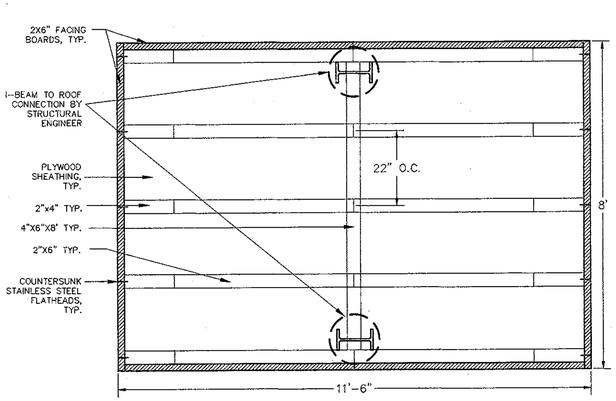
NOT TO SCALE



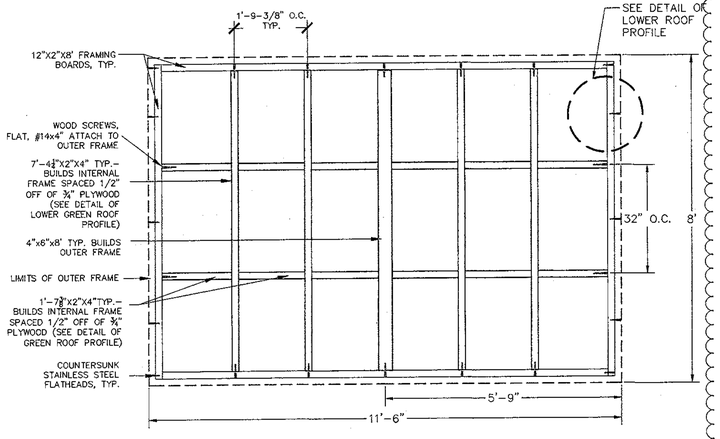
DETAIL OF LOWER GREEN ROOF PROFILE

FOR CONSTRUCTION

REPLACE GREEN ROOF WITH METAL ROOF

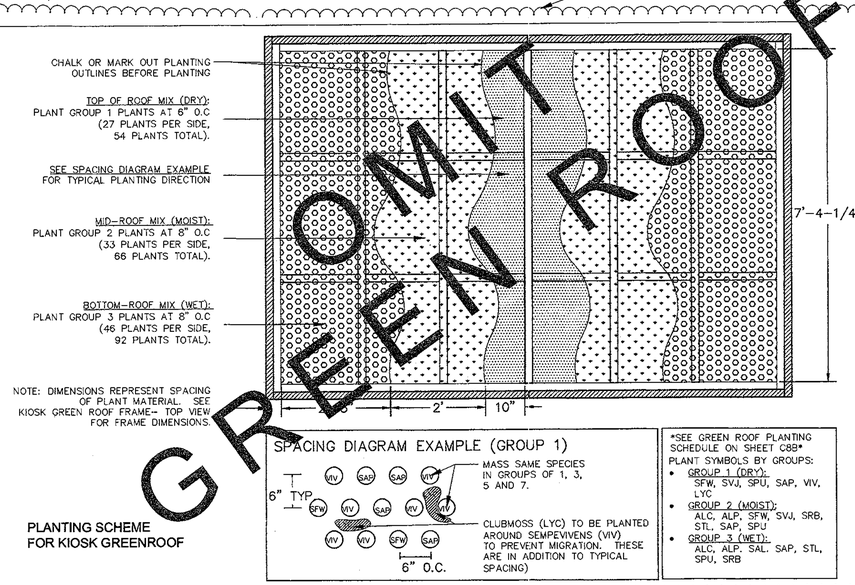


KIOSK GREEN ROOF STRUCTURAL TOP VIEW (CONCEPT DESIGN- NOT FOR CONSTRUCTION)



NOTE:INNER FRAME CAN BE PRE-CONSTRUCTED AND PLACED INTO OUTER FRAME

KIOSK GREEN ROOF FRAME TOP VIEW



PLANTING SCHEME FOR KIOSK GREENROOF

SPACING DIAGRAM EXAMPLE (GROUP 1)

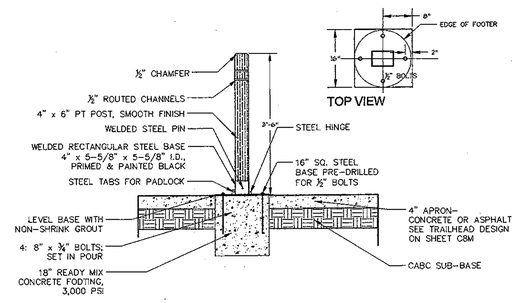
SEE GREEN ROOF PLANTING SCHEDULE ON SHEET C8P

PLANT SYMBOLS BY GROUPS:

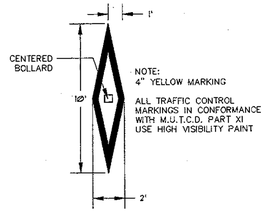
- GROUP 1 (DRY): SFW, SVJ, SPU, SAP, VIV, LYC
- GROUP 2 (MOIST): ALC, ALP, SFW, SVJ, SRB, STL, SAP, SPU
- GROUP 3 (WET): ALC, ALP, SAL, SAP, STL, SPU, SRB

7 GREENROOF KIOSK- PLAN VIEW

NOT TO SCALE



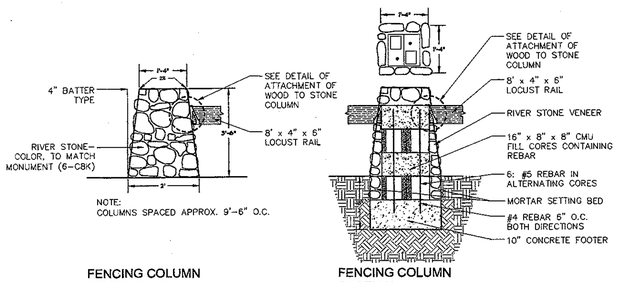
SIDE ELEVATION



MARKING ENVELOPE DETAIL

8 WOODEN BOLLARD- STANDARD CITY OF ASHEVILLE

NOT TO SCALE



FENCING COLUMN SIDE ELEVATION

FENCING COLUMN SECTION

ATTACHMENT DETAIL

9 RAIL FENCING WITH STONE COLUMNS

NOT TO SCALE

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1547 DAVID P. TUCH

Revisions		Date
3	RE-BID	5/27/14

Issue Date: 12/6/2013
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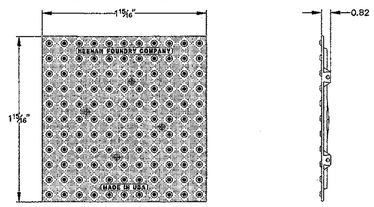
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS
GREENWAY DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

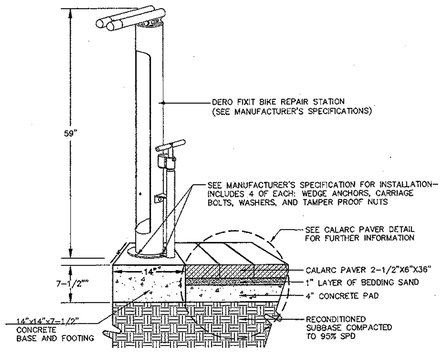
Verticol Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C8P

FOR CONSTRUCTION

NOTE:
USE NEENAH FOUNDRY COMPANY R-4984 DETECTABLE WARNING PLATE OR EQUAL AND MUST COMPLIES WITH ADAAG (AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES) AND ARCHITECTURAL BARRIER ACT 1968 GUIDELINES.



CAST IRON DETECTABLE WARNING PLATE

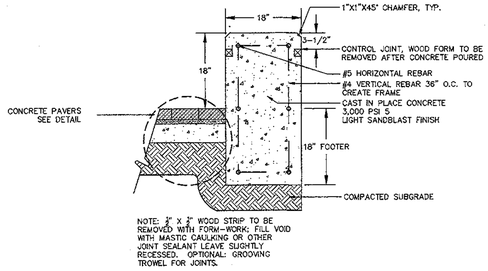


10 TRUNCATED DOME, TYP.

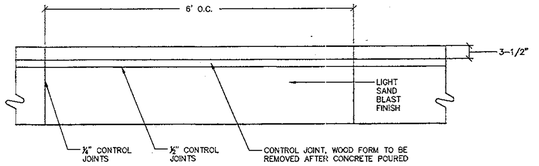
NOT TO SCALE

11 BIKE REPAIR STATION

NOT TO SCALE



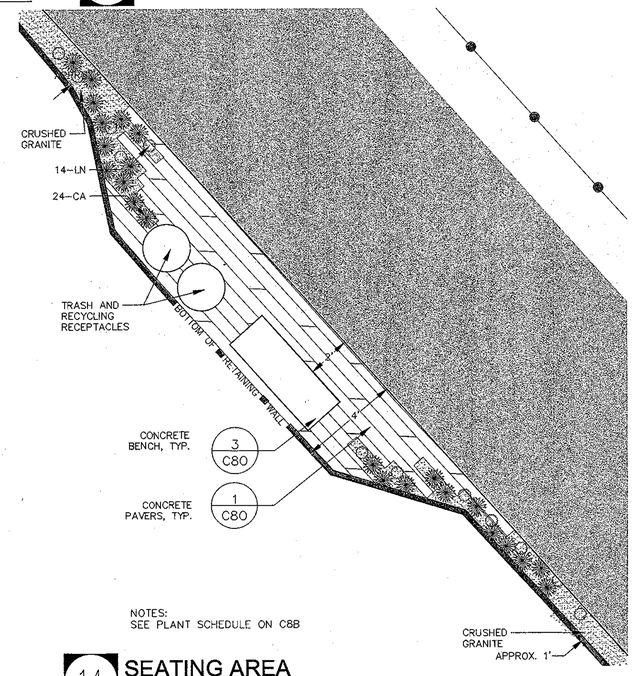
CONCRETE SEAT WALL- SECTION



CONCRETE SEAT WALL- SIDE VIEW

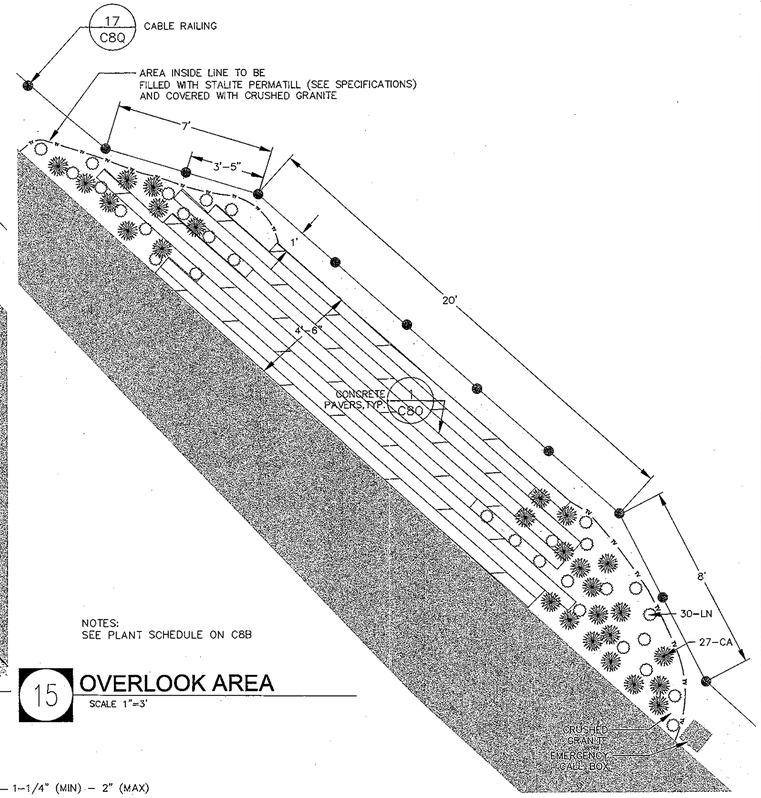
12 CONCRETE SEAT WALL- POURED IN PLACE

NOT TO SCALE



14 SEATING AREA

SCALE 1"=2'

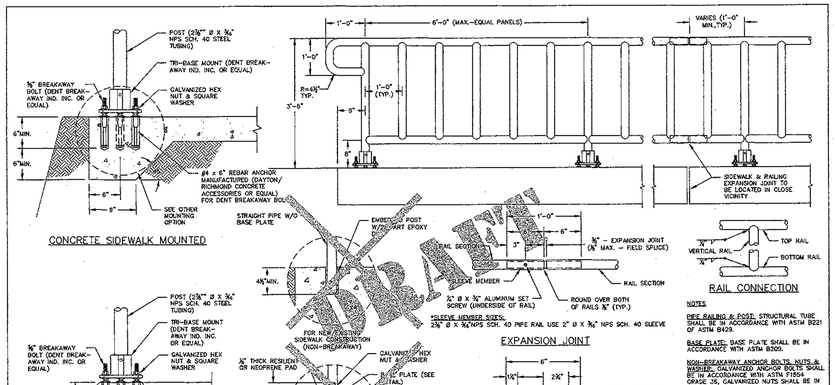


15 OVERLOOK AREA

SCALE 1"=3'

13 SIDEWALK SAFETY RAILING

NOT TO SCALE

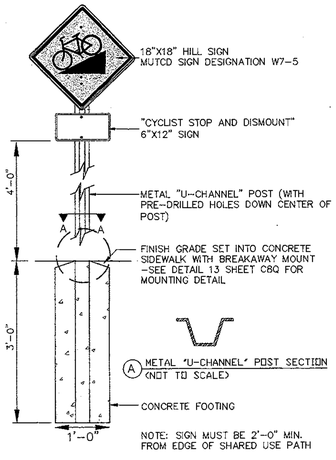


City of Asheville, NC
Transportation & Engineering Department

SIDEWALK SAFETY RAILING

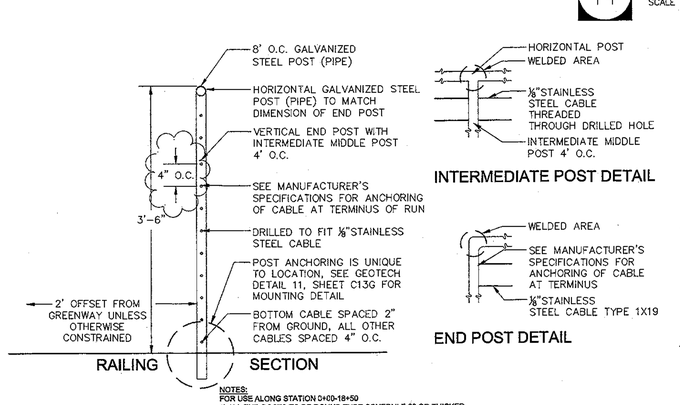
REVISIONS DATE	DESCRIPTION

STD. NO. 3.35



16 PEDESTRIAN SIGN

NOT TO SCALE

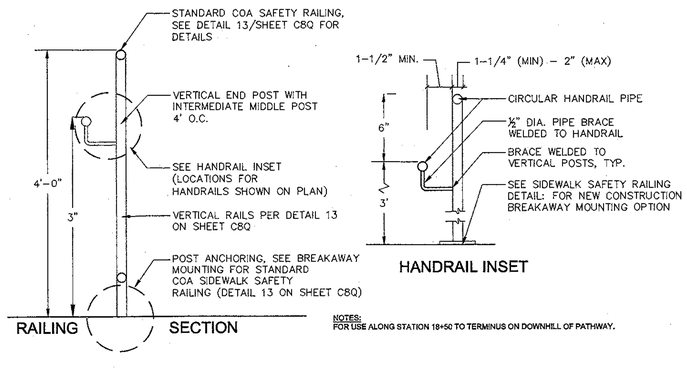


NOTES:
FOR USE ALONG STATION 0+00-18+50
1) ALL END POSTS TO BE ROUND TUBE SCHEDULE 80 OR THICKER.
2) INTERMEDIATE MIDDLE POST 1/2" FLAT BAR USE DOUBLE BAR AND ONLY WHEN NEEDED.
3) CABLE TENSION 350 LBS EACH OR MANUFACTURER'S RECOMMENDATIONS.
4) THE SAFETY RAIL SHOULD BEGIN 1' PRIOR TO THE AREA OF NEED (STEEP SLOPE).
5) THE ENDS OF THE SAFETY RAILING SHOULD BE FLARED AWAY FROM THE EDGE OF THE TRAIL.
6) THE MANUFACTURER IS AMERICAN CABLE RIGGING SUPPLY, INC. OR APPROVED EQUAL.
7) DRILLED HOLES IN POSTS AND BARS SHALL BE ROUNDED SMOOTH AND FREE OF BURRS OR ROUGH EDGES.
8) MAINTAIN HORIZONTAL SEPARATION OF THE VERTICAL PLANE OF NO LESS THAN 6" FROM CABLE TO FACE OF WALL.

17 CABLE RAILING

NOT TO SCALE

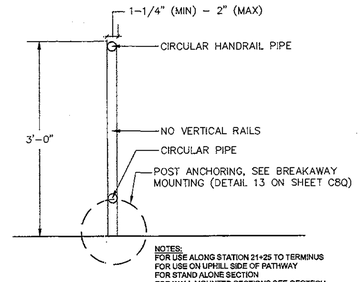
ALTERNATE: Galvanized steel 2" top rail with 1 ½" pipe welded rails (spacing to meet code) and 2 ½" posts spaced 5' O.C.



NOTES:
FOR USE ALONG STATION 18+50 TO TERMINUS ON DOWNHILL OF PATHWAY.

18 GUARD RAIL WITH HAND RAIL (DOWNHILL SIDE)

NOT TO SCALE



NOTES:
FOR USE ALONG STATION 21+25 TO TERMINUS
FOR USE ON UPHILL SIDE OF PATHWAY
FOR STAND ALONE SECTION
FOR WALL MOUNTED SECTIONS SEE GEOTECH

19 HAND RAIL (UPHILL SIDE)

NOT TO SCALE

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT DAVID P. TUCH

Revisions		Date
3	RE-BID	5/27/14
		5/9/14

Issue Date: 12/6/2013
Drawn By: DC
Designed By: FG
CHECKED BY: DT
Date: 12/6/2013

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS
GREENWAY DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C8Q

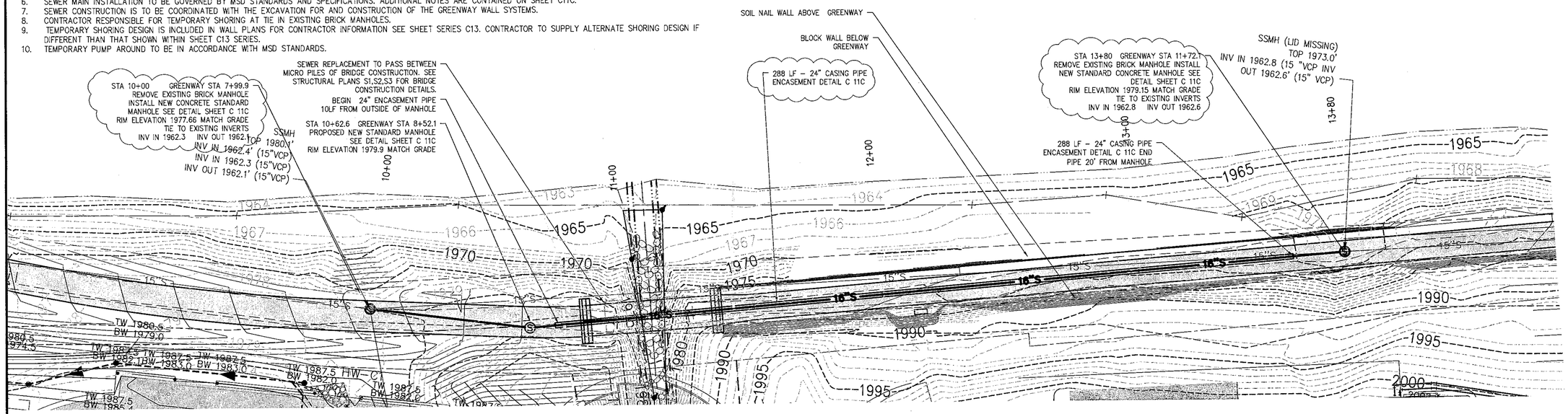
NOTES:

1. EXISTING SANITARY SEWER MAIN IS SHOWN AS 15" VITRIFIED CLAY PIPE. CONTRACTOR TO VERIFY SIZE.
2. PROPOSED SEWER PIPE SHALL BE 16" DIP.
3. SPACERS SHALL BE BY CASCADE WATER WORKS. SPACER SPACING SHALL BE 6', WITH SPACERS BEING PLACED WITHIN 2' OF EITHER SIDE OF PIPE JOINTS. CONTRACTOR SHALL CONFIRM SPACER SPACING AND LAYOUT WITH PIPE MANUFACTURER PRIOR TO CONSTRUCTION. SEE DETAIL SHEET C11C
4. ENCASEMENT PIPE SHALL BE 24" STEEL PIPE WITH MINIMUM WALL THICKNESS OF 0.250"

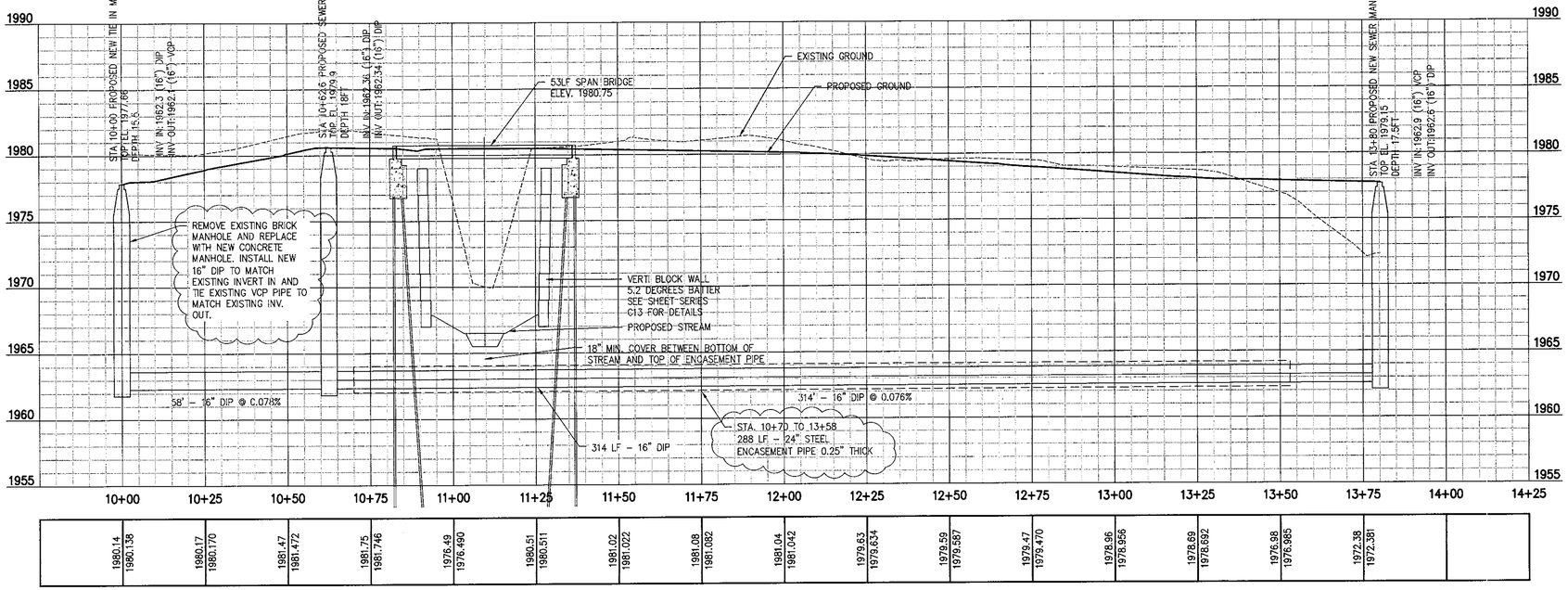
CONSTRUCTION NOTES

5. REFER TO GREENWAY EROSION CONTROL PLAN SERIES C8 FOR REQUIRED EROSION CONTROL MEASURES.
6. SEWER MAIN INSTALLATION TO BE GOVERNED BY MSD STANDARDS AND SPECIFICATIONS. ADDITIONAL NOTES ARE CONTAINED ON SHEET C11C.
7. SEWER CONSTRUCTION IS TO BE COORDINATED WITH THE EXCAVATION FOR AND CONSTRUCTION OF THE GREENWAY WALL SYSTEMS.
8. CONTRACTOR RESPONSIBLE FOR TEMPORARY SHORING AT TIE IN EXISTING BRICK MANHOLES.
9. TEMPORARY SHORING DESIGN IS INCLUDED IN WALL PLANS FOR CONTRACTOR INFORMATION SEE SHEET SERIES C13. CONTRACTOR TO SUPPLY ALTERNATE SHORING DESIGN IF DIFFERENT THAN THAT SHOWN WITHIN SHEET C13 SERIES.
10. TEMPORARY PUMP AROUND TO BE IN ACCORDANCE WITH MSD STANDARDS.

FOR CONSTRUCTION



PROPOSED GREENWAY SEWER



10+00	10+25	10+50	10+75	11+00	11+25	11+50	11+75	12+00	12+25	12+50	12+75	13+00	13+25	13+50	13+75	14+00
1980.14 / 1980.138	1980.17 / 1980.170	1981.47 / 1981.472	1981.75 / 1981.746	1976.49 / 1976.490	1980.51 / 1980.511	1981.02 / 1981.022	1981.08 / 1981.082	1981.04 / 1981.042	1979.63 / 1979.634	1979.59 / 1979.587	1979.47 / 1979.470	1978.96 / 1978.956	1978.69 / 1978.692	1976.98 / 1976.985	1972.38 / 1972.381	

0 10' 20' 40'
SCALE: 1" = 20'–0"

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	3.14.14
CONSTRUCTION BID SET	5.27.14
CONSTRUCTION RE BID SET	

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

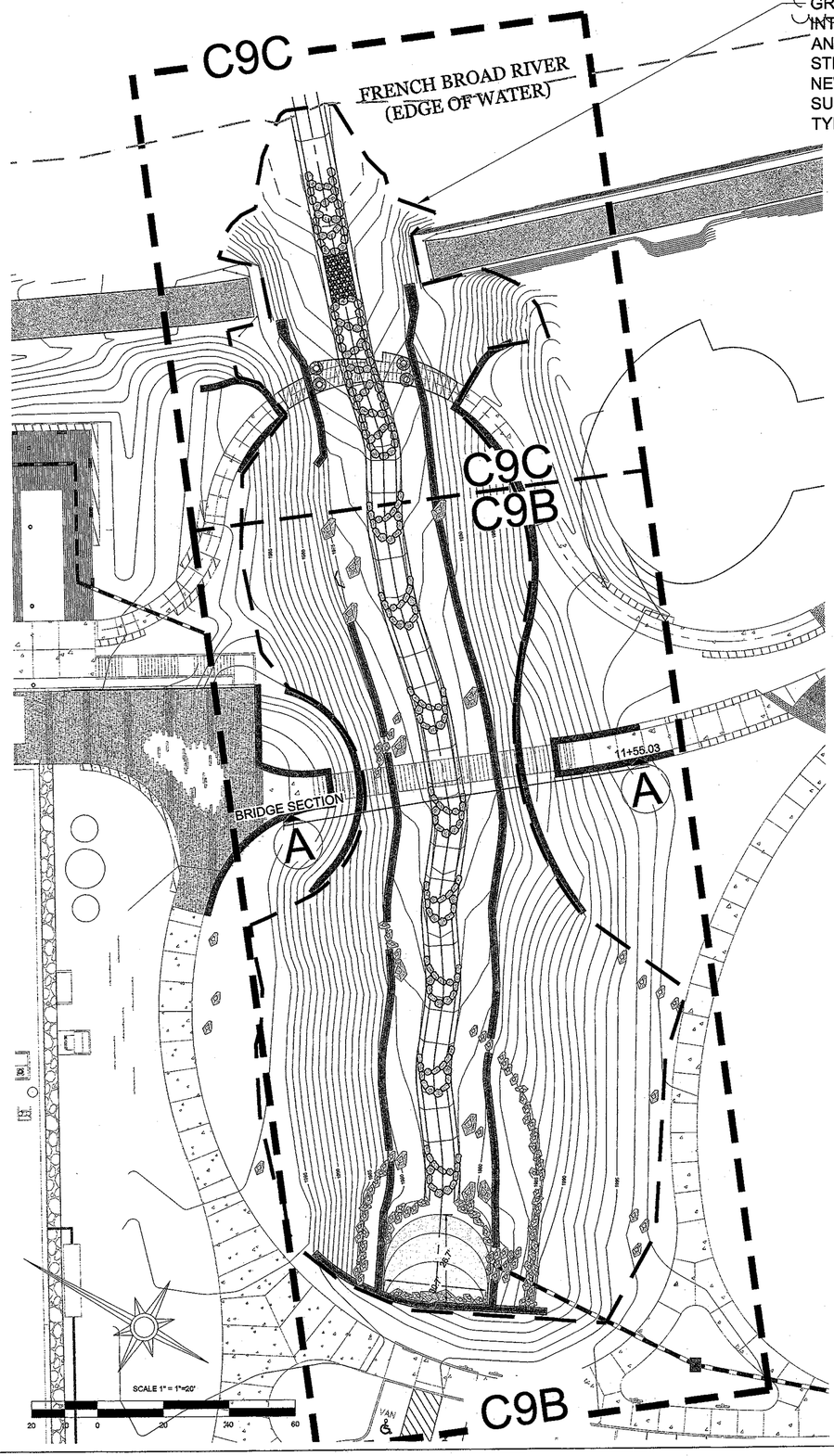
CRAVEN STREET IMPROVEMENTS

GREENWAY SEWER REPLACEMENT AT GREENWAY BRIDGE

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1" = 5'
Horizontal Scale: 1" = 20'
Commission Number: 3267
Sheet No.: C8R

FOR CONSTRUCTION



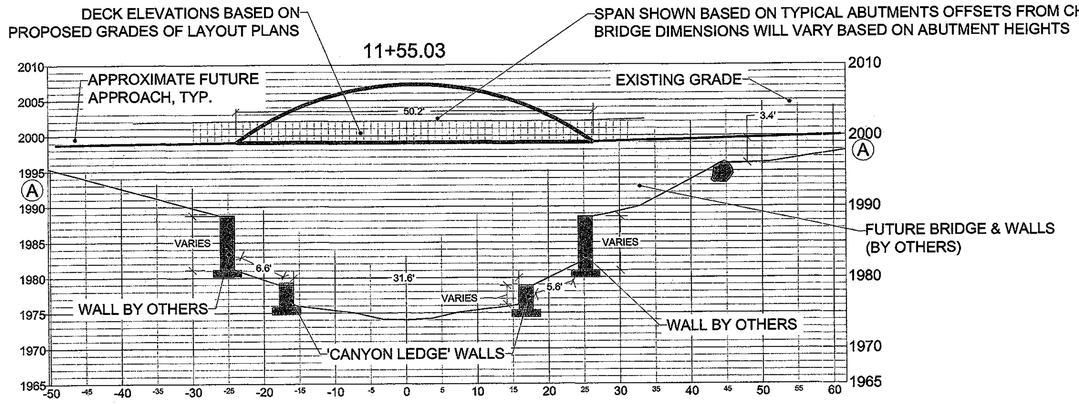
GRADING LIMITS SHALL TERMINATE INTO EXISTING GRADE. FUTURE GRADING, SITE, HARDSCAPE AND BRIDGE INSTALLATION WILL OCCUR WHICH WILL TIE INTO STREAM RESTORATION GRADING UPON CONSTRUCTION OF THE NEW BELGIUM SITE. STEEP SLOPE EROSION CONTROL PRACTICES SUCH AS AN FGM APPLICATION SHALL BE IMPLEMENTED WHERE TYING OUT OF SLOPES EXCEED 2:1.

NOTE:
1. RETAINING WALLS AND GRADING REVISED ON 5/7/2014.
2. ALL WALLS EXCEPT BOULDER WALLS DESIGNED BY OTHERS.

CHANNEL CONSTRUCTION NOTES:

1. CONTRACTOR SHALL PERFORM ALL NECESSARY SUBSURFACE UTILITY INVESTIGATIONS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF EXISTING CONDITIONS, OBSTRUCTIONS, AND UTILITIES WHICH MAY AFFECT PROPOSED WORK.
2. CONSTRUCTION SHALL BEGIN AT THE UPSTREAM END OF EACH CHANNEL REACH AND PROCEED DOWNSTREAM UNLESS APPROVED OTHERWISE BY THE ENGINEER.
3. ALL MECHANIZED EQUIPMENT OPERATED IN OR NEAR THE STREAM OR ITS TRIBUTARIES SHALL BE INSPECTED REGULARLY AND MAINTAINED TO PREVENT CONTAMINATION OF STREAM WATERS FROM FUELS, LUBRICANTS, HYDRAULIC FLUIDS, OR OTHER TOXIC MATERIALS.
4. CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIALS GENERATED BY CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.
5. THE INSTALLATION OF EROSION CONTROL MEASURES AND PRACTICES SHALL OCCUR PRIOR TO LAND DISTURBING ACTIVITIES.
6. DIMENSION TOLERANCES SHALL BE AS FOLLOWS:
   WIDTH: +/- 0.5 FT
   DEPTH: +/- 0.2 FT
   RIFFLE ELEVATIONS: +/- 0.1 FT
   POOL ELEVATIONS: + 0.1 FT, - 0.5 FT
   STRUCTURE ELEVATIONS: +/- 0.1 FT
7. PUMP AROUND OPERATION SHALL BE USED TO DIVERT FLOW DURING CONSTRUCTION EXCEPT AS ALLOWED BY THE ENGINEER. ALL EXCAVATION SHALL BE PERFORMED IN THE DRY OR IN ISOLATED REACHES EXCEPT AS ALLOWED BY THE ENGINEER.
8. ANY LINER UTILIZED TO BE AQUATIC-SAFE/FISH GRADE.

BRIDGE SECTION (BETWEEN LIQUID CENTER AND BREWHOUSE)



Horizontal Scale 1"=10'
Vertical Scale: 1"=10'

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH
Upland Design

NORTH CAROLINA PROFESSIONAL SEAL 021767 ENGINEER GRANT GINN
Stream Restoration

Revisions	Date
1 WALL ADJUSTMENTS	05-09-14
3 RE-BID	5/27/14

Issue Date: 12/6/2013
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Designed By: FG/GG
Checked By: DT/GG
Date: 12/6/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENGINEERING
Cole Jenest & Stone
Wolf Creek

CRAVEN STREET IMPROVEMENTS
STREAM ENHANCEMENT PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 1"=20'
Commission Number: 3267
Sheet No.: C9A

WASHED RIVER ROCK TO TRANSITION IN BANDS FROM LARGE 7-8" TO SMALL 2-3" AT AVG. 18" THICK

FUTURE DEVELOPMENT & GRADING, TYP.

STREAM GRADING LIMITS FOR CONSTRUCTION

WALLS BY OTHERS, TYP.

WALLS DESIGNED BY OTHERS

HOOK-RUN STA=10+34.1 EL=1978.51

HOOK-RUN STA=10+64.8 EL=1977.99

HOOK-RUN STA=10+92.1 EL=1977.16

HOOK-RUN STA=11+44.1 EL=1974.75

HOOK-RUN STA=11+17.3 EL=1975.90

HOOK-RUN STA=11+76.1 1973.77

HOOK-RUN STA=12+08.9 EL=1973.43

HOOK-RUN STA=12+35.7 EL=1972.55

LARGE FLAT BOULDERS BURIED 2/3 INTO GRADE

RECEIVING BASIN 4 C9D

SEE GEOTECH FOR WALL

30.7'

26.7'

BOULDER WALL, TYP. 2 C9D

BOULDER/GRANITE WALL INTERFACE

HISTORIC CRAFT STONE MASONRY WALL 'CLASS C', TYP. 1 C9D

HOOK-RUN, TYP. 1 C9C

6'

LIMITS OF GRADING, TYP.

FUTURE DEVELOPMENT

MATCHLINE C9B

MATCHLINE C9C

PLAN VIEW

SCALE 1" = 10'

PEDESTRIAN BRIDGE
STA:11+62.32
ELEV:1999.56

FINISHED GRADE
Station=9+86.89
elev = 1993.416

TOP OF ARCH
Station=10+00.00
elev = 1986.566

ARCH INVERT
Station=10+00.46
elev = 1979.602

EL 1978.60 STA 10+25.01
EL 1978.51 STA 10+34.05
EL 1978.23 STA 10+48.85
EL 1977.99 STA 10+64.81
EL 1977.44 STA 10+78.02
EL 1977.16 STA 10+92.06
EL 1976.17 STA 11+03.56
EL 1975.90 STA 11+17.30
EL 1975.06 STA 11+28.80
EL 1974.75 STA 11+44.15
EL 1973.97 STA 11+55.65
EL 1973.77 STA 11+76.10
EL 1973.62 STA 11+90.70
EL 1973.43 STA 12+08.94
EL 1972.84 STA 12+21.26
EL 1972.55 STA 12+35.74
EL 1971.59 STA 12+47.24

-0.01% -1.00% -1.66% -1.53% -4.16% -2.00% -8.57% -2.00% -7.33% -2.00% -6.78% -0.98% -1.02% -1.05% -4.79% -2.00% -8.32%

2000 1996 1992 1988 1984 1980 1976 1972 1968

10+00 10+50 11+00 11+50 12+00 12+50

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P TUCH
Upland Design

NORTH CAROLINA PROFESSIONAL SEAL 021757 ENGINEER GRANT GINN
Stream Restoration

Revisions	Date
1 WALL ADJUSTMENTS	5-9-14
3 RE-BID	5/27/14

Issue Date: 12/6/2013
Drawn By: FG
Designed By: GG/FG
Checked By: GG/DT
Date: 12/6/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone
Wolf Creek

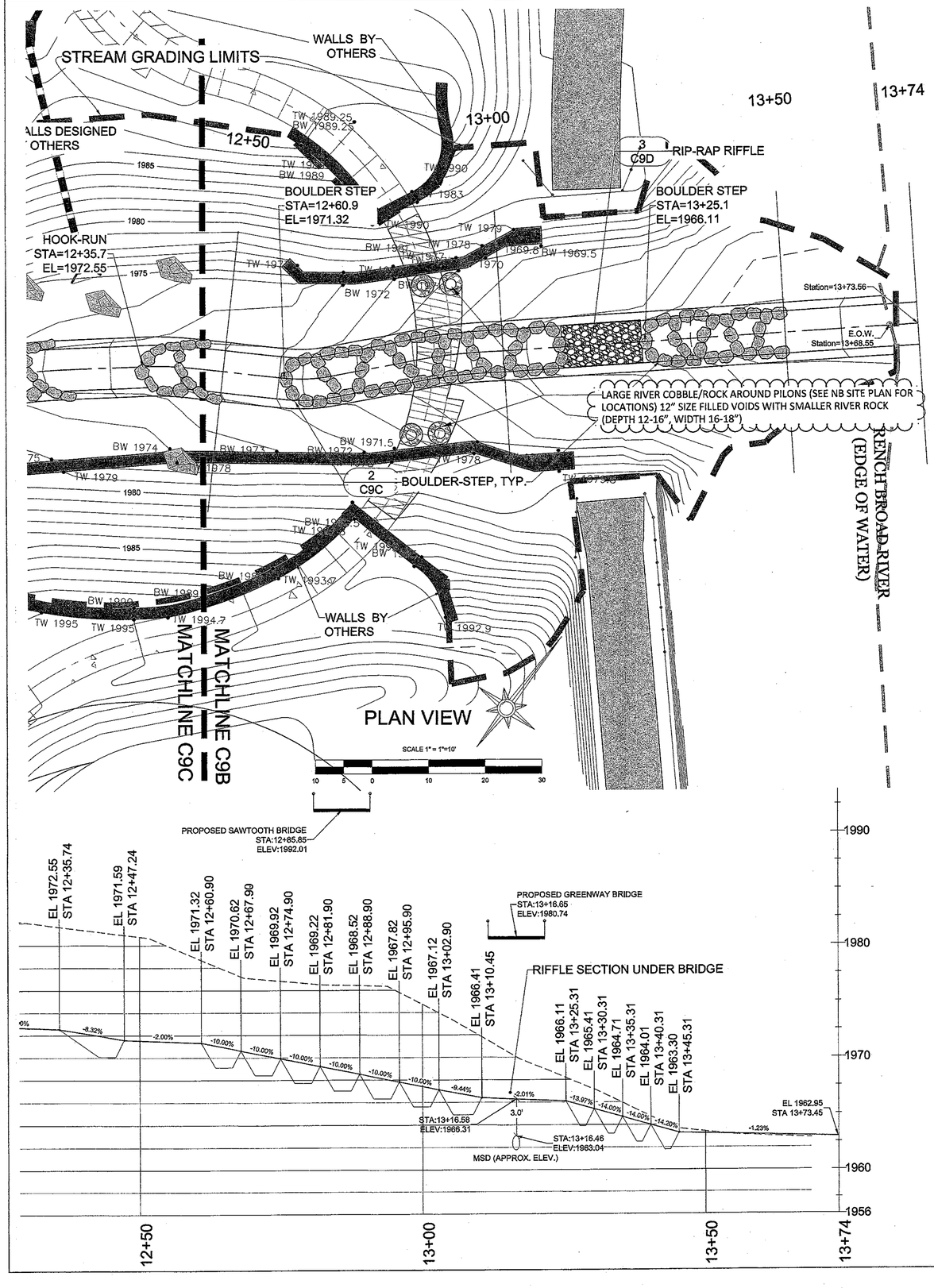
CRAVEN STREET IMPROVEMENTS

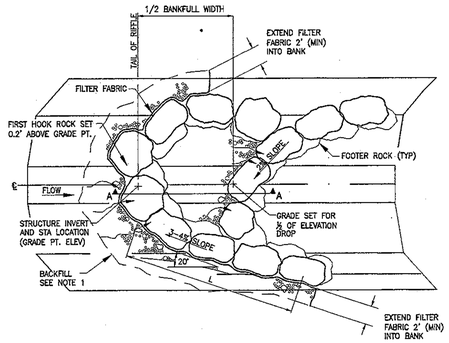
STREAM ENHANCEMENT PLAN SERIES

CITY OF ASHEVILLE, NORTH CAROLINA

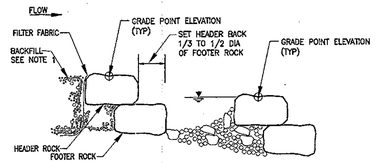
Vertical Scale: 1"=5'
Horizontal Scale: 1"=10'
Commission Number: 3267
Sheet No.: C9B

FOR CONSTRUCTION





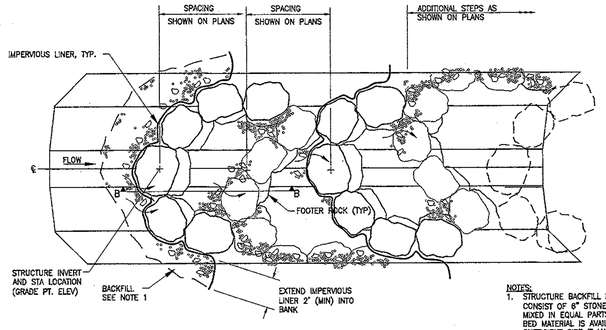
HOOK RUN
PLAN VIEW
NOT TO SCALE



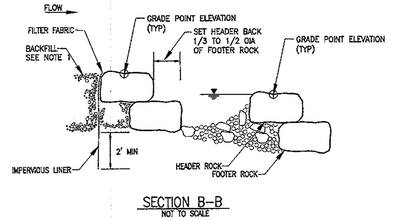
SECTION A–A
NOT TO SCALE

NOTES:
1. STRUCTURE BACKFILL MATERIAL SHALL CONSIST OF 6" STONE, 2" STONE AND SOIL MIXED IN EQUAL PARTS. WHERE EXISTING BED MATERIAL IS AVAILABLE AND OF SUFFICIENT SIZE IT MAY BE USED IN PLACE OF QUARRY STONE, AS APPROVED BY THE ENGINEER.
2. ALL VOIDS AND GAPS BETWEEN BOULDERS SHALL BE CHINKED WITH STONE PRIOR TO INSTALLATION OF FILTER FABRIC.

1 HOOK-RUN
NOT TO SCALE



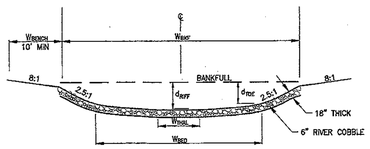
BOULDER STEP
PLAN VIEW
NOT TO SCALE



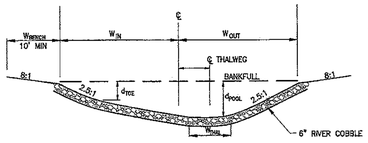
SECTION B–B
NOT TO SCALE

NOTES:
1. STRUCTURE BACKFILL MATERIAL SHALL CONSIST OF 6" STONE, 2" STONE AND SOIL MIXED IN EQUAL PARTS. WHERE EXISTING BED MATERIAL IS AVAILABLE AND OF SUFFICIENT SIZE IT MAY BE USED IN PLACE OF QUARRY STONE, AS APPROVED BY THE ENGINEER.
2. ALL VOIDS AND GAPS BETWEEN BOULDERS SHALL BE CHINKED WITH STONE PRIOR TO INSTALLATION OF IMPERVIOUS LINER.

2 BOULDER-STEP
NOT TO SCALE



SECTION 1
TYPICAL RIFFLE
NOT TO SCALE



SECTION 1
TYPICAL POOL
NOT TO SCALE

TABLE 1: SECTION DIMENSIONS

REACH	TYPICAL SECTION	STATION	RIFFLE DIMENSIONS						POOL DIMENSIONS		
			W_{BKF} (ft)	W_{BED} (ft)	W_{THAL} (ft)	W_{BENCH} (ft)	d_{RIFF} (ft)	d_{TOE} (ft)	W_{IN} (ft)	W_{OUT} (ft)	d_{POOL} (ft)
Craven	1	10+00 TO 13+80	11.5	7.5	2.3	10	1.00	0.80	6.9	5.8	1.51

TABLE 2: BED MATERIAL

REACH	PERCENT OF TOTAL MAX						
	ON-SITE SAND/CLAY	1/2" STONE	3/4" STONE	2" STONE	6" STONE	12" STONE	DEPTH OF BED MATERIAL
Craven	20	–	–	20	60	–	0.5

TABLE 3: STRUCTURE DIMENSIONS

REACH	STRUCTURES				BOULDERS		
	ARM LENGTH L (FT)	THROAT WIDTH W (FT)	BURIED LENGTH X (FT)	TOTAL LOG LENGTH (FT)	LENGTH (FT)	WIDTH (FT)	DEPTH (FT)
Craven	12	4	4	20	3.0–3.5	2.0–2.5	1.5–2.0

NOTE: TOTAL LOG LENGTH INCLUDES THE ROOTBALL

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH
Upland Design

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028767 GRANT GINN
Stream Restoration

Revisions		Date
1	WALL ADJUSTMENTS	5/9/14
3	RE-BID	5/27/14

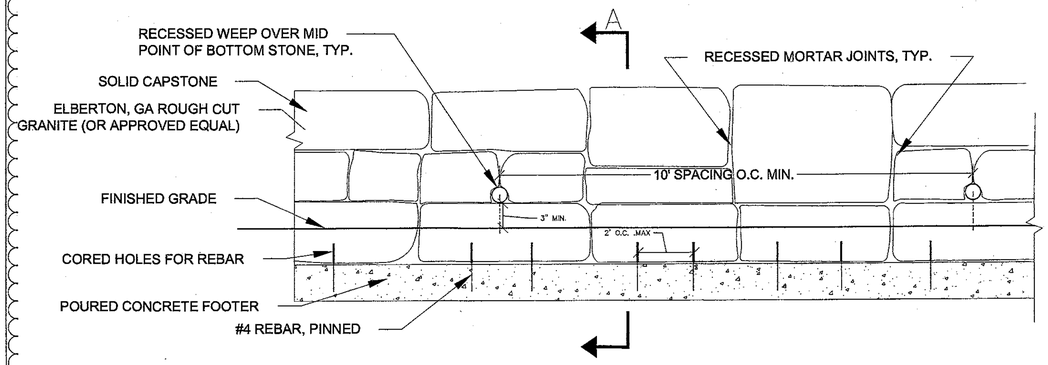
Issue Date: 12/6/2013
Drawn By:
Designed By:
Checked By:
Date: 12/6/2013

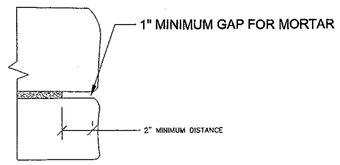
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone
Wolf Creek

CRAVEN STREET IMPROVEMENTS
STREAM ENHANCEMENT PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

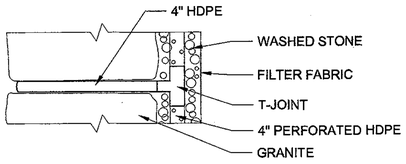
Vertical Scale: 1"=5'
Horizontal Scale: 1"=10'
Commission Number: 3267
Sheet No.: C9C

FOR CONSTRUCTION





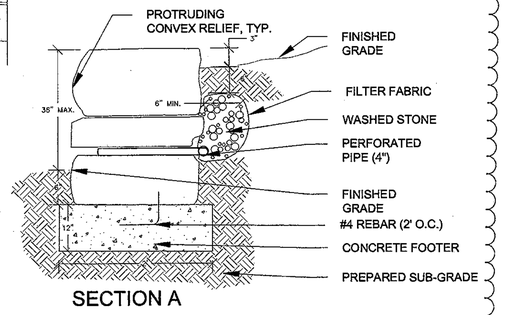
MORTAR DETAIL SECTION



PLAN VIEW OF WALL DRAINAGE

REMOVED

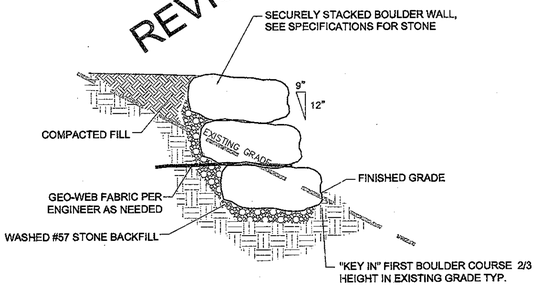
REPLACE WITH VERTI-BLOCK
"CANYON LEDGE #702" COLOR
SELECTED BY LANDSCAPE ARCHITECT ON
SITE WITH 3 NATURAL COLORS (GRAY RANGE)
PROVIDED FOR SELECTION (SEE GEOTECH).



SECTION A

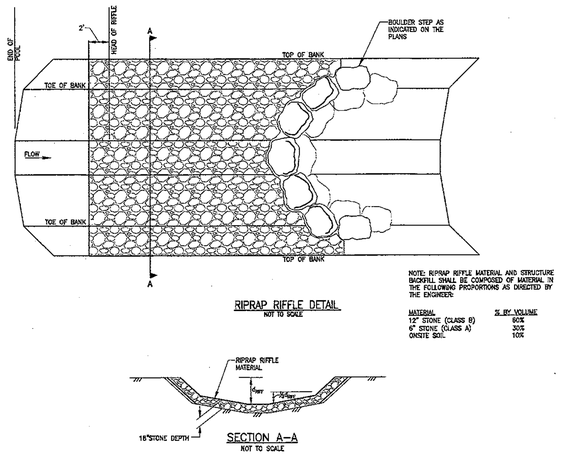
1 HISTORIC CRAFT STONE MASONRY WALL 'CLASS C'
NOT TO SCALE

REVISED BY ECS

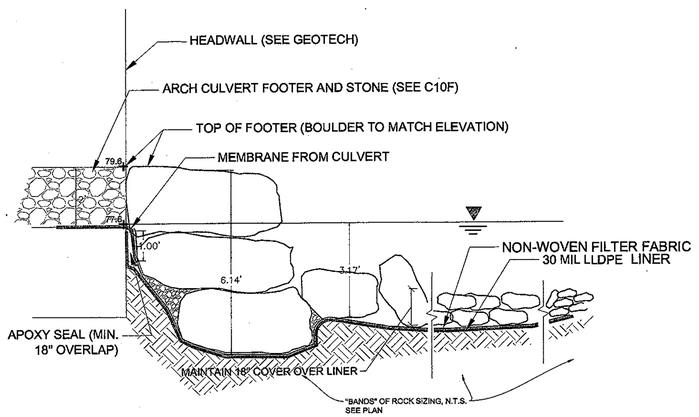


NOTE: WALLS OVER 4' TO BE APPROVED
BY CIVIL ENGINEER

2 BOULDER WALL
NOT TO SCALE



3 RIP RAP RIFFLE
NOT TO SCALE



4 RECEIVING BASIN
NOT TO SCALE

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P TUCH
Upland Design
PROFESSIONAL SEAL 037767 ENGINEER GRANT GUNN
Stream Restoration

Revisions		Date
1	WALL ADJUSTMENTS	5-9-14
3	RE-BID	6/27/14

Issue Date: 12/6/2013
Drawn By:
Designed By:
Checked By:
Date: 12/6/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone
Wolf Creek

CRAVEN STREET IMPROVEMENTS

STREAM ENHANCEMENT PLAN SERIES

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: 1"=10'
Horizontal Scale: 1"=10'
Commission Number: 3267
Sheet No.: C9D

REVEGETATION LEGEND

SYMBOL	REVEGETATION ZONE DESCRIPTION
	Riparian/Bankful Zone: Includes area from top of bank to approximate floodplain bench, or equivalent (8'-10' wide, typical). This zone includes temporary seeding, permanent seeding (Channel Mix), and some plug plantings (See Plan).
	Upland Zone: Includes area from top of the bench to existing grade at the limit of disturbance. This zone includes temporary seeding, permanent seeding (Riparian Buffer Mix), and B&B, container plants and plugs (See Plan).

FOR CONSTRUCTION

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

Revisions	Date
MSD ADJUSTMENT	5.9.14
RE BID	5.27.14

Issue Date: 5/27/2014
Drawn By: EE
Designed By: EE
Checked By: DT
Date: 12/6/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
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CRAVEN STREET IMPROVEMENTS

STREAM ENHANCEMENT PLAN SERIES

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale:
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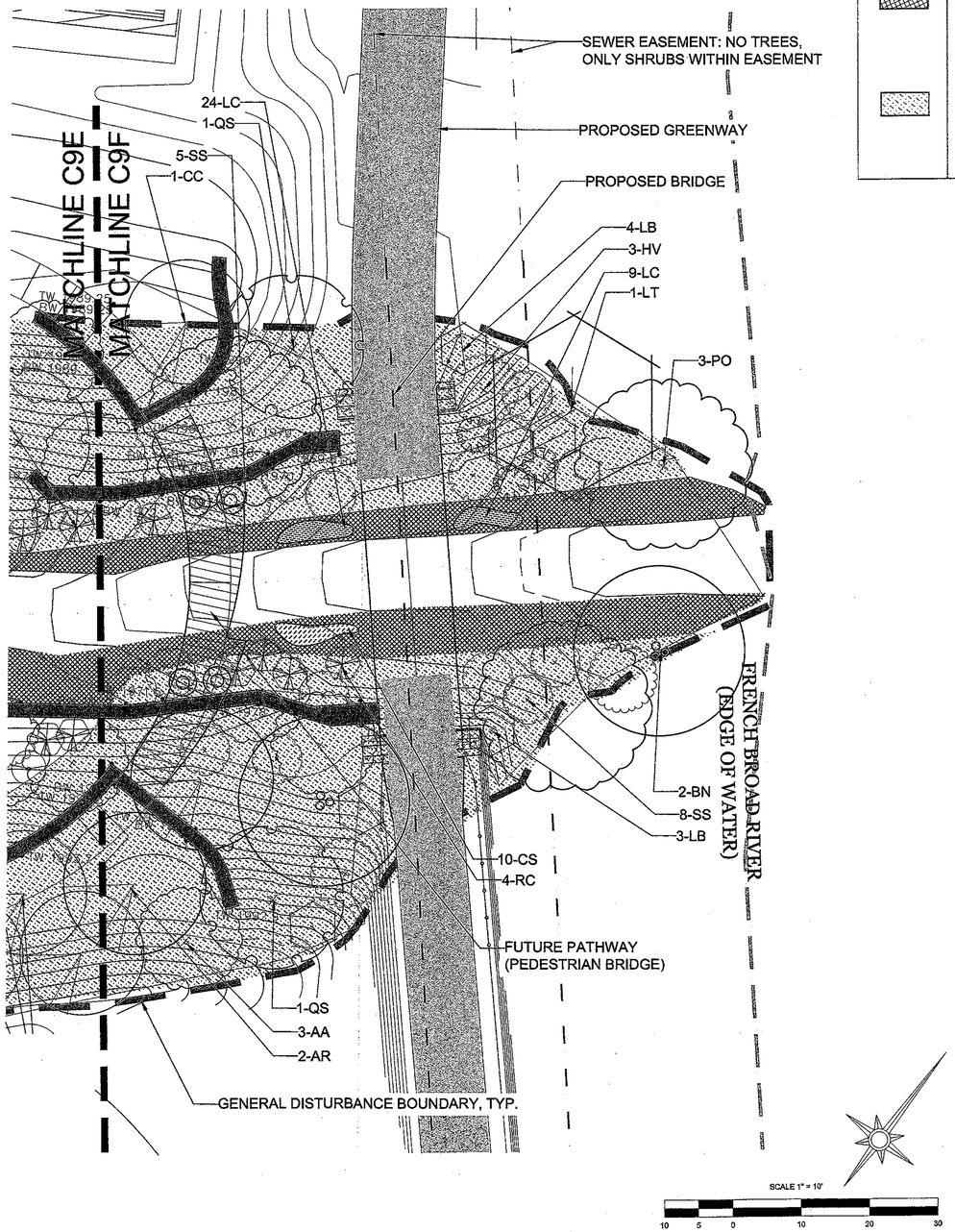
Commission Number: 3267
Sheet No.: C9E

890-SH
4-PO
3-IO
470-BG
3-BN
42-CV
52-PV
1-IJ
26-CL
SEE NEW BELGIUM SITE PLANS
40-CV
25-CL
MULCHED PLANTING BED, TYPICAL (ALL NON-SEEDED AREAS TO BE MULCHED)
3-AA
3-QS
1-PO
3-BN
3-AR
1-QS
3-HQ
10-FG
27-CF
7-IV
1-IO
3-CC
5-HQ
5-IG
3-IM
3-RC
3-CC
1-LT
MATCHLINE C9E
MATCHLINE C9F
RAILING BY OTHERS
9-JV
16-CL
21-IV
42-CF
35-IV
23-CF
POOL
10-CS
38-LC
34-LC
13-CS
3-IG
7-RC
74-ES
61-PD
27-CS
11-LS
20-CS
28-JE
60-JE
33-CF
17-LS
40-JE
13-CS
11-LS
9-FG
SEEDED AREAS, TYPICAL (SEE LEGEND)
SEE GRADING PLAN FOR BOULDER LOCATIONS, TYP.
7-IG
10-IM
647-SH
455-BG
3-IO
58-CV
7-PV
47-EC
53-ES
5-CL
7-PV
MULCHED PLANTING BED ALONG BORDER (MULCH ALL BEDS AND PLANTING MASSES, TYP.)
5-BN
13-BC
3-AR
5-PV
13-BC
19-PV
ADDITIONAL BOULDERS IN BEDS, TYP.
NO TREES OR SHRUBS WITHIN MAINTENANCE ACCESS
4-PO
20-BC
275-SH
3-IG
11-PV
5-AA
9-CL
12-BC
MULCHED BEDS FOR SHRUB MASSES, TYP.
GRASS SEEDED AREA (GRASS MIX)
GRASS SEEDED AREA (BY OTHERS) - SEE SITE PLAN
SEE NEW BELGIUM SITE PLANS BRIDGE LOCATIONS & PLANTINGS, BY OTHERS
3-CC
3-RC
4-FG
3-AA
4-BN
9-RC
3-LT
1-QS
5-HQ
5-IG
4-HV

*NOTE: RAILING TO BE PROVIDED BY OTHERS .

NOTES:
- ALL CONTAINER PLANTS SHOWN AS INDIVIDUAL SYMBOLS; ALL PLUG PLANTINGS SHOWN AS HATCHED MASSES.
- SEE PLANTING & REVEGETATION SPECIFICATIONS FOR MORE INFORMATION.
- ALL BEDS WITH "SH" PLANTED MUST HAVE SOIL WITH pH BETWEEN RANGE OF 6-7, TYPICAL.

PLAN VIEW
SCALE 1" = 10'
10 5 0 10 20 30



REVEGETATION LEGEND

SYMBOL	REVEGETATION ZONE DESCRIPTION
	Riparian/Bankful Zone (0.2 acres): Includes area from top of bank to approximate floodplain bench, or equivalent (8'-10' wide, typical). This zone includes temporary seeding, permanent seeding (Channel Mix), and some plug plantings (See Plan).
	Upland Zone (0.6 acres): Includes area from top of the bench to existing grade at the limit of disturbance. This zone includes temporary seeding, permanent seeding (Riparian Buffer Mix), and B&B, container plants and plugs (See Plan).

STREAM RESTORATION PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
BC	Bouteloua curtipendula	Sideoats gramma grass	58	1 Gallon	2'-0" O.C.
BG	Bouteloua gracilis	Blue gama grass	925	Plug	2'-0" O.C.
CS	Carex stricta	Tussock sedge	137	Plug	2'-0" O.C.
CL	Chasmanthium latifolium	River oats	206	1 Gallon	2'-0" O.C.
CV	Coreopsis verticillata	Yellow coreopsis	132	1 Gallon	2'-0" O.C.
ES	Eragrostis spectabilis	Purple love grass	127	Plug	2'-0" O.C.
EC	Eupatorium (Conoclinium) coelestinum	Blue mist flower	47	Plug	2'-0" O.C.
IV	Iris virginica	Blue flag iris	63	1 Gallon	2'-0" O.C.
JE	Juncus effusus	Soft rush	128	Plug	18" O.C.
LC	Lobelia cardinalis	Cardinal Flower	81	Plug	18" O.C.
LS	Lobelia siphilitica	Blue lobelia	39	Plug	18" O.C.
PV	Panicum virgatum 'Northwind'	Switchgrass	101	1 Gallon	3'-0" O.C.
PD	Penstemon digitalis 'Husker Red'	Husker red grass	61	Plug	2'-0" O.C.
CF	Polystichum acrostichoides	Christmas Fern	108	1 Gallon	18" O.C.
SH	Sporobolus heterolepis	Prairie dropseed	1812	Plug	16" O.C.
Shrubs					
SS	Calycanthus floridus	Sweetshrub	13	5 Gallon	As shown
FG	Fothergilla 'Mt. Airy'	Fothergilla	19	5 Gallon	As shown
HV	Hamamelis vernalis	Witch hazel	7	5 Gallon	As shown
HQ	Hydrangea quercifolia	Oakleaf hydrangea	13	5 Gallon	As shown
IG	Ilex glabra	Inkberry	20	5 Gallon	As shown
IM	Itea virginica	Viginia sweetspire	13	5 Gallon	As shown
JV	Juniperus virginiana 'Grey Owl'	Grey owl juniper	9	5 Gallon	As shown
LB	Lindera benzoin	Spicebush	7	5 Gallon	As shown
RC	Rhododendron catawbiense	Catawba rhododendron	26	5 Gallon	As shown
Trees					
AR	Acer rubrum	Red maple	8	1-1/2" to 2" Cal.	As shown
AA	Amelanchier 'Autumn Brilliance'	Serviceberry	14	8' - 10' Height	Multi-stem**
BN	Betula nigra 'Heritage'	River birch	17	14' - 16' Height	Multi-stem**
CC	Carpinus caroliniana	Ironwood	10	1-1/4" to 1-1/2" Cal.*	As shown
IJ	Ilex opaca 'Jersey Knight'	American holly pollinator	1	8' - 10' Height	Specimen
IO	Ilex opaca 'Satyr Hill'	American holly	7	8' - 10' Height	As shown
LT	Liriodendron tulipifera	Tulip poplar	5	2" to 2-1/2" Cal.	As shown
PO	Platanus occidentalis	Sycamore	12	3" Cal.	As shown
QS	Quercus shumardii	Shumard oak	7	2" to 2-1/2" Cal.	As shown

** Multi-stem specimens can vary from this caliper, but should be at minimum 10' in height.*

*** Multi-stems to be 3-5 stems only.*

Plugs available at North Creek Nurseries in Landenberg Pennsylvania (5" root length typical); 1-(877)-ECO-PLUG.

STREAM SEEDING SCHEDULE

1. TO ENSURE SURVIVABILITY, WATER SEEDING AND PLANTING IMMEDIATELY AFTER PLANTING.
2. CONTRACTOR TO KEEP RECORD OF SOIL TESTS, SEED PURCHASES, AND APPLICATION RATES FOR FINAL INSPECTION (BAGS & RECEIPTS).
3. GROUND STABILIZATION REQUIRED IN (7) SEVEN DAYS ON PERIMETER AREAS AND SLOPES GREATER THAN 3:1, AND GROUND STABILIZATION IN (14) DAYS ON OTHER AREAS

TEMPORARY SEEDING SCHEDULE

TEMPORARY SEEDING MUST OCCUR WHEN DENUDED AREAS WILL NOT BE BROUGHT TO FINAL GRADE WITHIN 7 CALENDAR DAYS (SEE NOTE 3 ABOVE).

SUMMER

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
GERMAN MILLET	40
PARTRIDGE PEA	10

SEEDING DATES: May 15-Aug 15

WINTER & EARLY SPRING

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
RYE GRASS	40
PARTRIDGE PEA	10

SEEDING DATES: Feb 1-May 15

FALL

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
RYE GRASS	40
PARTRIDGE PEA	10

SEEDING DATES: Aug 15-Dec 30

GENERAL

SOIL AMENDMENTS:
Follow recommendation of soil tests (i.e., lime, etc.). Use only amendments safe for riparian areas (See Planting & Revegetation Specifications for amendment list).

MULCH:
Apply 4,000 lb/acre straw. Anchor straw by tacking.

MAINTENANCE:
Water daily via sprinkler system to ensure germination of seed within the riparian/bankful zone and upland zone. Continue watering at least twice a week until established. If it is necessary to extend temporary cover beyond June 15th overseed with mixes provided. Reseed and mulch immediately following erosion or other damage. See Planting & Revegetation Specifications for more information.

PERMANENT SEEDING SCHEDULE

PERMANENT SEEDING MUST OCCUR WITHIN 14 CALENDAR DAYS OF FINAL GRADING.
COVER CROPS (TEMPORARY SEEDING) TO BE ADDED TO PERMANENT SEEDING MIXES IF NO TEMPORARY SEEDING HAS BEEN PLACED PREVIOUSLY.

REVEGETATION SEEDING MIXES:

	RATE (LB/ACRE)
"RIPARIAN BUFFER MIX" (ERNMX #178):	35
"CHANNEL MIX" (CUSTOM MIX):	35

- See Planting & Revegetation Specifications for species lists

- The seed mixes above are available at ERNST CONSERVATION SEEDS (800.873.3321). Local sources of similar seed mix may be used (to be approved by Equinox in writing).

GRASS SEEDING MIX:	RATE (LB/ACRE)
"GRASS MIX" (CUSTOM):	30
Creeping Red Fescue	15
Kentucky Bluegrass	15

SOIL AMENDMENTS: Physically or chemically treat all exotic invasive plants before amending soil. Add 2"-3" of topsoil and mix into top 6" of soil or alternatively rake topsoil into existing soil to mix before seeding. Follow recommendation of soil tests (i.e., lime, etc.). Use only amendments safe for riparian areas (See Planting & Revegetation Specifications for amendment list).

SOIL PREPARATION: Soil impacted by construction must be loosened prior to seeding by means of disking or raking. Seedbed shall be well-pulvarized, loose, and uniform. All stones larger than three (3) inches, sticks, roots, and other extraneous materials shall be removed. Apply seed uniformly with a cyclon seeder, drop-type spreader, drill or hydro-seeder. Cover broadcast seed by lightly raking, then firm surface with roller or cultpacker. Cut or disc temporary seeding cover crop prior to seeding.

SEED PREPARATION:
Apply seed treated with mycorrhizae solution (See Planting & Revegetation Specifications for supplier), then apply spray on mulch (see Mulch below).

MULCH:
Apply 4,000-5,000 lb/acre grain straw or equivalent cover of another suitable, weed-free mulching material. Use a spray-on growth (mulch) matrix (Flexterra FGM®or equal) for slope embankments that exceed 3:1 slopes.

MAINTENANCE:
Water daily via sprinkler system to ensure germination of seed within the riparian/bankful zone and upland zone. Continue watering at least twice a week until established. Mow or cut back no more than once a year. Reseed and mulch damaged areas immediately. Weed during first 2 years of establishment.

NOTES:
- ALL CONTAINER PLANTS SHOWN AS INDIVIDUAL SYMBOLS; ALL PLUG PLANTINGS SHOWN AS HATCHED MASSES.
- SEE PLANTING & REVEGETATION SPECIFICATIONS FOR MORE INFORMATION.

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 15642 DAVID P TUCH

Revisions	Date
MSD ADJUSTMENT	5.9.14
RE BID	5.27.14

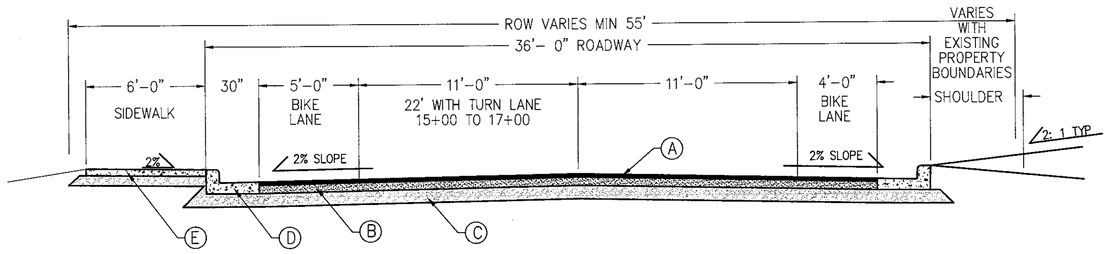
Issue Date: 5/27/2014
Drawn By: EE
Designed By: EE
Checked By: DT
Date: 12/6/2013

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

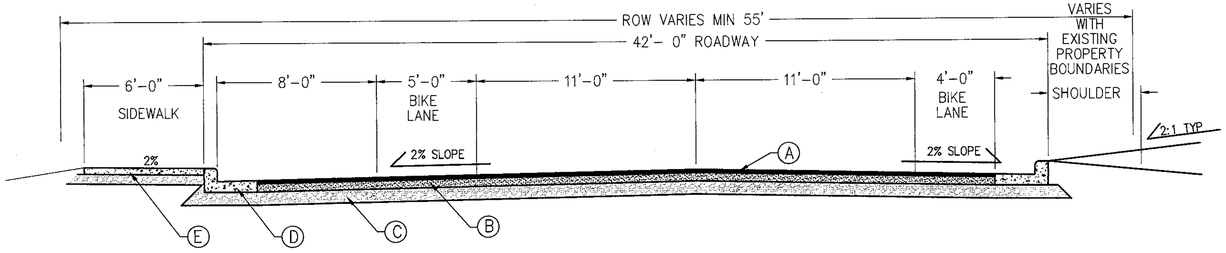
CRAVEN STREET IMPROVEMENTS
STREAM ENHANCEMENT PLAN SERIES
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale:
Horizontal Scale: 1"=10'
Commission Number: 3267
Sheet No.: C9F

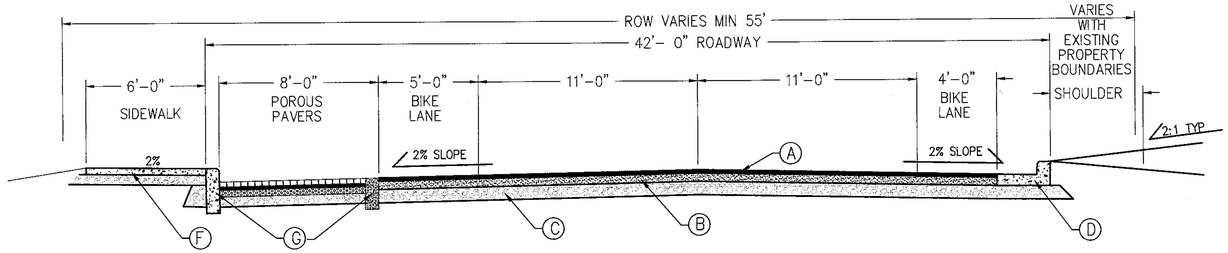
ROADWAY TYPICAL SECTION DETAILS



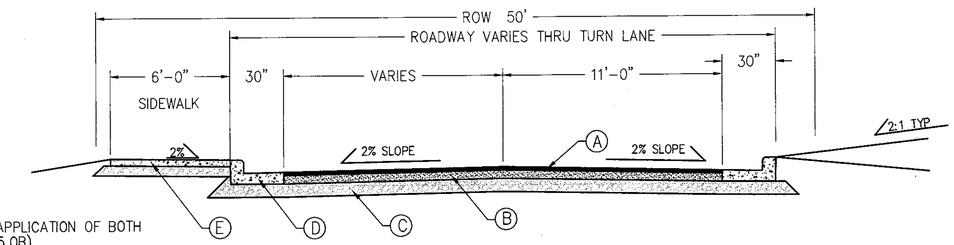
STANDARD CRAVEN STREET ROAD SECTION
STA 15+00 TO 20+00, 28+65–29+85, 33+90–35+36



CRAVEN STREET WITH ON–STREET PARKING ROAD SECTION
STA 20+00 TO 24+80, 26+90–28+65, 32+30–33+90



CRAVEN STREET WITH ON–STREET POROUS PAVER PARKING
STA 25+30 TO 26+15, 29+85–31+65, 35+36–36+65



CRAVEN STREET BRIDGE TO HAZEL MILL ROAD SECTION
STA 10+00 TO 15+33

SIDEWALK CONFIGURATION VARIES SEE SITE PLANS FOR DETAILS

PAVEMENT SCHEDULE

A – 2" OF SF 9.5B

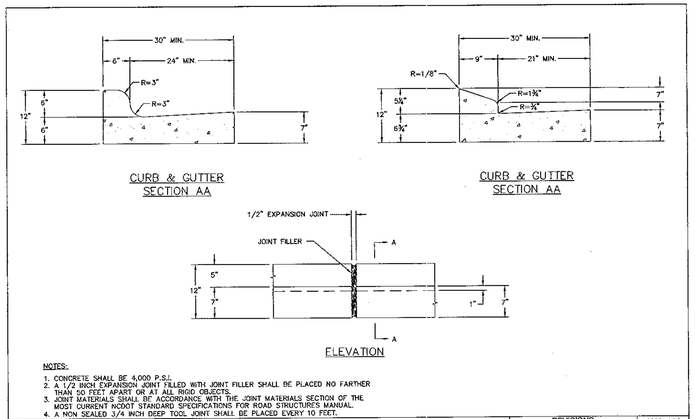
B – 5" OF I 19.0B OR 25.0B OR APPLICATION OF BOTH BINDERS(I19.0B ON TOP OF 25.0B)

C – AGGREGATE BASE COURSE 8" ABC

D – STANDARD CURB AND GUTTER STD DET 3.11

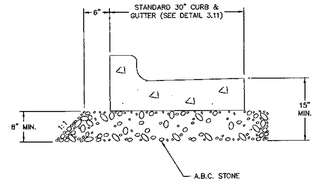
F – MONOLITHIC SIDEWALK CONSTRUCTION PER STD DET 3.16A

G – PERVIOUS PAVER SECTION PER DETAIL 1/C12F

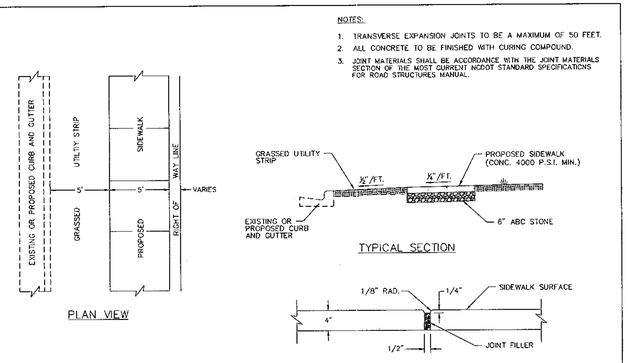


NOTES:
1. CONCRETE SHALL BE 4,000 P.S.I.
2. A 1/2 INCH EXPANSION JOINT FILLED WITH JOINT FILLER SHALL BE PLACED NO FARTHER THAN 50 FEET APART OR AT ALL RIGID OBJECTS.
3. JOINT MATERIALS SHALL BE ACCORDANCE WITH THE JOINT MATERIALS SECTION OF THE MOST CURRENT NCDOT STANDARD SPECIFICATIONS FOR ROAD STRUCTURES MANUAL.
4. A NON SEALED 3/4 INCH DEEP TOOL JOINT SHALL BE PLACED EVERY 10 FEET.

City of Asheville, NC Transportation & Engineering Department	STANDARD CONCRETE CURB AND GUTTER	REVISIONS DATE / DESCRIPTION	STD. NO. 3.11



City of Asheville, NC Transportation & Engineering Department	A.B.C. UNDER 2'-6" CURB & GUTTER	REVISIONS DATE / DESCRIPTION	STD. NO. 3.10



City of Asheville, NC Transportation & Engineering Department	STANDARD CONCRETE SIDEWALK	REVISIONS DATE / DESCRIPTION	STD. NO. 3.16

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 CHARLES S. QUESINBERRY 5/28/14

Revisions	Date
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BID SET	5.27.14
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Issue Date: 5/27/2014
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Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS
ROADWAY DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C10A

FOR CONSTRUCTION

City of Asheville, NC
Transportation & Engineering Department

STANDARD STAND-UP & MOUNTABLE CURB

REVISIONS		STD. NO.
DATE	DESCRIPTION	3.11A

NOTES:
1. RESIDENTIAL DRIVEWAYS – 6" OF 100% CABC WITH 6" CONCRETE FOR FULL LENGTH & DEPTH OF DRIVEWAY APRON
2. COMMERCIAL DRIVEWAYS – 8" OF 100% CABC WITH 6" CONCRETE FOR FULL LENGTH & DEPTH OF DRIVEWAY APRON
3. WHERE SIDEWALK IS OR TO BE INSTALLED, DRIVEWAY APRON MUST EXTEND A MINIMUM OF 10' PAST SIDEWALK.
4. RESIDENTIAL DRIVEWAYS TO BE 12' TO 14' IN WIDTH.
5. COMMERCIAL ACCESS APRON (ONE-WAY) DRIVEWAYS TO BE 14 FT TO 20 FT IN WIDTH.
6. COMMERCIAL ACCESS APRON (TWO-WAY) DRIVEWAYS TO BE 24 FT TO 36 FT IN WIDTH.
7. ALL CONCRETE SHALL BE A MINIMUM OF 4000 P.S.I.
8. ELEV. "B" MINUS ELEV. "A" EQUALS 1 INCH.
9. JOINT MATERIALS SHALL BE ACCORDANCE WITH THE JOINT MATERIALS SECTION OF THE MOST CURRENT NCDOT STANDARD SPECIFICATIONS FOR ROAD STRUCTURES MANUAL.

City of Asheville, NC
Engineering Services Division of the Public Works Department

STANDARD DRIVEWAY ACCESS APRON WITH SIDEWALK ADJACENT TO CURB

REVISIONS		STD. NO.
DATE	DESCRIPTION	3.15A

NOTES:
1. THE CITY TRAFFIC ENGINEER TO APPROVE THE USE OF MONOLITHIC CURB SIDEWALK.
2. THE 1'-0" SAW CUT, REMOVAL, AND THE REPAIR OF ABC STONE, BINDER, SURFACE COURSE FROM FACE OF CURB IS ONLY FOR THE INSTALLATION OF THE MONOLITHIC CURB & SIDEWALK ADJACENT TO AN EXISTING STREET.

City of Asheville, NC
Transportation & Engineering Department

MONOLITHIC CURB & SIDEWALK

REVISIONS		STD. NO.
DATE	DESCRIPTION	3.16A

City of Asheville, NC
Transportation & Engineering Department

MEDIAN ISLAND w/STANDARD MOUNTABLE CURB

REVISIONS		STD. NO.
DATE	DESCRIPTION	3.11B

W	A	W+A+9"	X	B
5'	0.0'	5.8'	5.8'	5.0'*
6'	0.0'	6.8'	6.8'	6.0'**
7'	0.0'	7.8'	7.3'	6.5'**
8'	0.0'	8.8'	7.3'	6.5'**
5'	2.0'	7.8'	7.8'	5.0'
5'	2.5'	8.3'	8.1'	4.8'
5'	3.0'	8.8'	8.3'	4.4'
5'	3.5'	9.3'	8.4'	4.1'
5'	4.0'	9.8'	8.6'	3.8'
5'	4.5'	10.3'	8.7'	3.4'
5'	5.0'	10.8'	8.9'	3.1'

City of Asheville, NC
Engineering Department

STANDARD WHEELCHAIR RAMP

REVISIONS		STD. NO.
DATE	DESCRIPTION	3.17

INSTALLATION NOTES:
1. 3' OF PIPE HEIGHT ABOVE GROUND (PAINTED YELLOW).
2. MINIMUM 3' OF PIPE BELOW FOUNDATION.
3. BACKFILL FOUNDATION WITH CONCRETE AND FILL PIPE WITH CONCRETE.
4. INCREASE NUMBER OF BOLLARDS AS NECESSARY TO OBTAIN 4' MAXIMUM SPACING.

THIS DRAWING OR BILL OF MATERIAL IS CONFIDENTIAL AND MAY NOT BE LOANED, REPRODUCED OR COPIED, EITHER WHOLLY OR IN PART, OR MADE PUBLIC IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF DUKE ENERGY CORPORATION.

DFTD: JNC | CHECKED: JAR | DATE: 08/7/12

Duke Energy.

TRANSMISSION ENGINEERING STANDARDS
BOLLARD INSTALLATION
STANDARD FOR "PASSENGER VEHICLES"

SCALE: NTS | REV: 0 | DWG NO: 120801

City of Asheville, NC
Transportation & Engineering Department

STANDARD METHOD OF ENDING CURB AND GUTTER

REVISIONS		STD. NO.
DATE	DESCRIPTION	3.13

NOTE:
HANDICAP SIGNS SHALL BE LOCATED BEHIND CONCRETE CURB, CENTERED IN FRONT OF EACH HANDICAPPED PARKING SPACE. SIGN MAY BE MOUNTED ON WALL IN LIEU OF POST MOUNTING WHERE APPLICABLE.

CENTER AISLE SHALL BE 5'-0", UNLESS SPACES ARE DESIGNATED VAN-ACCESSIBLE. AISLES ADJACENT TO A VAN-ACCESSIBLE SPACE SHALL BE A MINIMUM OF 8'-0". HANDICAPPED PARKING DETAILS
N.T.S.

LOCATE AT EDGE OF PARKING SPACE UNLESS ACCOMPANIED BY "VAN" LETTERING

HANDICAPPED PARKING SYMBOL
N.T.S.

HANDICAPPED PARKING SIGN
N.T.S.

NOTES:
1. 4000 PSI CONCRETE.
2. ALL CONCRETE WALKS SHALL BE REINFORCED WITH NOVOMESH 950 AT A RATE OF 5 LB/CY IN ACCORDANCE WITH ASTM C1116.
3. SURFACE SHALL BE GIVEN A LIGHT BROOM FINISH WITH THE BRUSH MARKS PARALLEL TO THE CURB.
4. PROVIDE EXPANSION JOINTS AT 30 FT/O.C. (MAX.)
5. PROVIDE CONTRACTION JOINTS AT 5 FT/O.C. (TYP). REFER TO SITE PLAN FOR ACTUAL LOCATIONS.
6. EXPANSION JOINTS ARE REQUIRED WHERE THE SIDE WALK JOINS ANY RIGID STRUCTURE.
7. EXPANSION JOINTS AT JUNCTIONS WITH EXISTING CONCRETE CURB AND WALKS SHALL BE DOWELED JOINTS IF EXISTING WALK SLAB IS 6" OR GREATER.

6" CONCRETE TRANSIT SHELTER FOUNDATION
NOT TO SCALE

SEAL 035195 — NORTH CAROLINA PROFESSIONAL ENGINEER — GABRIEL S. QUESINBERRY — 5/28/14

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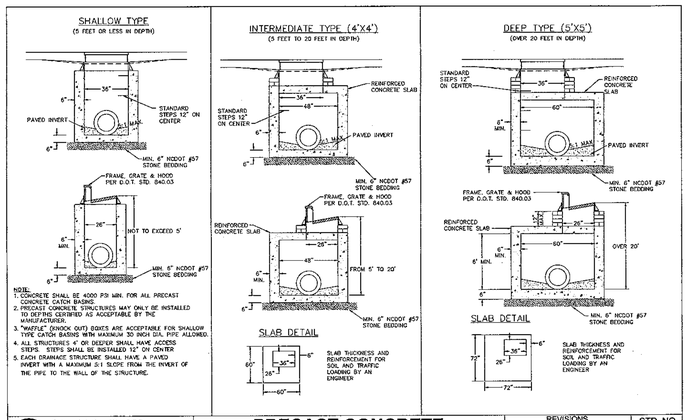
Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS
STANDARD DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C10B

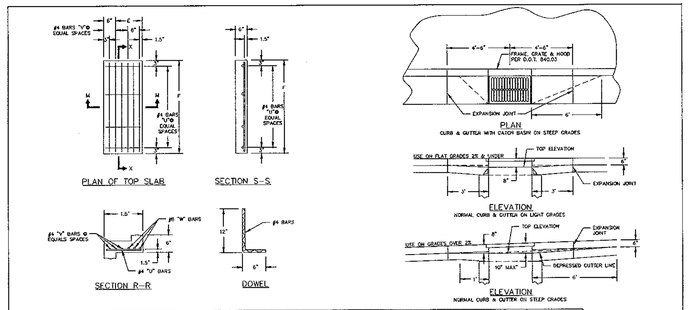
FOR CONSTRUCTION



City of Asheville, NC
Engineering Services Division
of the Public Works Department

PRECAST CONCRETE CATCH BASIN

REVISIONS DATE	DESCRIPTION	STD. NO.
		8.03



MINIMUM DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN (BASED ON MIN. HEIGHT, H, WITH NO RISER) *

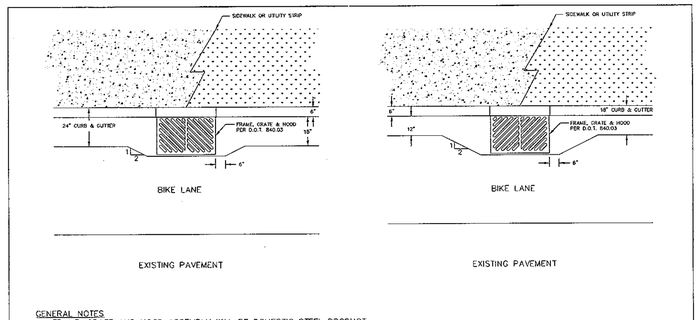
DIMENSIONS OF BOX AND PIPE							COVER		DIM/WIDTH	BARS-U		BARS-V		BARS-W		TOTAL	CU. YDS. CONC. IN BOX TOP SLAB	BOTTOM SLAB	DEDUCTIONS FOR CONC. IN HEIGHT, H	ONE PIPE	
PIPE	SPAN	HGT	THK	WIDTH	SPAN	MIN.	HEIGHT			NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	LBS.	SLAB	SLAB		C.M.	B.C.
D	A	B	C	G	H		E	F													
12"	3'-0"	2'-2"	---	---	2'-9"		---	---	---	---	---	---	---	---	---	---	0.235	0.772		0.015	0.026
18"	3'-0"	2'-2"	---	---	3'-0"		---	---	---	---	---	---	---	---	---	---	0.235	0.829		0.023	0.036
18"	3'-0"	2'-2"	---	---	3'-3"		---	---	---	---	---	---	---	---	---	---	0.235	0.887		0.033	0.049
24"	3'-0"	2'-2"	---	---	3'-6"		---	---	---	---	---	---	---	---	---	---	0.235	1.001		0.050	0.068
30"	3'-0"	2'-2"	1'-1"	---	4'-3"		1'-4"	4'-0"	---	4	3'-5"	3	3'-0"	3	3'-0"	39	0.123	0.321	1.433	0.092	0.127
36"	3'-0"	2'-2"	1'-1"	---	4'-9"		1'-4"	4'-0"	---	4	4'-11"	3	3'-9"	3	3'-9"	43	0.161	0.358	1.714	0.132	0.176
42"	3'-0"	2'-2"	1'-1"	4'-5"	5'-3"		1'-4"	4'-0"	---	4	5'-8"	2	2'-11"	3	2'-11"	52	0.122	0.398	1.738	0.180	0.243
48"	3'-0"	2'-2"	1'-1"	5'-0"	5'-9"		2'-0"	5'-0"	---	4	6'-5"	3	2'-11"	3	2'-11"	55	0.145	0.424	2.053	0.235	0.317
54"	3'-0"	2'-2"	1'-1"	5'-7"	6'-3"		2'-7"	5'-7"	---	4	12'-10"	5	7'-11"	3	2'-11"	41	0.180	0.386	2.387	0.297	0.401

* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

City of Asheville, NC
Engineering Services Division
of the Public Works Department

PRECAST CONCRETE CATCH BASIN

REVISIONS DATE	DESCRIPTION	STD. NO.
		8.03A

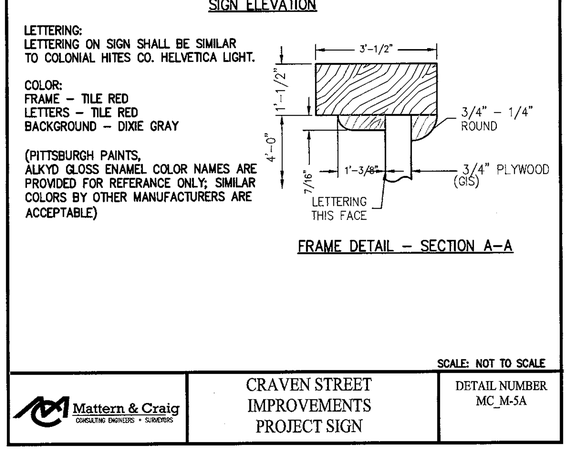


GENERAL NOTES
1. FRAME, GRATE AND HOOD ASSEMBLY WILL BE DOMESTIC STEEL PRODUCT
2. WHEN WARRANTED GRATES WILL BE TYPE F OR BICYCLE SAFE TYPE F AND TYPE G PER NC DOT STD. DETAIL 840.03 PAGE 2 OF 2.
3. CURB AND GUTTER WILL BE CONSTRUCTED WITH 4000 PSI CONCRETE
4. ANY SUBSTITUTION OF GRATE TYPES OR VARIANCE OF CONSTRUCTION PRACTICES MUST BE APPROVED BY THE STORMWATER SERVICES MANAGER OR APPOINTED DESIGNEE.

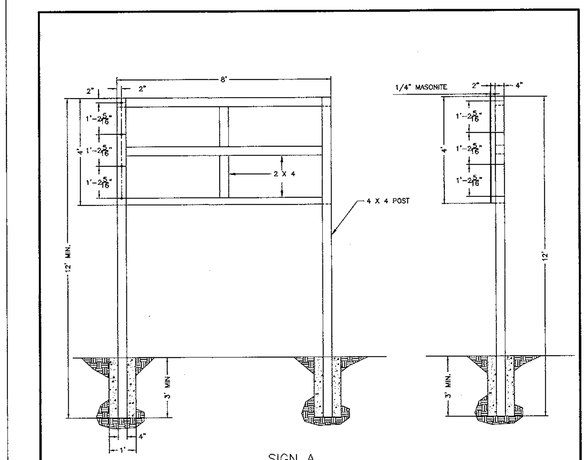
City of Asheville, NC
Engineering Department

CURB INLETS FOR 18" & 24" CURB & GUTTER

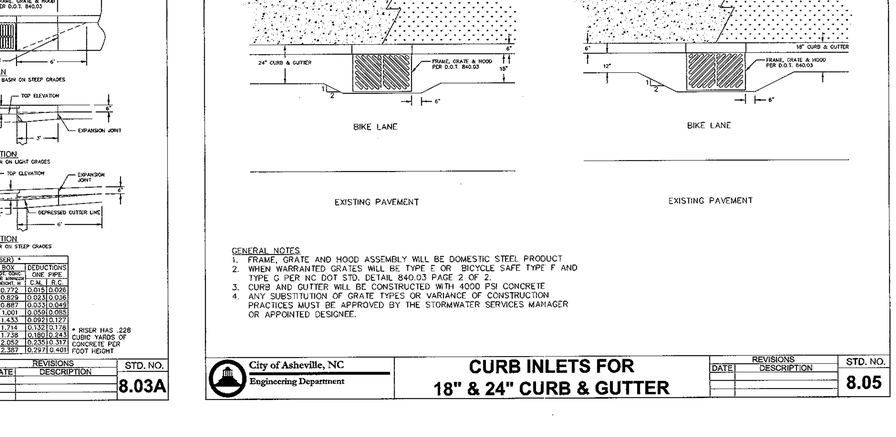
REVISIONS DATE	DESCRIPTION	STD. NO.
		8.05



Mattern & Craig CONSULTING ENGINEERS • SURVEYORS	CRAVEN STREET IMPROVEMENTS PROJECT SIGN	DETAIL NUMBER MC_M-5A



PROJECT – SIGN A
ECONOMIC DEVELOPMENT ADMINISTRATION



RECIPIENT NAME = CITY OF ASHEVILLE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY 5/27/14

Revisions	Date
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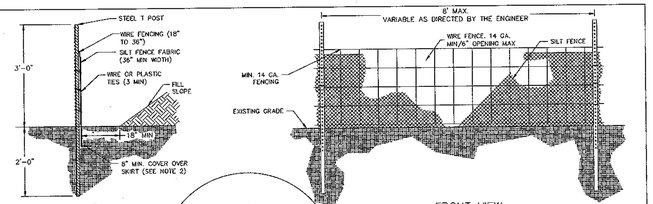
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS
CRAVEN STREET STORM DRAINAGE/SIGNAGE DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C10C

FOR CONSTRUCTION



NOTES:
1. SILT FENCE MUST BE PLACED 18" (MIN) FROM BASE OF A FILL SLOPE. IT CAN NOT BE USED TO HOLD BACK FILL MATERIALS
2. BOTTOM 12 INCHES OF SILT FENCE MUST BE BURIED. PLACE IT IN A TRENCH 8" DEEP AND 4" WIDE.
3. USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE AND NEVER IN AREAS OF CONCENTRATED FLOW OR IN A STREAM BED.

MAXIMUM SLOPE LENGTH AND SLOPE WHICH SEDIMENT FENCE IS APPLICABLE*

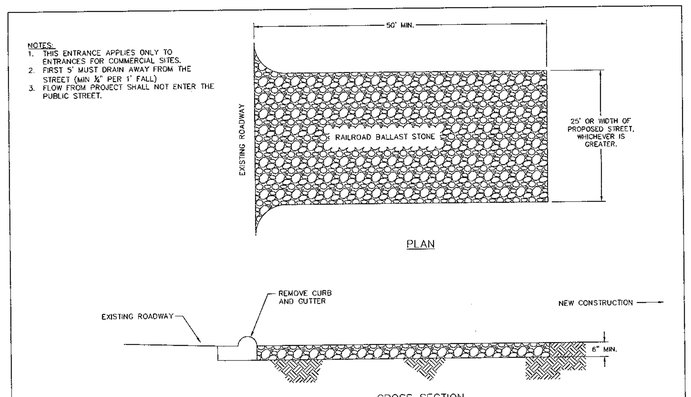
SLOPE	SLOPE LENGTH (FT)	MAXIMUM AREA (SQ FT)
<2%	100	10,000
2 TO 5%	75	7,500
5 TO 10%	50	5,000
10 TO 20%	25	2,500
>20%	15	1,500

* TABLE INFORMATION TAKEN FROM THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, DETAIL 6.62A.

City of Asheville, NC
Engineering Services Division of the Public Works Department

STANDARD TEMPORARY SILT FENCE

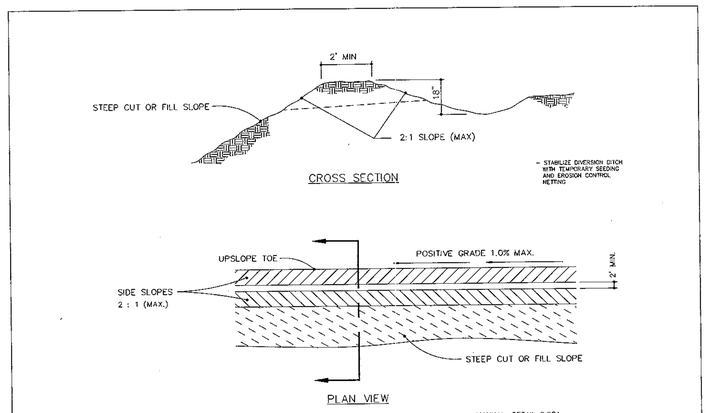
REVISIONS DATE	DESCRIPTION	STD. NO.
		7.01



City of Asheville, NC
Transportation & Engineering Department

COMMERCIAL CONSTRUCTION ENTRANCE

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.03

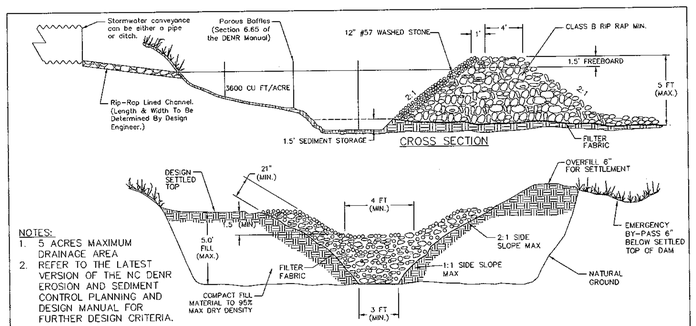


MANUAL, DETAIL 6.62A.

City of Asheville, NC
Transportation & Engineering Department

DIVERSION DITCH

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.04



NOTES:
1. 5 ACRES MAXIMUM DRAINAGE AREA
2. REFER TO THE LATEST VERSION OF THE NC DENR EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR FURTHER DESIGN CRITERIA.

MAINTENANCE.
1. INSPECT ONCE A WEEK AND AFTER EACH SIGNIFICANT (½ INCH OR GREATER) RAINFALL AND MAKE REPAIRS IMMEDIATELY.
2. REMOVE SEDIMENT AND RESTORE THE TRAP TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO ½ THE DESIGN DEPTH OF THE TRAP.
3. PLACE SEDIMENT IN A DESIGNATED (PERMITTED) DISPOSAL AREA AND REPLACE GRAVEL FACINGS THAT HAVE BEEN IMPAIRED BY SEDIMENT.
4. ANY RIPRAP DISPLACED FROM THE SPILLWAY MUST BE REPLACED IMMEDIATELY.
5. CHECK THE TRAP FOR DAMAGE CAUSE BY EROSION OR PIPING.
6. PERIODICALLY CHECK THE SPILLWAY TO INSURE IT IS MINIMUM 1½ FEET BELOW THE EMBANKMENT.

DESIGN OF SPILLWAY

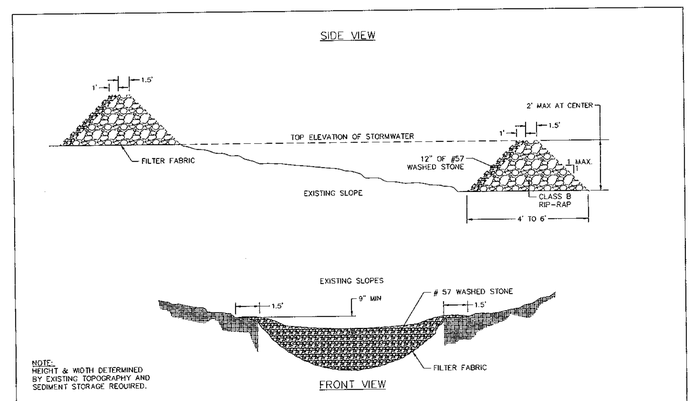
DRAINAGE AREA (ACRES)	WEIR LENGTH* (FT)
1	4.0
2	6.0
3	8.0
4	10.0
5	12.0

* DIMENSIONS SHOWN ARE MINIMUM

City of Asheville, NC
Transportation & Engineering Department

TEMPORARY SEDIMENT TRAP

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.08



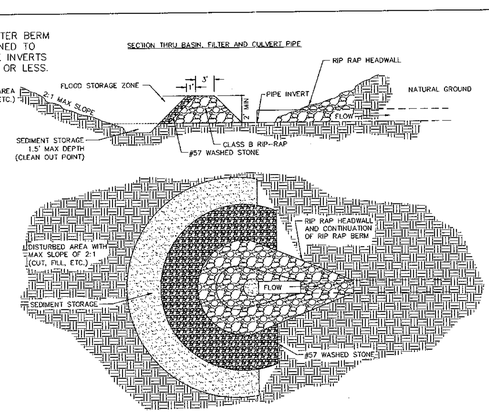
NOTE:
HEIGHT & WIDTH DETERMINED BY EXISTING TOPOGRAPHY AND SEDIMENT STORAGE REQUIRED.

City of Asheville, NC
Transportation & Engineering Department

CHECK DAM

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.07

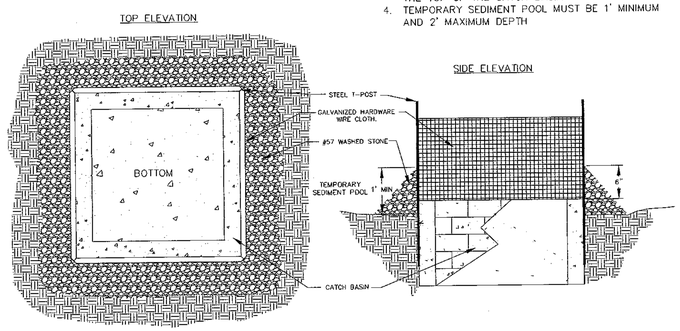
NOTE:
GRAVEL & RIP RAP FILTER BERM BASIN DETAIL IS DESIGNED TO PROTECT EXISTING PIPE INVERTS THAT DRAIN 10 ACRES OR LESS.



City of Asheville, NC
Transportation & Engineering Department

GRAVEL & RIP RAP PIPE INLET PROTECTION

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.10

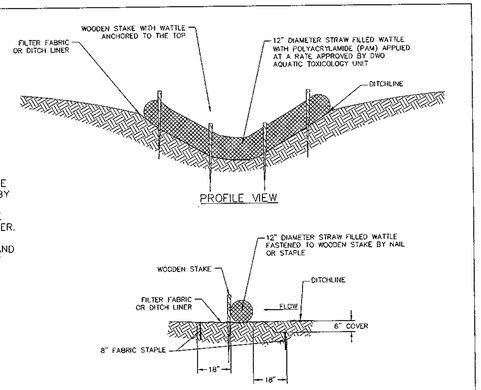


NOTES:
1. SILT FENCE IS NOT ACCEPTABLE IN PLACE OF HARDWARE CLOTH.
2. ONLY STEEL T-POST ARE ACCEPTABLE.
3. #57 WASHED STONE MUST BE A MIN 6" ABOVE THE TOP OF THE CATCH BASIN.
4. TEMPORARY SEDIMENT POOL MUST BE 1' MINIMUM AND 2' MAXIMUM DEPTH

City of Asheville, NC
Transportation & Engineering Department

STANDARD CATCH BASIN INLET PROTECTION

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.11



NOTES:
1. WATTLES SHALL BE FILLED WITH STRAW OR OTHER APPROVED MATERIAL
2. POLYACRYLAMIDE (PAM) SHALL BE APPLIED AT A RATE APPROVED BY DWQ AQUATIC TOXICOLOGY UNIT.
3. SPACING FOR WATTLES SHALL BE DETERMINED BY THE SITE ENGINEER.
4. WATTLES MAY BE USED FOR PROTECTION OF CATCH BASINS AND DROP INLETS WITH APPROVAL BY THE STORMWATER SERVICES MANAGER OR DESIGNEE.

City of Asheville, NC
Transportation & Engineering Department

WATTLE DETAIL

REVISIONS DATE	DESCRIPTION	STD. NO.
		7.05

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038195 GABRIEL S. QUESINBERRY

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Matternn & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL CONSULTING & DESIGN
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET EROSION CONTROL DETAILS

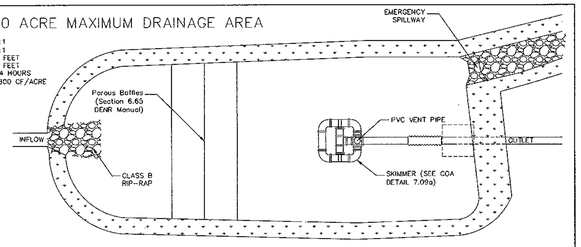
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C10D

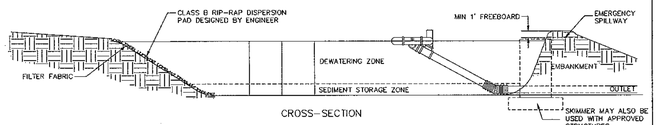
FOR CONSTRUCTION

NOTE: FOR 10 ACRE MAXIMUM DRAINAGE AREA

MINIMUM L/W RATIO: 2:1
MAXIMUM L/W RATIO: 6:1
MINIMUM DEPTH: 2 FEET
MAX. DAM HEIGHT: 5 FEET
MIN DEWATERING TIME: 24 HOURS
STORAGE VOLUME: 1800 CF/ACRE



PLAN VIEW

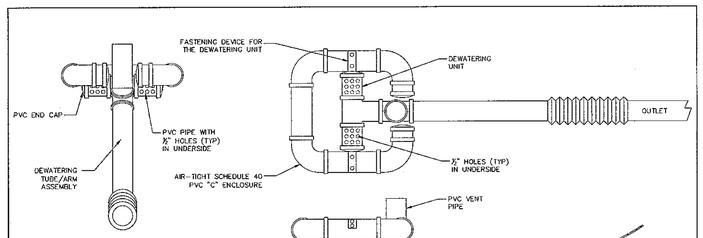


CROSS-SECTION

City of Asheville, NC
Engineering Services Division
of the Public Works Department

SKIMMER SEDIMENT BASIN

REVISIONS DATE	DESCRIPTION	STD. No.
		7.09



NOTES:

** SKIMMER ORIFICE SIZE IS DETERMINED BY STORAGE VOLUME OF BASIN AND DESIRED DEWATERING TIME. SEE TABLE 6.64b OF THE NC DENR EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

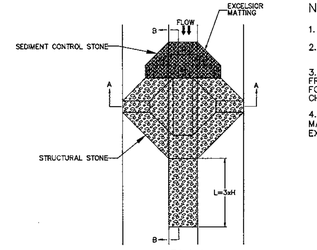
3" SCHEDULE 40 PVC: MINIMUM SIZE ALLOWABLE FOR THE CONSTRUCTION OF SKIMMER.

City of Asheville, NC
Engineering Services Division
of the Public Works Department

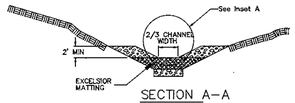
SKIMMER DETAIL

REVISIONS DATE	DESCRIPTION	STD. No.
		7.09A

TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



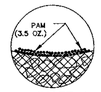
PLAN



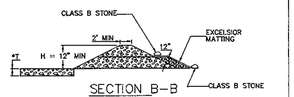
SECTION A–A

NOTES

1. SECURE MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.
2. USE EXCELSIOR MATTING MATERIAL AND ANCHORS OR APPROVED EQUAL.
3. PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM THE PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH ROCK SILT CHECK.
4. INITIALLY APPLY 3.5 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A

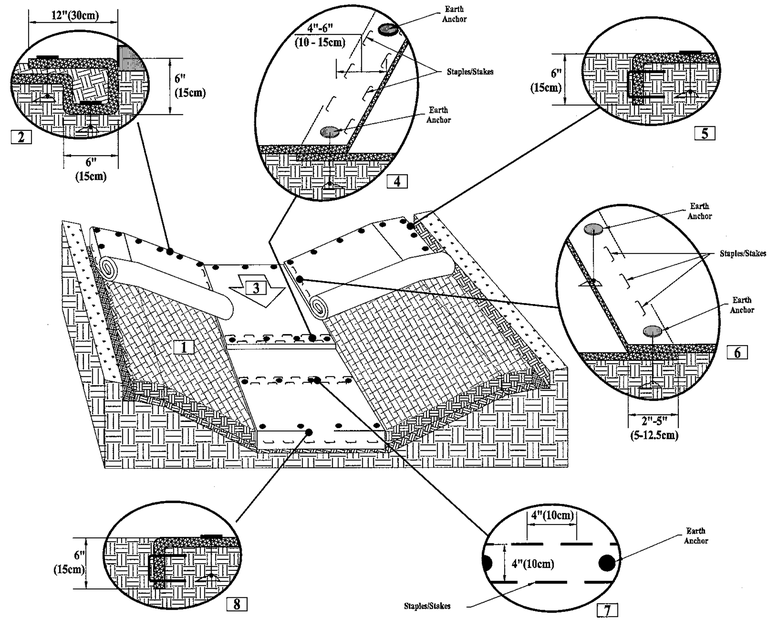


SECTION B–B

*T = 12" MIN., 18" MAX.

NOT TO SCALE

Sheet 1 of 2.



Drawing Not To Scale

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5401 St. Wendel - Cynthiana Rd.
Poseyville, IN 47633
PH: 800-722-2040
www.nagreen.com

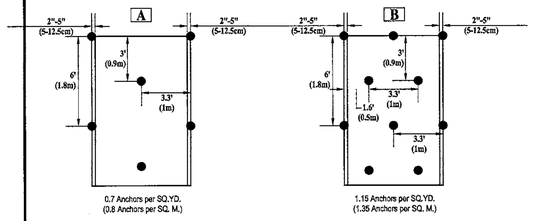
Disclaimer:
The information presented herein is general design information only. For specific applications, consult an independent professional for further design guidance.

Drawn on: 03-07-11

CHANNEL INSTALLATION EARTH ANCHOR (EA) DETAIL

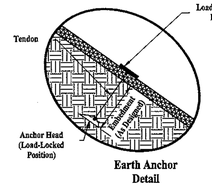
1. Prepare soil before installing TRM, including any necessary application of lime, fertilizer, and seed.
2. Begin at the top of the channel by anchoring the TRM in a 6" (15 cm) deep x 6" (15cm) wide trench with approximately 12" (30 cm) of TRM extended beyond the up-slope portion of the trench. Use ShoreMax mat at the channel/culvert outlet as supplemental scour protection as needed. Anchor the TRM with a row of staples and anchors approximately 12" (30 cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining 12" (30 cm) portion of TRM back over seed and compacted soil. Secure TRM over soil with a row of staples and anchors spaced approximately 12 (30 cm) across the width of the TRM.
3. Roll center TRM in direction of water flow in bottom of channel. TRM will unroll with appropriate side against the soil surface. All TRM must be securely fastened to soil surface by placing staples and anchors in appropriate locations as shown in the fastener pattern guide.
4. Place consecutive TRM end-over-end (shingle style) with a 4" - 6" (10 cm - 15 cm) overlap. Use a double row of staples staggered 4" (10 cm) apart and 4" (10 cm) on center to secure TRM.
5. Full length edge of TRM at top of side slopes must be anchored with a row of staples and anchors approximately 12" (30 cm) apart in a 6" (15 cm) deep x 6" (15cm) wide trench. Backfill and compact the trench after stapling.
6. Adjacent TRM must be overlapped approximately 2" - 5" (5 cm - 12.5 cm) (depending on TRM type) and fastened.
7. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot (9 m - 12 m) intervals. Use a double row of staples staggered 4" (10 cm) apart and 4" (10cm) on center over entire width of the channel.
8. The terminal end of the TRM must be anchored with a row of stakes and anchors approximately 12" (30 cm) apart in a 6" (15 cm) deep x 6" (15 cm) wide trench. Backfill and compact the trench after stapling.

Sheet 2 of 2.

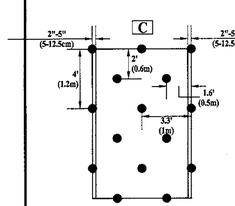


0.7 Anchors per SQ.YD. (0.8 Anchors per SQ. M.)

1.15 Anchors per SQ.YD. (1.35 Anchors per SQ. M.)

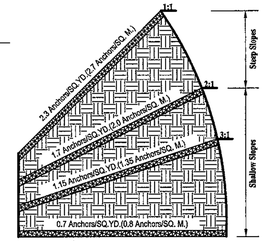


Earth Anchor Detail



1.7 Anchors per SQ.YD. (2.0 Anchors per SQ. M.)

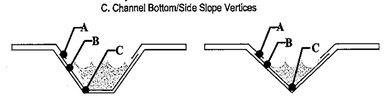
2.3 Anchors per SQ.YD. (2.7 Anchors per SQ. M.)



Slope Gradient Detail

NOTES:
* The performance of ground anchoring devices is highly dependent on numerous site/project specific variables. It is the sole responsibility of the project engineer and/or contractor to select the appropriate anchor type and length. Anchoring shall be selected to hold the mat in intimate contact with the soil subgrade and resist pullout in accordance with the project's design intent.
* Anchor Pattern Guide can vary based on earth anchor and blanket selection.
* If desired, the system can be soil-filled and sodded after TRM installation. Sod should be staples/staked according to plan specifications.

CRITICAL POINTS
A. Overlaps and Seams
B. Projected Water Line
C. Channel Bottom/Side Slope Vertices



Drawing Not To Scale

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Drawn on: 03-07-11

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 BRIAN S. QUESNERRY

Revisions	Date
FINAL TRC SUBMITTAL	3.14.14
EC REVIEW SUBMITTAL	5.27.14
BID SET	
RE BID SET	

Issue Date: 5/27/2014
Drawn By: HPO
Designed By: HPO
Checked By: GSQ
Date: 5/27/2014

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL CONSULTANTS & ENGINEERS
Cole-Jenest & Stone

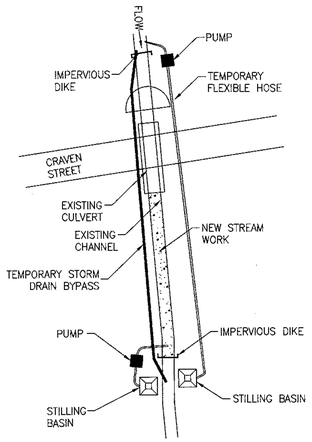
CRAVEN STREET IMPROVEMENTS

CRAVEN STREET EROSION CONTROL DETAILS

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C10E

FOR CONSTRUCTION



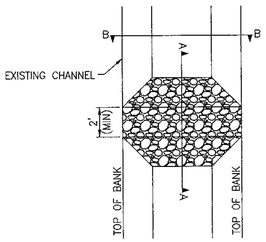
SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP-AROUND

1. INSTALL STILLING BASINS.
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM DIKE FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED WITHIN THE PUMP-AROUND AREA BETWEEN THE IMPERVIOUS DIKES. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKES.
8. REMOVE STILLING BASINS AND BACKFILL. STABILIZED DISTURBED AREA WITH SEED AND MULCH.

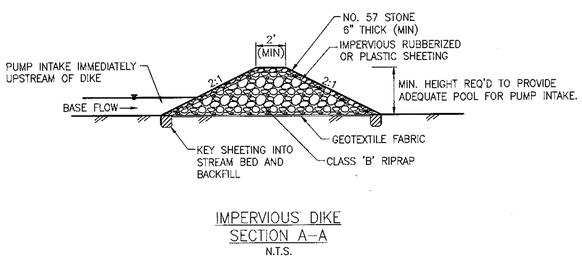
NOTES:

1. ALL EXCAVATION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF THE CHANNEL.
2. IMPERVIOUS DIKES ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW WHEN NECESSARY.
3. ALL GRADED AREAS SHALL BE STABILIZED WITHIN 24 HOURS.
4. MAINTENANCE OF STREAM FLOW OPERATION SHALL BE INCIDENTAL TO THE WORK. THIS INCLUDES SHEETING, DIVERSIONS PIPES, PUMPS AND HOSES.
5. PUMPS AND HOSES SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA.

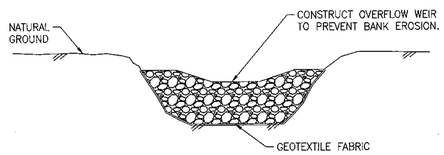
PUMP-AROUND OPERATION (TYP)
N.T.S.



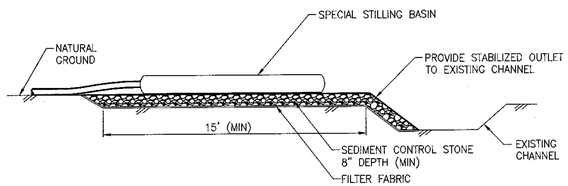
IMPERVIOUS DIKE
PLAN
N.T.S.



IMPERVIOUS DIKE
SECTION A-A
N.T.S.

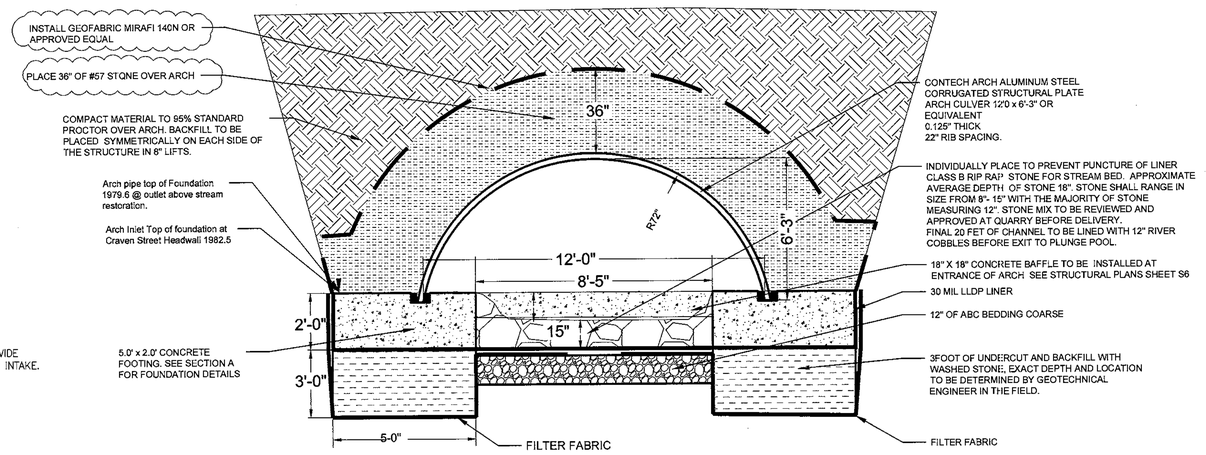


IMPERVIOUS DIKE
ELEVATION B-B
N.T.S.



SPECIAL STILLING BASIN
WITH ROCK PAD
N.T.S.

PROPOSED GRADE VARIES

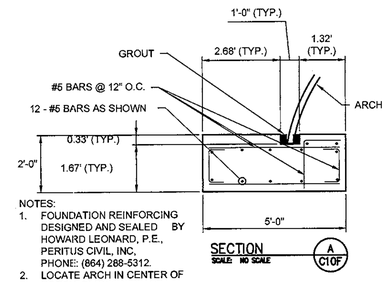


NOTES:

1. ALL DIMENSIONS ARE TO THE INSIDE CORRUGATION, UNLESS NOTED.
2. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
3. LAST 20 FEET OF CHANNEL TO BE LINED WITH 12" RIVER COBBLES.

PROPOSED PIPE ARCH CULVERT CROSSING CRAVEN STREET
STATION 27+50

SCALE 1" = 30"



NOTES:
1. FOUNDATION REINFORCING DESIGNED AND SEALED BY HOWARD LEONARD, P.E., PERITUS CIVIL, INC, PHONE: (864) 288-5312.
2. LOCATE ARCH IN CENTER OF NOTCH. BLOCK IN PLACE AND GROUT.

SECTION A C10F
SCALE: NO SCALE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EC REVIEW SUBMITTAL	3.14.14
BID SET	5.27.14
RE BID SET	

Issue Date: 5/27/2014
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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

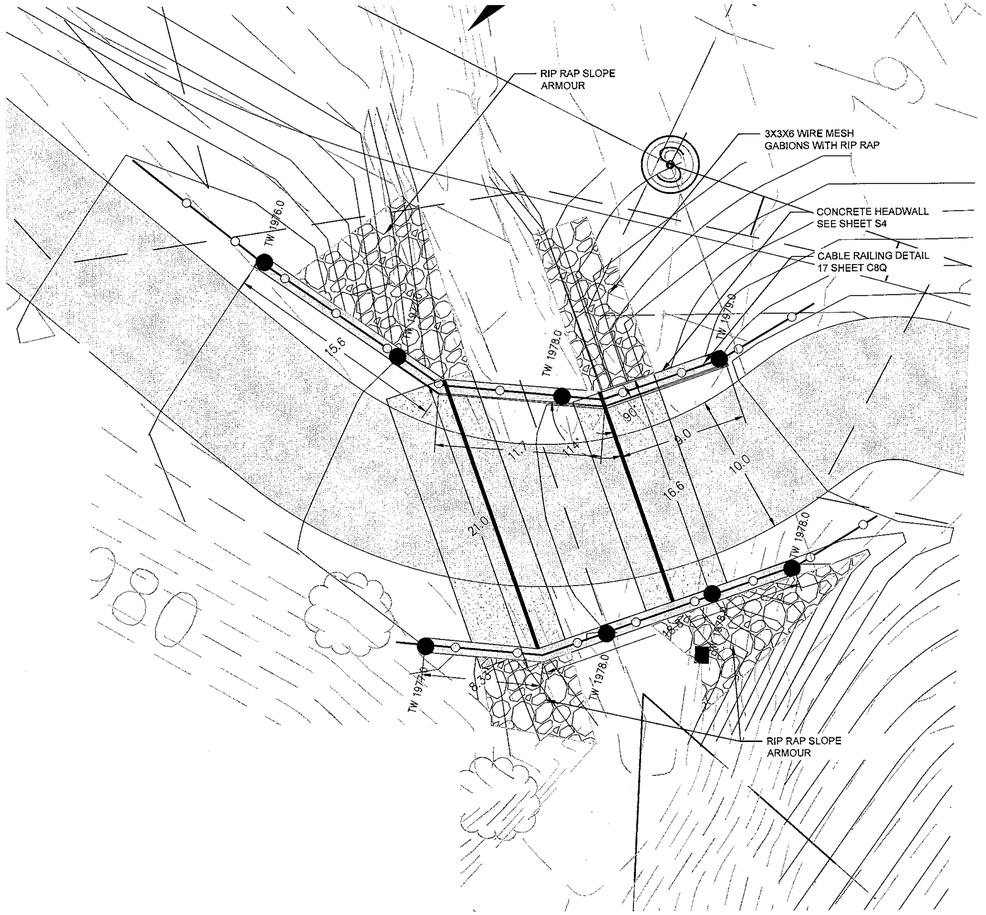
CRAVEN STREET IMPROVEMENTS

CRAVEN STREET AND GREENWAY ARCH DETAILS

CITY OF ASHEVILLE, NORTH CAROLINA

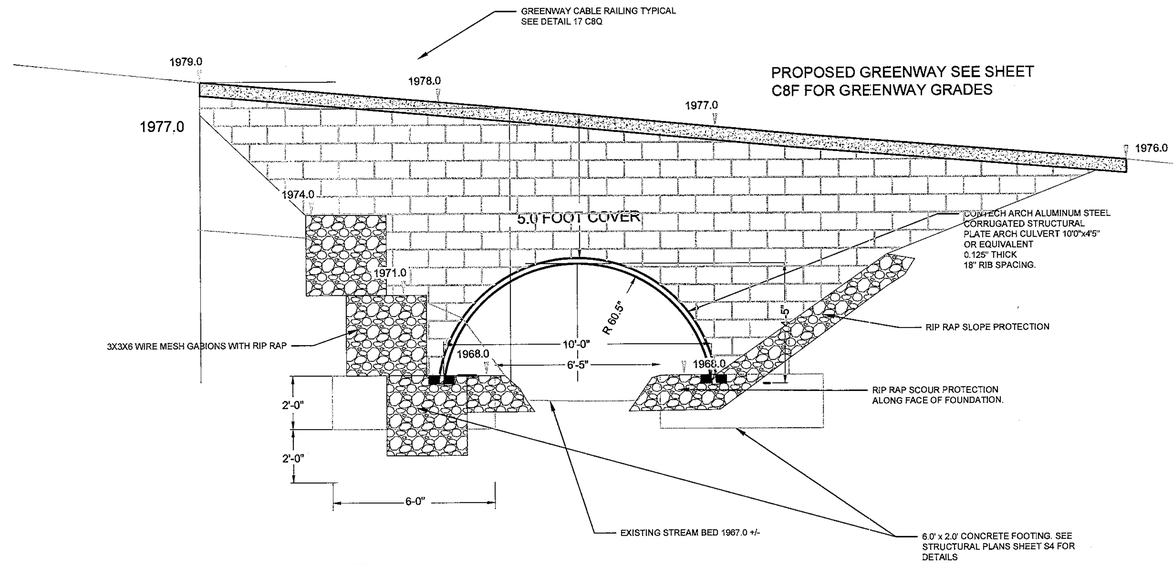
Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C10F

FOR CONSTRUCTION



0 5' 10'

SCALE: 1" = 5'-0"



NOTES:

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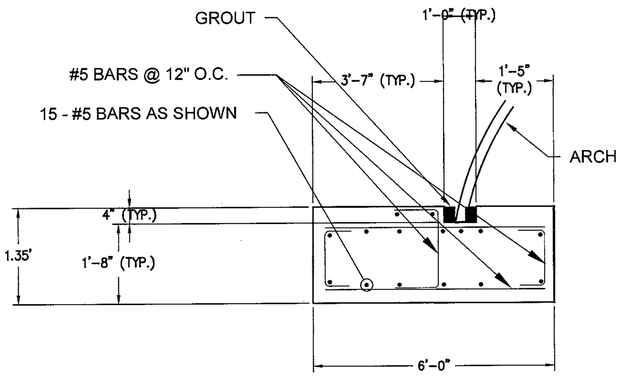
PROPOSED PIPE ARCH CULVERT ELEVATION
CROSSING GREENWAY STATION 18+12 LOOKING UPSTREAM

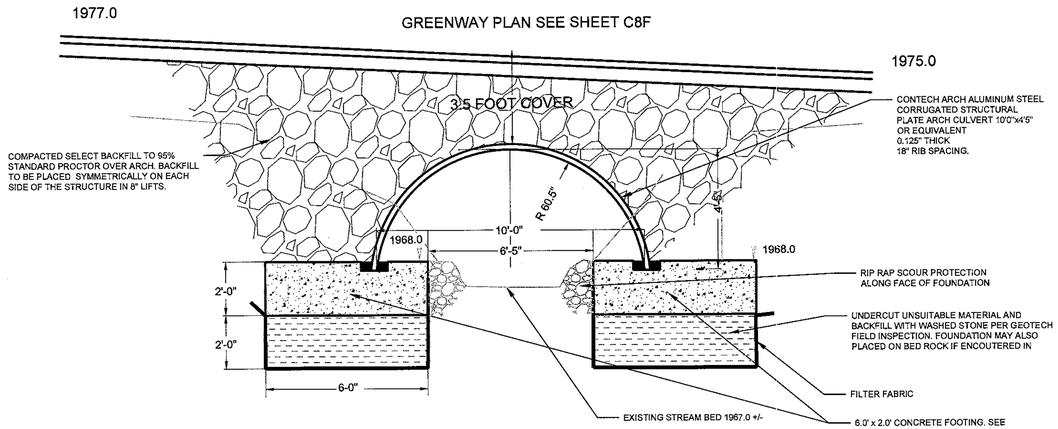
SCALE NTS



NOTES:

1. FOUNDATION REINFORCING DESIGNED AND SEALED BY HOWARD LEONARD, P.E., PERITUS CIVIL, INC, PHONE: (864) 288-5312.
2. LOCATE ARCH IN CENTER OF NOTCH. BLOCK IN PLACE AND GROUT.

SECTION A C10G
SCALE: NO SCALE



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PROPOSED PIPE ARCH CULVERT
CROSS SECTION AT GREENWAY STATION 18+12
LOOKING UPSTREAM

SCALE N.T.S

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
EROSION CONTROL SUBMITTAL	
CONSTRUCTION BID SET	3.14.14
CONSTRUCTION RE BID SET	5.27.14

Issue Date: 5/27/2014
Drawn By: HPO
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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

CRAVEN STREET IMPROVEMENTS GREENWAY ARCH CULVERT

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N.T.S
Horizontal Scale: 1" = 5'
Commission Number: 3267
Sheet No.: C10G

FOR CONSTRUCTION

GENERAL NOTES:
1. THIS DETAIL WILL APPLY TO ALL DOMESTIC WATER SERVICE TRANSFERS AS DESCRIBED IN THE TECHNICAL SPECIFICATIONS AND SHOWN ON THE ENGINEERING DRAWINGS.
2. ALL METER SERVICE FITTINGS AND APPURTERENCES IN CONTACT WITH WATER SHALL BE LEAD FREE TYPE PRODUCTS.
3. CAST IRON RING & COVER MIN WEIGHT 54 LBS. "CITY OF ASHEVILLE" LOGO ON BOTH RING AND COVER TOP OF LID-ANTI-SKID GRID SURFACE.

City of Asheville, NC
WATER ENGINEERING DIVISION

5/8"- 3/4" WATER METER BOX

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.01	W.01

GENERAL NOTES:
1. VALVE BOX SHALL NOT CONTACT WATER MAIN OR VALVE.
2. VALVE PAD REQUIREMENTS SHALL NOT BE APPLICABLE FOR IMPROVED PAVED SURFACES.
3. VALVE BOX ADJUSTMENT MUST BE DONE BY ADJUSTING/RAISING THE TOP SECTION OF THE EXISTING ADJUSTABLE SCREW-TYPE VALVE BOX TO GRADE OR BY INSTALLING A NEW VALVE BOX TOP SECTION. THE USE OF PAVING RINGS OR ADJUSTING C.I. SLEEVES IS NOT ALLOWED.

City of Asheville, NC
WATER ENGINEERING DIVISION

TYPICAL VALVE & VALVE BOX INSTALLATION / ADJUSTMENT

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.06	W.18

GENERAL NOTES:
1. CONSTRUCTION OF TRENCHES SHALL BE IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS. CONTRACTOR SHALL BE RESPOSIBLE FOR COMPLIANCE WITH ALL APPLICABLE REGULATIONS.
2. NO BOULDERS OR STONES IN EXCESS OF 4" IN SIZE SHALL BE USED AS PART OF THE INITIAL BACKFILL.
3. PIPE BEDDING MATERIAL SHALL BE # 57 WASHED STONE.
4. SELECT BACKFILL MATERIAL SHALL BE CLASS I OR II AS PER NCDOT STANDARD SPECIFICATIONS.

City of Asheville, NC
WATER ENGINEERING DIVISION

TYPICAL TRENCH DETAIL

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.19	W.21

NOTES:
1. TAPPING SLEEVE WILL BE MUELLER #H-615 OR APPROVED EQUAL.
2. APPROVED RESILIENT SEAT TAPPING VALVE.
3. SOLID CONCRETE OR BRICK BLOCKING WILL BE USED AS FOOTING FOR DUCTILE IRON PIPE.
4. ALL FITTINGS AND APPURTENANCES SHALL BE RESTRAINED AS PER IN LIEU OF THRUST BLOCKING SPECIFICATIONS

City of Asheville, NC
WATER ENGINEERING DIVISION

TAPPING SLEEVE AND VALVE ASSEMBLY

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.22	W.20

GENERAL NOTES:
1. PRIOR TO CONNECTING TO THE EXISTING WATERLINE, THE NEW WATER LINE WILL BE PRESSURE TESTED, DISINFECTED AND A CLEAR WATER SAMPLE OBTAINED.
2. ALL WATER FOR FILLING AND FLUSHING OF NEW WATER LINE WILL BE DRAWN THROUGH THE DOUBLE CHECK VALVE ASSEMBLY.
3. THE COSTS FOR PROVIDING DOUBLE CHECK VALVE ASSEMBLY AND SLEEVE NECESSARY FOR FINAL CONNECTION WILL BE INCIDENTAL TO THE WATER LINE INSTALLATION.
4. CONTRACTOR WILL BE REQUIRED TO HAVE WATER METER TESTED TO MEET ACCURACY STANDARDS OF AWWA C700, BY THE CITY OF ASHEVILLE WATER MAINTENANCE DIVISION ANNUALLY. METER MUST BEAR A CERTIFICATION TAG AT ALL TIMES.

City of Asheville, NC
WATER ENGINEERING DIVISION

NEW WATER LINE PRESSURE TEST BACKFLOW PREVENTION ASSEMBLY

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.21	W.28

RECOMMENDED MINIMUM RESTRAINED LENGTH REQUIRED EACH SIDE OF FITTING (FEET)

FITTING TYPE	SIZE	WORKING PRESSURE (PSI) 125	150	175	200
HORIZ. 11 1/4 DEG.	6"	4	4	5	6
	8"	5	6	7	8
	10"	6	7	8	9
HORIZ. 22 1/2 DEG.	6"	7	9	10	12
	8"	10	12	14	16
	10"	12	14	17	19
REDUCER	8"X6"	14	17	20	23
	10"X8"	14	17	20	23
	12"X10"	14	17	20	23
HORIZ. 45 DEG.	6"	16	19	22	25
	8"	20	24	28	33
	10"	25	30	35	40
DEAD END	6"	26	31	36	41
	8"	34	41	48	55
	10"	42	50	58	67
TEE	TO BE CALCULATED ON A CASE BY CASE BASIS.				
90 DEG. VERT. BENDS	TO BE CALCULATED ON A CASE BY CASE BASIS.				

= 1 JOINT EQUIVALENT = 2 JOINTS EQUIVALENT
= 3 JOINTS EQUIVALENT = 4 JOINTS EQUIVALENT

GENERAL NOTES:
1. RESTRAINED JOINTS BY AN APPROVED PIPE MANUFACTURER ARE TO BE USED FOR ALL PUBLIC WATERLINES. THRUST BLOCKS ARE PERMITTED WHERE THE USE OF MECHANICAL RESTRAINT IS NOT FEASIBLE.
2. DIMENSION TABLE GIVEN IS A GUIDE ONLY. TO ENGINEER SHALL BE RESPONSIBLE TO CALCULATE THRUST BLOCK DIMENSIONS AND/OR BASED ON RESTRAINED LENGTH ACTUAL SOIL AND OPERATING PRESSURE CONDITIONS.
3. FITTING JOINTS SHALL BE KEPT FREE OF CONCRETE. A LAYER OF POLYETHYLINE PLASTIC SHALL BE PLACED BETWEEN THE FITTING AND THE CONCRETE.
4. PRE-CAST THRUST BLOCKS ARE NOT ACCEPTABLE.
5. CONCRETE SHALL HAVE 4000 P.S.I. COMPRESSIVE STRENGTH.

TABLE OF "A" DIMENSIONS (IN FEET)

PIPE SIZE (NOMINAL DIAMETER IN INCHES)	BEND 90	45	22 1/2	11 1/4	TEE
6	1.4	1.1	1.0	1.0	1.2
8	1.9	1.5	1.5	1.5	1.6
10	2.4	1.8	1.8	1.8	2.0
12	2.8	2.1	2.0	2.0	2.4
16	3.8	2.8	2.5	2.5	2.8
24	5.6	4.2	3.0	3.0	4.5

City of Asheville, NC
WATER ENGINEERING DIVISION

THRUST BLOCK FOR FITTINGS & RESTRAINING REQUIREMENTS

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.13	W.22
10/2011	NOTE 1 REVISED	

NOTES:
1. WHEN THERE IS ONLY ONE SUPPLY LEG FEEDING TWO DEAD END LEGS, PLACE VALVES ON DEAD END LEGS.
2. WHEN THERE ARE TWO SUPPLY LEGS FEEDING ONE DEAD END LEG, PLACE VALVES ON SUPPLY LEGS.
3. WHEN ALL THREE LEGS ARE SUPPLY,ENGINEER'S CHOICE.
4. CITY MAY DESIGNATE A CURRENT DEAD END LEG AND A FUTURE SUPPLY LEG ACCORDING TO WATER PLANNING AND REQUIRE VALVE PLACEMENT ACCORDINGLY.
5. ON HYDRANT TEE, ONE VALVE IS ALWAYS ON HYDRANT LEG.

TWO VALVES AT A TEE

NOTES:
1. WHEN THERE IS ONLY ONE SUPPLY AND THREE DEAD END LEGS, PLACE VALVES ON DEAD END LEGS.
2. WHEN THERE ARE THREE SUPPLY LEGS AND ONE DEAD END LEG, PLACE VALVES ON SUPPLY LEGS.
3. WHEN THERE ARE TWO SUPPLY LEGS AND TWO DEAD END LEGS, PLACE VALVES ON ALL FOUR LEGS.
4. CITY MAY REQUIRE VALVE PLACEMENT BASED ON CURRENT OR FUTURE NEEDS.
5. WHEN ONE LEG AT A INTERSECTION IS A HYDRANT LEG,VALVE MUST BE PLACED ON A HYDRANT LEG. VALVING ON REMAINING LEGS TO BE PLACED AS THOUGH THEY MADE UP A TEE.
6. A "SUPPLY LEG" IS ANY LEG CONNECTED TO THE TREATED WATER SOURCE BY PIPING EQUAL AND OR GREATER THAN ITS SIZE AND SEPARATE FROM THE TEE OR CROSS BEING CONSIDERED.

THREE AND FOUR VALVES AT A INTERSECTION

City of Asheville, NC
WATER ENGINEERING DIVISION

TYPICAL VALVING CONFIGURATION

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.17	W.17

City of Asheville, NC
WATER ENGINEERING DIVISION

FIRE HYDRANT INSTALLATION

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.05	W.16

GENERAL NOTES
1. ALL FITTINGS MUST BE RESTRAINED AS SPECIFIED IN THE STANDARD SPECIFICATIONS AND DETAILS MANUAL
2. DIMENSION TABLE GIVEN IS A GUIDE ONLY. ENGINEER SHALL BE RESPONSIBLE TO CALCULATE THRUST BLOCK DIMENSIONS BASED ON ACTUAL SOIL AND OPERATING
3. FITTING JOINTS SHALL BE KEPT FREE OF CONCRETE. A LAYER OF POLYETHYLINE PLASTIC SHALL BE PLACED BETWEEN THE FITTING AND THE CONCRETE.
4. CONTRACTOR HAS THE OPTION TO RESTRAIN PIPE JOINTS IN LIEU OF CONCRETE DEADMAN & RODDING.

	PIPE SIZE (NOMINAL DIAMETER IN INCHES) 6	8	10	12	16	24
"A" DIMEN. IN FEET	1.2	1.6	2.0	2.4	2.8	4.5

City of Asheville, NC
WATER ENGINEERING DIVISION

END OF LINE PLUG

REVISIONS		STD. NO.
DATE	DESCRIPTION	
6/2009	REVISED DETAIL FROM 6.14	W.23

Revisions	Date
FINAL TRC SUBMITTAL	
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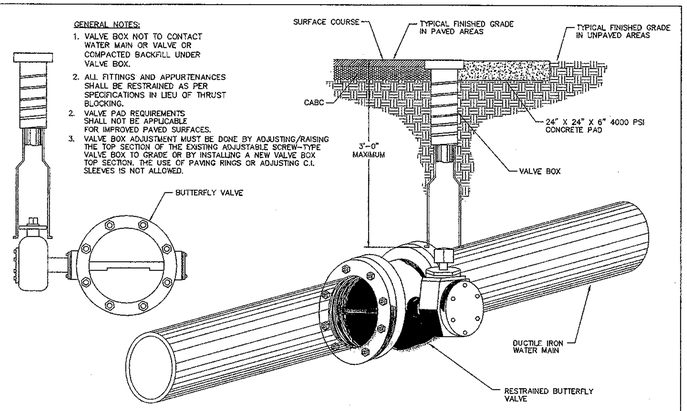
CRAVEN STREET IMPROVEMENTS

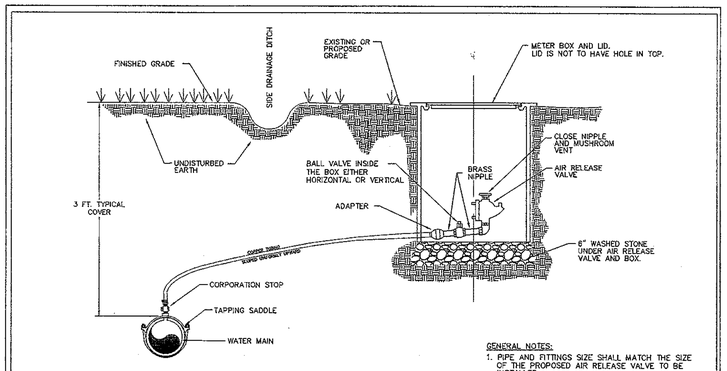
WATER MAIN UPGRADE PLAN STANDARD DETAILS

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C11A

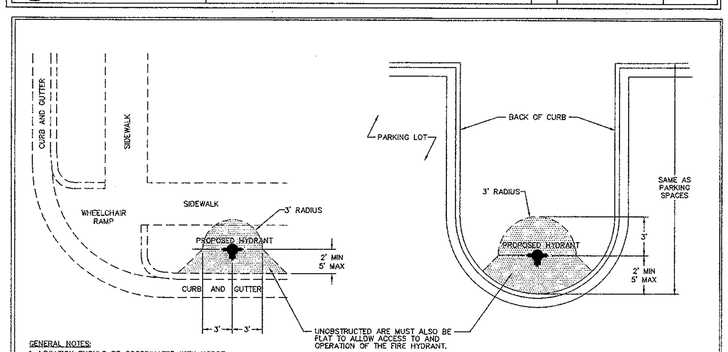


City of Asheville, NC WATER ENGINEERING DIVISION	TYPICAL BUTTERFLY VALVE INSTALLATION	REVISIONS DATE / DESCRIPTION: 6/2009 REVISED DETAIL FROM 6.20	STD. NO. W.19



GENERAL NOTES:
1. PIPE AND FITTINGS SIZE SHALL MATCH THE SIZE OF THE PROPOSED AIR RELEASE VALVE TO BE INSTALLED.
2. REFER TO STANDARD DETAIL FOR METER BOX SPECIFICATIONS.
3. LOCATION TO BE SAME AS METER BOX DETAILS W.01 & W.05

City of Asheville, NC WATER ENGINEERING DIVISION	STANDARD AIR RELEASE VALVE INSTALLATION	REVISIONS DATE / DESCRIPTION: 6/2009 REVISED DETAIL FROM 6.10	STD. NO. W.24



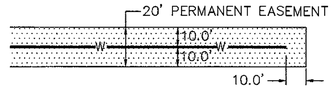
GENERAL NOTES:
1. LOCATION SHOULD BE COORDINATED WITH NCDOT ALONG STATE MAINTAINED ROADWAYS.
2. OBSTRUCTION FREE AREA SHALL APPLY TO ALL LOCATIONS FOR FIRE HYDRANT INSTALLATION.
3. HYDRANT LOCATION SHALL NOT INTERFERE WITH THE REQUIREMENTS OF THE NORTH CAROLINA BUILDING CODE.
4. CONCRETE BOLLARDS WILL BE REQUIRED FOR INSTALLATION WITHIN PARKING AREAS

City of Asheville, NC WATER ENGINEERING DIVISION	STANDARD HYDRANT LOCATION	REVISIONS DATE / DESCRIPTION: 6/2009 REVISED DETAIL FROM 6.07	STD. NO. W.15

GENERAL NOTES FOR WATER

1. WATER CONSTRUCTION ON THIS SITE IS AUTHORIZED BY PERMITS ISSUED BY THE NORTH CAROLINA DEPARTMENT OF THE ENVIRONMENT AND NATURAL RESOURCES (NCDENR), AND THE CITY OF ASHEVILLE. THE WORK IS SUBJECT TO INSPECTIONS AT ALL TIMES BY REPRESENTATIVES OF NCDENR, THE CITY OF ASHEVILLE, THE OWNER, OR THE ENGINEER. THE PERMITS REQUIRE CERTIFICATION OF COMPLETION OF THE WATER SYSTEMS BY THE ENGINEER PRIOR TO ISSUANCE OF FINAL OPERATION APPROVAL BY THE CITY OF OF ASHEVILLE.
2. CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND ELEVATION FOR ALL UTILITIES, DRAINAGE AND OTHER UNDERGROUND FACILITIES BOTH EXISTING AND PROPOSED, AND SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS PRIOR TO CONSTRUCTION.
3. INSTALL FERROUS PIPING FOR BOTH WATER AND SEWER WITHIN 10 FT. OF A CROSSING IF:
   A. SEWER LINE CROSSES OVER WATER, OR
   B. VERTICAL CLEARANCE BETWEEN WATER AND SEWER IS LESS THAN 18 INCHES.

   MAINTAIN 10 FEET HORIZONTAL SEPARATION BETWEEN SEWER AND WATER MAINS UNLESS LAID IN SEPARATE TRENCHES WITH THE BOTTOM OF THE WATER LINE AT LEAST 18 INCHES ABOVE THE TOP OF SEWER, OR USE FERROUS MATERIAL FOR BOTH WATER AND SEWER.
4. MAINTAIN 12 INCHES VERTICAL SEPARATION BETWEEN STORM DRAIN AND WATER , OR INSTALL FERROUS MATERIAL ON WATER LINE WITHIN 10 FEET EACH SIDE OF CROSSING.
5. COORDINATE EXACT LOCATIONS OF VAULTS, METERS, BACK FLOW PREVENTION DEVICES, AND SERVICE LINES WITH THE CITY OF ASHEVILLE WATER AND SEWER ORDINANCE, AND THE DETAILED ARCHITECTURAL, PLUMBING, LIGHTING, AND LANDSCAPING PLANS.
6. ALL WATER MAINS SHALL HAVE 3 FEET MINIMUM COVER OR BE CONSTRUCTED OF A FERROUS MATERIAL.
7. MATERIALS AND INSTALLATION FOR WATER LINES SHALL CONFORM TO THE CITY OF ASHEVILLE'S STANDARD SPECIFICATIONS AND DETAILS MANUAL AND SHALL BE INSTALLED UNDER THE INSPECTION OF THE CITY OF ASHEVILLE AND INSTALLED BY A NORTH CAROLINA LICENSED UTILITY CONTRACTOR. UPON COMPLETION AND ACCEPTANCE, WATER LINES SHALL BE MAINTAINED BY THE CITY OF ASHEVILLE.
8. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION. REPAIRS SHALL BE MADE IN ACCORDANCE WITH APPLICABLE STANDARDS OF APPROPRIATE AGENCIES AT THE CONTRACTORS EXPENSE.
9. CONTRACTOR SHALL NOTIFY ONECALL & APPROPRIATE UTILITY AGENCY PRIOR TO PERFORMING ANY WORK.
10. TYPICAL EASEMENTS FOR WATER LINES LOCATED OUTSIDE ESTABLISHED UTILITY EASEMENTS OR ROAD RIGHT-OF-WAYS SHALL BE 20 FEET IN WIDTH AND LOCATED IN EASEMENT PER SKETCH.



11. SERVICE WILL BE PROVIDED ONCE FINAL CLOSEOUT SUBMITTALS HAVE BEEN APPROVED BY THE CITY OF ASHEVILLE'S ENGINEERING DEPARTMENT.
12. ALL WATER LINES SHALL BE DUCTILE IRON PIPE WITH RESTRAINED JOINTS.
13. ALL CONSTRUCTION SHALL BE PERFORMED BY A LICENSED UTILITY CONTRACTOR OF NORTH CAROLINA.
14. EXISTING WATER SERVICES AND/OR METER BOXES WITHIN THE PROJECT LIMITS THAT DO NOT COMPLY WITH DETAIL W.01 OR OTHER APPLICABLE METER DETAIL SHALL BE REPLACED.

TESTING/INSPECTION

1. NOTIFY THE ENGINEER AT LEAST 48 HOURS BEFORE STARTING CONSTRUCTION OF SEWER AND WATER FACILITIES. THE ENGINEER SHALL PERIODICALLY INSPECT THE PROGRESS OF INSTALLATION AND SHALL COMPLETE A FINAL WATER AND SEWER INSPECTION. THE CONTRACTOR SHALL FURNISH, SECURE, AND PROVIDE ALL NECESSARY TESTING MATERIALS, EQUIPMENT, PROCEDURES, AND CERTIFIED LABORATORY TEST RESULTS FOR USE WITH ENGINEERS FINAL CERTIFICATION OF COMPLETION.
2. PRESSURE TEST WATER MAINS TO 200 PSI MIN AND 250 PSI MAX AS PER CITY OF ASHEVILLE REQUIREMENTS. DISINFECT WATER LINES AND PROVIDE ACCEPTABLE BACTERIOLOGICAL TEST FROM A CERTIFIED TESTING LABORATORY FOR USE WITH THE ENGINEERS CERTIFICATION OF COMPLETION.
3. SECURE FINAL OPERATIONAL APPROVAL FROM THE CITY OF ASHEVILLE PRIOR TO ACTIVATION OF THE SYSTEM.
4. TRENCH BACKFILL AND COMPACTION TESTING SHALL BE PERFORMED BY A CERTIFIED SOILS LABORATORY UNDER ALL PAVED AREAS. BACKFILL MATERIAL FROM THE BOTTOM OF TRENCH TO WITHIN SIX (6) INCHES OF THE SUBGRADE SHALL HAVE A MINIMUM DRY DENSITY OF 95% AS DEFINED BY THE STANDARD PROCTOR TEST. ALL MATERIAL WITHIN THE TOP 6 INCHES OF THE SUBGRADE LEVEL SHALL HAVE AN IN PLACE DENSITY OF 100%.
5. THE CONTRACTOR SHALL SUPPLY THE ENGINEER WITH WATER SERVICE MEASUREMENTS SUITABLE FOR PREPARATION OF FINAL RECORD DRAWINGS.

CONSTRUCTION NOTES:

1. ALL UTILITIES SHOWN ARE BASED ON AVAILABLE RECORDS, SURFACE UTILITY LOCATES AND VISIBLE APPURTENANCES. CONTRACTOR SHALL FIELD VERIFY AND PHYSICALLY LOCATE UTILITIES AND NOTIFY ENGINEER IMMEDIATELY IF UTILITY LOCATIONS AND TYPE DEVIATE FROM THIS PLAN.
2. CONTRACTOR SHALL COORDINATE WITH UTILITY OWNERS PRIOR TO BEGINNING ANY SITE WORK OR DEMOLITION ACTIVITIES.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL UTILITIES WITHIN THE PROJECT IN ACCORDANCE WITH THE UTILITY OWNER'S GUIDELINES AND REQUIREMENTS.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN SERVICE TO CUSTOMERS AT ALL TIMES. SHOULD IT BE NECESSARY TO INTERUPT CUSTUMER SUPPLY CONTRACTOR MUST NOTIFY CITY 96 HOURS IN ADVANCE.
5. PROPOSED WATER METERS SHALL BE PLACED WITHIN 5 FEET OF BACK OF CURB.
6. CONTRACTOR SHALL LAY WATERLINE TO PROVIDE MINIMUM OF 3' HORIZONTAL CLEARANCE AND 12" VERTICAL CLEARANCE WITH NATURAL GAS, CABLES, AND OTHER UTILITIES.

NORTH CAROLINA PROFESSIONAL SEAL 035195 ENGINEER RACHEL S. QUESTENBERRY

Revisions	Date
FINAL TRC SUBMITTAL	
WATER SUBMITTAL TO COA	
SECOND REVIEW SUBMITTAL TO COA	

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CRAVEN STREET IMPROVEMENTS

WATER MAIN UPGRADE PLAN STANDARD DETAILS AND NOTES

CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontol Scale: N/A
Commission Number: 3267
Sheet No.: C11B

FOR CONSTRUCTION

TRENCH BACKFILL IN MSD RIGHTS of WAY

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
TRENCH BACKFILL
APPROVED: FEBRUARY 25, 2010 | 1.16-01

NOTES:
1. Minimum allowable depth of cover is 3 ft.
2. In rock or wet soil, pipe must be bedded in at least 6" of crushed stoned embedment material below the invert of the pipe.
3. Granular materials are defined per the AASHTO Soil Classification System (ASTMD3282) or the Unified Soil Classification System (ASTM D2487), with the exception that gravel bedding/backfill adjacent to the pipe is limited to 2" maximum particle size per ANSI/AWWA C600
4. These pipes are adequate for depths of cover from 3 ft. up to the maximum shown including an allowance for a single H-20 truck with a 1.5 impact factor unless noted.
5. Ring deflection limited to 3%, minimum safety factor of 2. Earth load based on soil weight of 120 pcf.

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
TYPICAL TRENCH DETAIL FOR DUCTILE IRON PIPE-1
APPROVED: FEBRUARY 25, 2010 | 2.05-01

Maximum Depth of Cover for Ductile Iron Pipe with Cement Lining

Pipe Size	Pressure Class	Laying Condition				
		Type 1	Type 2	Type 3	Type 4	Type 5
4	350	53	61	69	85	100
6	350	26	31	37	47	65
8	350	16	20	25	34	50
10	350	11	15	19	28	45
12	350	10	15	19	28	44
14	250	-	11	15	23	36
14	300	-	13	17	26	42
14	350	-	14	19	27	44
16	250	-	11	15	24	34
16	300	-	13	17	26	39
16	350	-	15	20	28	44
18	250	-	10	14	22	31
18	300	-	13	17	26	36
18	350	-	15	19	28	41
20	250	-	10	14	22	30
20	300	-	13	17	26	35
20	350	-	15	19	28	38
24	200	-	8	12	17	25
24	250	-	11	15	20	29
24	300	-	13	17	24	32
24	350	-	15	19	28	37
30	200	-	8	12	16	24
30	250	-	11	15	19	27
30	300	-	12	16	21	29
30	350	-	15	19	25	33
36	200	-	8	12	15	23
36	250	-	10	14	18	25
36	300	-	12	16	20	28
36	350	-	15	19	24	32
42	200	-	8	12	15	22
42	250	-	10	14	17	25
42	300	-	12	16	20	27
42	350	-	15	19	23	32
48	200	-	8	11	15	22
48	250	-	10	13	17	24
48	300	-	12	15	19	27
48	350	-	15	18	22	30
54	200	-	8	11	14	22
54	250	-	10	13	16	24
54	300	-	13	15	19	27
54	350	-	15	18	22	30
60	200	-	8	11	14	22
60	250	-	10	13	16	24
60	300	-	13	15	19	26
60	350	-	15	18	22	30
64	200	-	8	11	14	21
64	250	-	10	13	16	24
64	300	-	12	15	19	26
64	350	-	15	17	21	29

Source: Ductile Iron Pipe for Wastewater Applications, DIPRA 2006

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
TYPICAL TRENCH DETAIL FOR DUCTILE IRON PIPE-2
APPROVED: FEBRUARY 25, 2010 | 2.05-02

MANHOLE NOTES:

1. FOR MANHOLES LARGER THAN 4 FT. DIA., MAINTAIN FULL MANHOLE DIA. TO 6 FT. ABOVE INVERT BENCH.

2. FOR 5 FT. AND 6 FT. DIA. MANHOLES, USE A TRANSITION CONE TO REDUCE TO 4 FT. DIA. FOR 7 FT. TO 10 FT. DIA. MANHOLES, USE A TRANSITION TOP TO REDUCE TO 4 FT. DIA.

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
STANDARD MANHOLE
APPROVED: FEBRUARY 25, 2010 | 2.11-01

NOTE: WATERTIGHT FRAME & COVER REQUIRED IN FLOODPLAIN OR WHEN SPECIFIED ON PLANS

NOTE: "MSD OF BUNCOMBE COUNTY" TO APPEAR ON COVERS ONLY WHEN THE SEWER SYSTEM IS TO BE MAINTAINED BY MSD

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
WATERTIGHT MANHOLE FRAME & COVER
APPROVED: FEBRUARY 25, 2010 | 2.11-08.2

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
BORE & ENCASEMENT DETAIL
APPROVED: FEBRUARY 25, 2010 | 2.14-01

UTILITY NOTES:

1. CONSTRUCTION AND TESTING OF THIS SEWER REPLACEMENT IS TO BE IN ACCORDANCE WITH MSD STANDARD DETAILS AND SPECIFICATIONS.

2. SANITARY SEWER LATERAL SHALL BE INSTALLED AT 1/4":1' SLOPE (MINIMUM) FROM POINT OF CONNECTION TO BUILDING. CONTRACTOR TO CONFIRM INVERT OF EXISTING MAIN OR LATERAL PRIOR TO INSTALLATION OF LATERAL.

3. A MINIMUM COVER OF THREE (3) FEET IS REQUIRED OVER PROPOSED SEWER LINES.

4. THE PROPOSED SEWER LINE SHALL MAINTAIN THE FOLLOWING VERTICAL SEPARATION FOR THE SPECIFIED UTILITIES:
A. WATER MAIN - 18" MINIMUM VERTICAL CLEARANCE
B. UNDERGROUND TELEPHONE, CABLE TV, AND CONDUIT BANKS - 12" MINIMUM SEPARATION OR CLEARANCE
C. GAS LINES - 18" MINIMUM SEPARATION OR CLEARANCE
D. ELECTRICAL CONDUIT - 12" MINIMUM SEPARATION OR CLEARANCE

DURING CONSTRUCTION, IF THE CONTRACTOR ENCOUNTERS A CONDITION WHERE THE LAYING OF THE PROPOSED SEWER WILL NOT MAINTAIN THE MINIMUM SEPARTION AS SPECIFIED ABOVE, THE CONTRACTOR SHALL CONTACT THE ENGINEER BEFORE PROCEEDING WITH THE LAYING OF THE PROPOSED SEWER PIPE.

GENERAL NOTES

THE LOCATION OF EXISTING UTILITIES, INCLUDING UNDERGROUND UTILITIES, IS INDICATED ON THE DRAWINGS INSOFAR AS THEIR EXISTENCE AND LOCATION WERE KNOWN AT THE TIME OF PREPARATION OF THE DRAWINGS. HOWEVER, NOTHING IN THESE CONTRACT DOCUMENTS SHALL BE CONSTRUED AS A GUARANTEE THAT SUCH UTILITIES ARE IN THE LOCATION INDICATED, OR THAT THEY ACTUALLY EXIST, OR THAT OTHER UTILITIES ARE NOT WITHIN THE SAME AREA OF OPERATIONS. THE CONTRACTOR SHALL MAKE ALL NECESSARY INVESTIGATIONS TO DETERMINE THE EXISTENCE AND LOCATIONS OF SUCH UTILITIES. THE CONTRACTOR SHALL PAY FOR ANY DAMAGE TO AND FOR MAINTENANCE AND PROTECTION OF EXISTNG UTILITIES AND STRUCTURES.

THE CONTRACTOR IS DIRECTED TO DIG AND LOCATE ALL UTILITIES, IN ADVANCE OF THE PIPELAYING, TO ALLOW FOR ADJUSTMENTS, DUE TO CONFLICTS WITH UTILITIES, IN THE HORIZONTAL AND VERTICAL LOCATION OF THE PIPE LINE.

3. INFLUENT LINES ENTERING MANHOLES AT AN ELEVATION GREATER THAN 2' ABOVE THE EFFLUENT SHALL BE INSTALLED WITH A DROP CONNECTION WHETHER INDICATED OR NOT.

4. THE CONTRACTOR SHALL NOTE THAT THIS IS A SEWER SYSTEM REPAIR AND REPLACEMENT PROJECT AND THEREFORE PORTIONS OF THE WORK SHALL ENTAIL DEALING WITH LIVE SEWAGE. THE CONTRACTOR SHALL (BY PUMPING OR OTHER METHOD) MAINTAIN SEWAGE FLOWS AT ALL TIMES, WHEN NECESSARY, THE CONTRACTOR SHALL BYPASS THE SEWAGE AROUND THE SECTIONS OF LINE THAT ARE TO BE RECONSTRUCTED. THE BYPASS SHALL BE MADE BY PLUGGING AN EXISTING UPSTREAM MANHOLE, IF NECESSARY, AND PUMPING THE SEWAGE INTO A DOWNSTREAM MANHOLE. THE PUMP AND BYPASS LINES SHALL BE ADEQUATE CAPACITY AND SIZE TO HANDLE THE FLOW. AT NO TIME WILL RAW SEWAGE BE ALLOWED TO DISCHARGE ON THE GROUND, IN WATERWAYS OR IN DRAINAGEWAYS.

5. THE LOCATION, SIZE, MATERIAL, ETC, OF THE SEWAGE LINES SHOWN ON THE PLANS WERE TAKEN IN PART FROM FIELD INVESTIGATIONS AND IN PART FROM EXISTING MAPPING AND ONLY REPRESENT APPROXIMATE DATA. THE CONTRACTOR SHALL MAKE ANY AND ALL NECESSARY FIELD INVESTIGATIONS TO DETERMINE EXACT FIELD CONDITIONS PRIOR TO ORDERING MATERIALS OR BEGINNING WORK.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035195 GABRIEL S. QUESINBERRY

Revisions	Date
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CONSTRUCTION BID SET	

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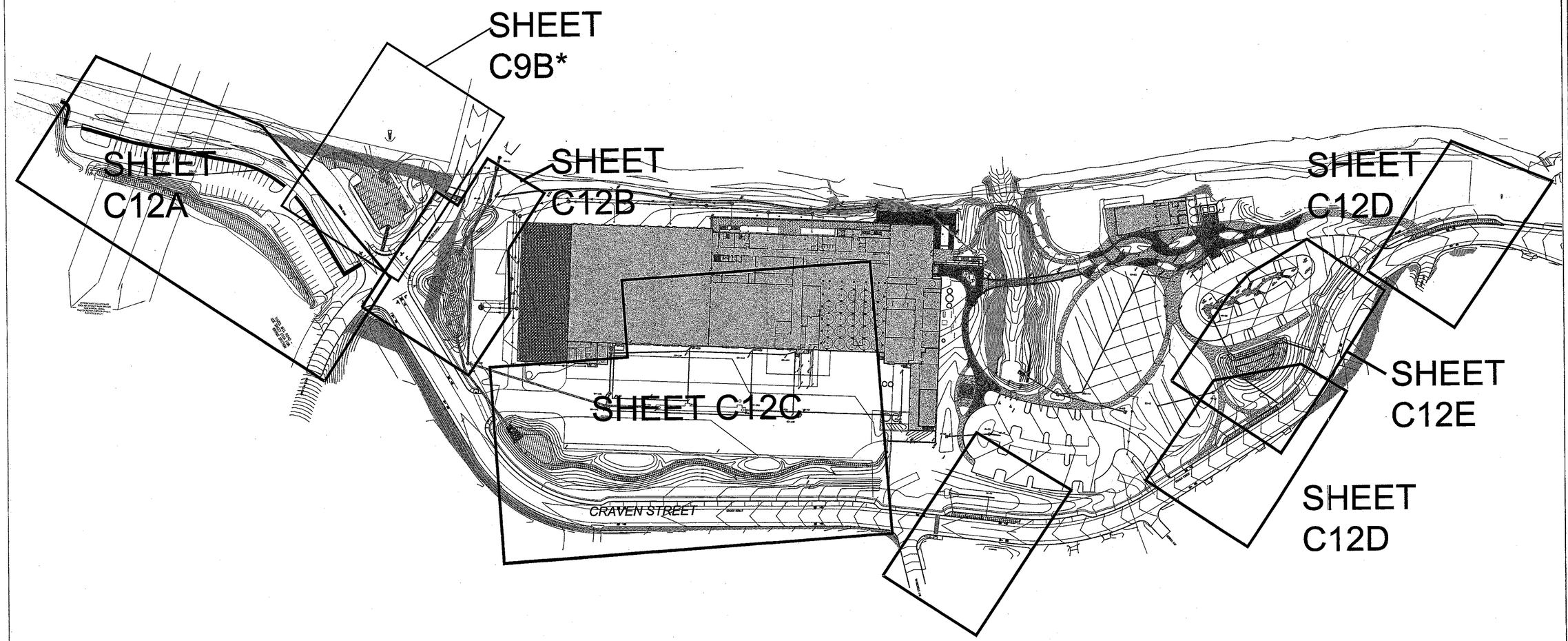
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
ASH EQUINOX ENVIRONMENTAL
ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS
SEWER DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C11C

FOR CONSTRUCTION

STORMWATER BMP PLAN SERIES - SHEET LAYOUT



* PART OF GREENWAY PLAN SERIES (INCLUDES LID PARKING AT TRAILHEAD) - SEE GREENWAY PLAN SERIES FOR SITE PLAN.

SCALE 1" = 80'

80 40 0 80 160 240

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCK

Revisions	Date
MSD ADJUSTMENT	5.9.14
RE BID	5.27.14

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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS
STORMWATER BMP PLAN SERIES
SHEET LAYOUT
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 80'
Commission Number: 3267
Sheet No.: C12

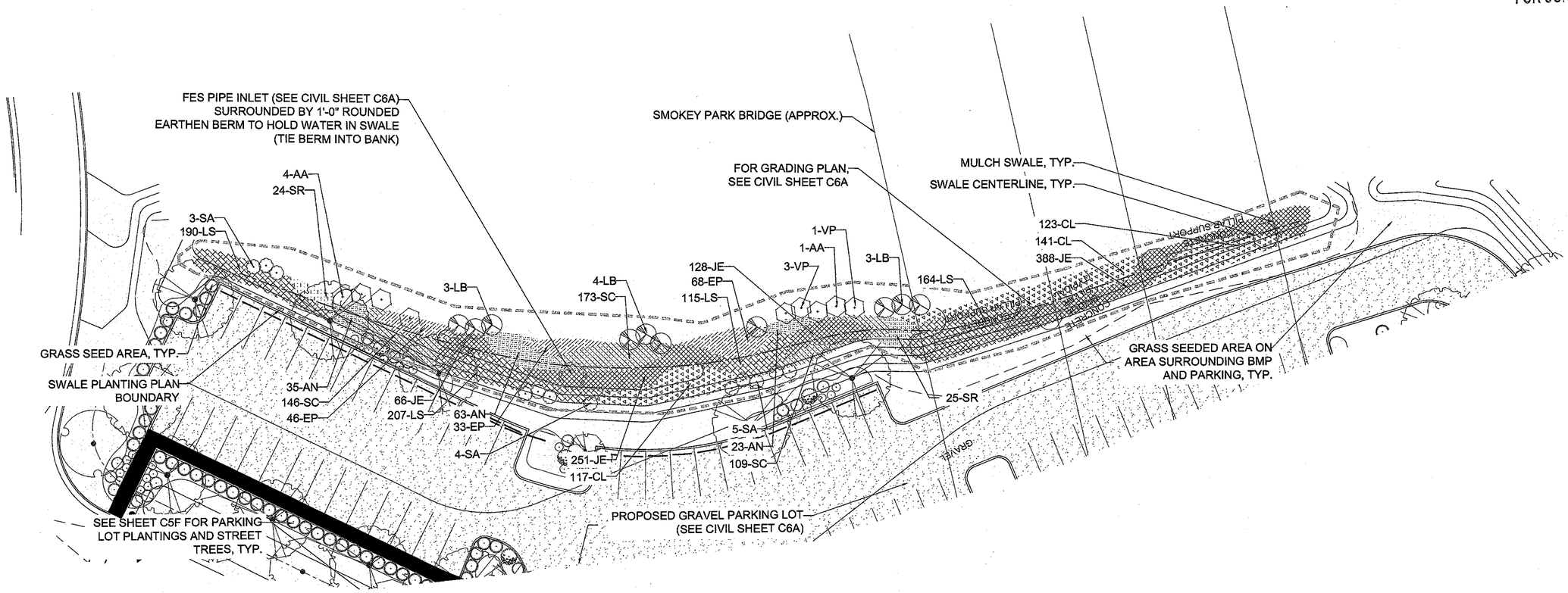
PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
CL	Chasmanthium latifolium	River oats	700	Plug	18" O.C.
SC	Scirpus cyperinus	Wool grass	430	Plug	18" O.C.
LS	Carex lurida	Lurid sedge	676	Plug	18" O.C.
AN	Aster novae-angliae	New England aster	120	Plug	2'-0" O.C.
EP	Eupatoreum purpureum 'Gateway'	Joe pye-weed	150	Plug	2'-0" O.C.
SR	Solidago rigida	Goldenrod	50	Plug	2'-0" O.C.
JE	Juncus effusus	Soft rush	830	Plug	18" O.C.
Shrubs					
AA	Aronia arbutifolia	Chokeberry	5	5 Gal.	As shown
LB	Lindera benzoin	Spicebush	10	5 Gal.	As shown
VP	Viburnum prunifolium	Blackhaw Viburnum	4	5 Gal.	As shown
SA	Spirea alba	Meadowsweet	12	5 Gal.	As shown

CONSTRUCTION SEQUENCE FOR STORMWATER BMPS:

1. CALL 1-800-632-4949 FOR UTILITY LOCATIONS PRIOR TO DIGGING.
2. HOLD PRE-CONSTRUCTION CONFERENCE AT LEAST ONE WEEK PRIOR TO STARTING CONSTRUCTION.
3. ESTABLISH CONSTRUCTION ACCESS, CONSTRUCTION ROUTES AND STAGING AREAS.
4. INSTALL TEMPORARY SILT FENCING AND ALL INLET/OUTLET PROTECTION FOR BMPS (SEE EROSION CONTROL PLAN FOR LOCATIONS AND DETAILS).
5. INSTALL CONSTRUCTION MUD MAT.
6. INSTALL TREE PROTECTION FENCING (TO BE DEMARCATED AT PRE-CONSTRUCTION MEETING). TREES TO BE SAVED WILL BE ALSO BE FLAGGED ON SITE.
7. CLEAR AND GRUB SITE.
8. BEGIN ROUGH GRADING OF SITE.
9. TEMPORARY DIVERSION DITCHES SHALL BE INSTALLED AT THE TOP OF FILL SLOPES OR WHERE NEEDED, DITCHES SHOULD BE INSPECTED AT THE END OF EACH WORK DAY.
10. INSTALL RUNOFF CONVEYANCE SYSTEMS - SWALES, INLET AND OUTLET PROTECTION,
11. TEMPORARY SEEDING SHALL BE INSTALLED WITHIN 21 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING.
12. INSTALL WATTLES IN SWALES AS GRADING PERMITS.
13. BEGIN FINE GRADING OF GROUNDS.
14. UPON COMPLETION OF FINE GRADING AND STABILIZATION WITH SEEDING, CONSTRUCTION OF BMPS IS TO BE COMPLETED. NO BIORETENTION MEDIA SHOULD BE PLACED ON SITE UNTIL SITE IS STABILIZED.
15. BEGIN PERMANENT SEEDING ON ALL FINISHED GRADED SLOPES. PERMANENT GROUNDCOVER FOR ALL DISTURBED AREAS WITHIN 15 WORKING DAYS OR 90 CALENDAR DAYS (WHICHEVER IS SHORTER) FOLLOWING COMPLETION OF SITE CONSTRUCTION.
16. INSTALL NECESSARY EROSION AND SEDIMENTATION CONTROL PRACTICES AS BUILDING CONSTRUCTION TAKES PLACE OR AS FUTURE CONSTRUCTION PHASES CONTINUE.
17. AFTER SITE IS STABILIZED, REMOVE ALL TEMPORARY MEASURES AND COMPLETE PERMANENT VEGETATIVE COVER.

FOR CONSTRUCTION



NOTE: SCALED BACK PLANTINGS BY OTHERS ARE ACCOUNTED FOR ON OTHER SITE PLAN SHEETS.

SCALE 1" = 20'

20 5 0 20 40 80

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

Revisions	Date
MSD ADJUSTMENT	5.9.14
RE BID	5.27.14

Issue Date: 5/27/2014
Drawn By: EE
Designed By: EE
Checked By: DT
Date: 12/6/2013

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

CRAVEN STREET IMPROVEMENTS

STORMWATER BMP PLAN SERIES
GRAVEL PARKING SWALE PLANTING
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C12A

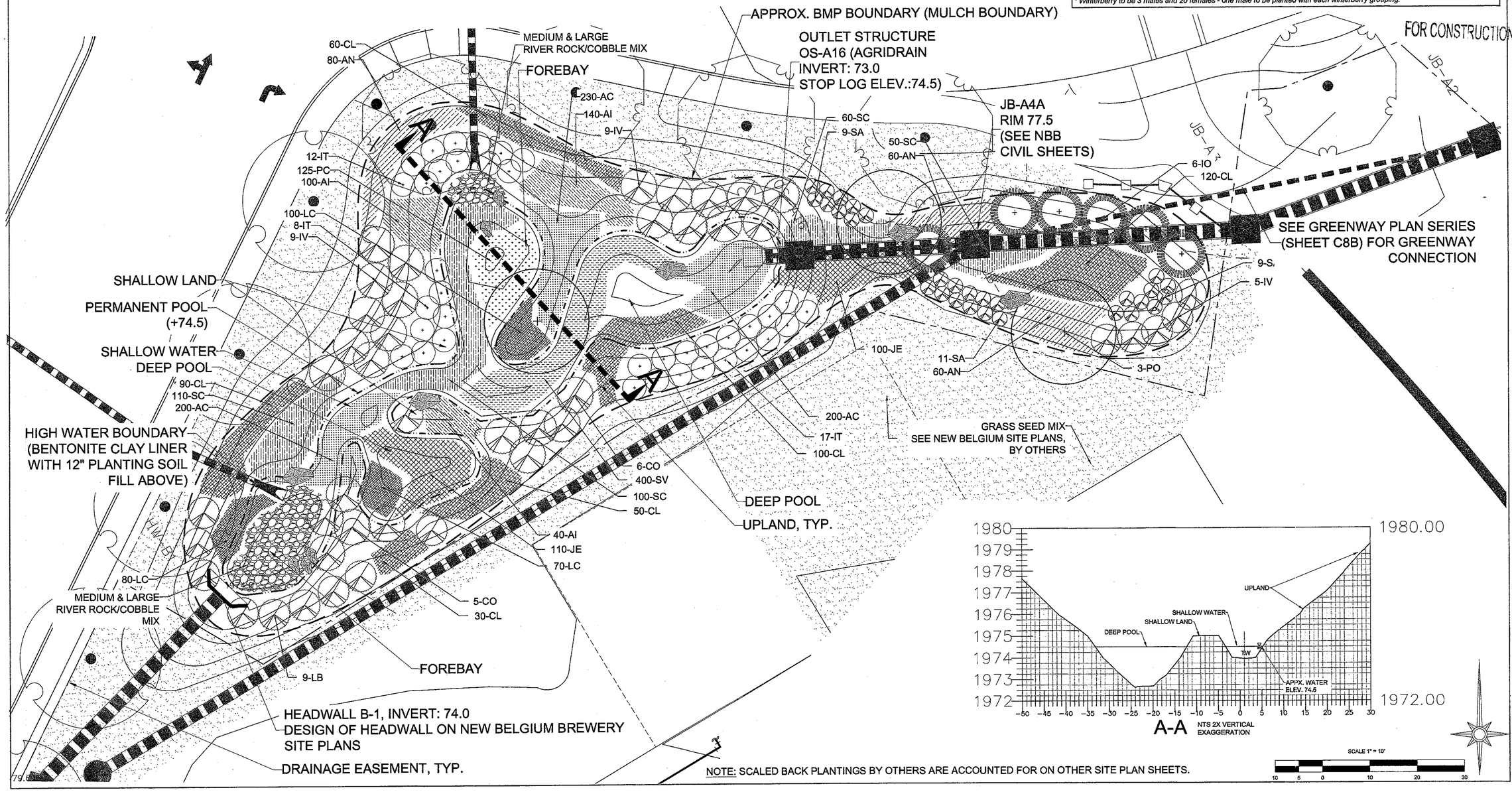
WETLAND CONSTRUCTION NOTES:

- DURING EXCAVATION OF THE CONSTRUCTED WETLAND CONTACT PROJECT LANDSCAPE ARCHITECT IF GRADING REVEALS PROBLEMATIC CONDITIONS FOR HOLDING WATER SUCH AS SANDY SOILS, GRAVEL, DRAIN TILES, ETC. PROJECT REFINEMENTS MAY BE NECESSARY TO CREATE A FUNCTIONING WETLAND.
- CONTRACTOR SHALL CONSTRUCT THE WETLAND IN A WAY THAT REDUCES THE POTENTIAL FOR EROSION WHICH MAY INCLUDE TEMPORARY DIVERSION DITCHES
- STRIP AND STOCKPILE TOPSOIL IF PRESENT. SOILS UNCOVERED DURING EXCAVATION THAT CONTAINS CLAY OR LOAM SOILS CAN BE USED WITHIN THE WETLAND AREA. NO SAND, GRAVEL, OR ROCK MAY BE USED WITHIN THE WETLAND.
- OVER EXCAVATION MAY BE NECESSARY TO REMOVE SILT, SEDIMENT, SAND, GRAVEL OR CONDITIONS THAT WOULD IMPACT WETLAND FUNCTION.
- EQUINOX TO OVERSEE FINE GRADING OF CONSTRUCTED WETLAND.
- SHARED CONSTRUCTED WETLAND - COST TO BE SHARED BY CITY OF ASHEVILLE AND NEW BELGIUM BREWING COMPANY.
- ALL BOTTOM AREAS WITHIN "HIGH WATER BOUNDARY" TO BE TILLED WITH BENTONITE CLAY LAYER.
- BENTONITE POWDER TO BE TILLED AT A RATE OF 1-2 LBS PER SQUARE FOOT, WETTED WITH SPRINKLER, AND ROLLED TO COMPACT CLAY PARTICLES (FINAL SOIL COMPOSITION SHOULD BE A MIN OF 20% CLAY).
  ADD WATER WHILE CLAY SOIL LAYER IS WET - DO NOT ALLOW WETLAND TO DRY OUT AND CRACK, OR SEAL WILL BECOMPROMISED.
- ALTERNATIVELY, A CLAY LINER MAY BE ALSO BE USED (FOLLOW MANUFACTURER'S INSTALLATION REQUIREMENTS).
- ON TOP OF THE BENTONITE CLAY LINER BUILD UP WETLAND GRADES AS SHOWN IN 6" LIFTS WITH EACH LIFT BEING THOROUGHLY COMPACTED. ON SITE SOILS MAY BE USED IF SOILS ARE CLAY OR LOAM SOILS. NO SAND, GRAVEL, OR ROCK MAY BE USED WITH THE SOIL LIFTS.
- TOPSOIL TO BE SPREAD SMOOTH OVER THE BOTTOM AND SIDES OF THE COMPLETED WETLAND AND UP THE INSIDE SLOPES OF THE WETLAND TO A DEPTH OF 8-12" AND SHALL MEET PROPOSED FINISHED GRADE (SEE SHEET C12H FOR SOIL SPECIFICATIONS).

PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
AC	Acorus calamus	Sweetflag	630	Plug	12" O.C.
AI	Asclepias incarnta	Marsh milkweed	280	Plug	12" O.C.
AN	Aster novae-angliae	New England Aster	200	Plug	18" O.C.
CL	Chasmanthium latifolium	River oats	450	Plug	18" O.C.
JE	Juncus effusus	Soft rush	210	Plug	12" O.C.
LC	Lobelia cardinalis	Cardinal flower	160	Plug	18" O.C.
PC	Pontederia cordata	Pickerelweed	150	Plug	12" O.C.
SC	Scirpus cyperinus	Woolgrass	320	Plug	18" O.C.
SV	Scirpus validus	Soft-stem bulrush	400	Plug	12" O.C.
Shrubs					
IT	Itea virginica	Virginia sweetspire	37	5 Gal.	As shown
CO	Cephalanthus occidentalis	Buttonbush	11	5 Gal.	As shown
IV	Ilex verticillata	Common winterberry	23*	5 Gal.	As shown
LB	Lindera benzoin	Spicebush	9	5 Gal.	As shown
SA	Spirea alba	Meadowsweet	29	5 Gal.	As shown
Trees					
IO	Ilex opaca 'Satyr Hill'	Holly	6	7' Height B&B	As shown
PO	Platanus occidentalis	Sycamore	3	2-1/2" Min.	As shown

** Winterberry to be 3 males and 20 females - one male to be planted with each winterberry grouping.*



NOTE: SCALED BACK PLANTINGS BY OTHERS ARE ACCOUNTED FOR ON OTHER SITE PLAN SHEETS.

NORTH CAROLINA LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

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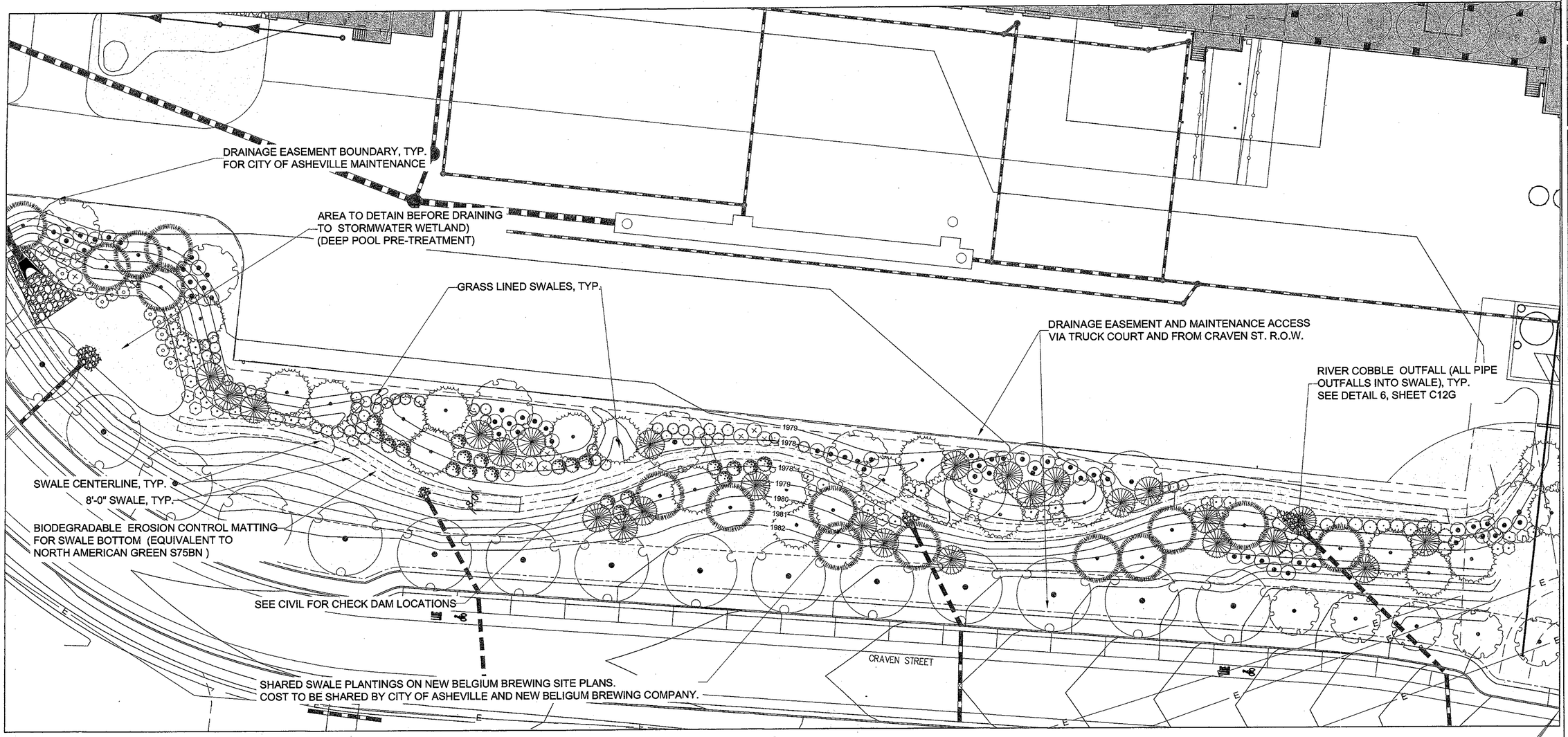
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Color Jones & Stone

CRAVEN STREET IMPROVEMENTS

STORMWATER BMP PLAN SERIES
CONSTRUCTED WETLAND
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C12B

FOR CONSTRUCTION



NOTE: SCALED BACK PLANTINGS BY OTHERS ARE ACCOUNTED FOR ON OTHER SITE PLAN SHEETS.

SCALE 1" = 20'

20 10 0 20 40 60

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EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS

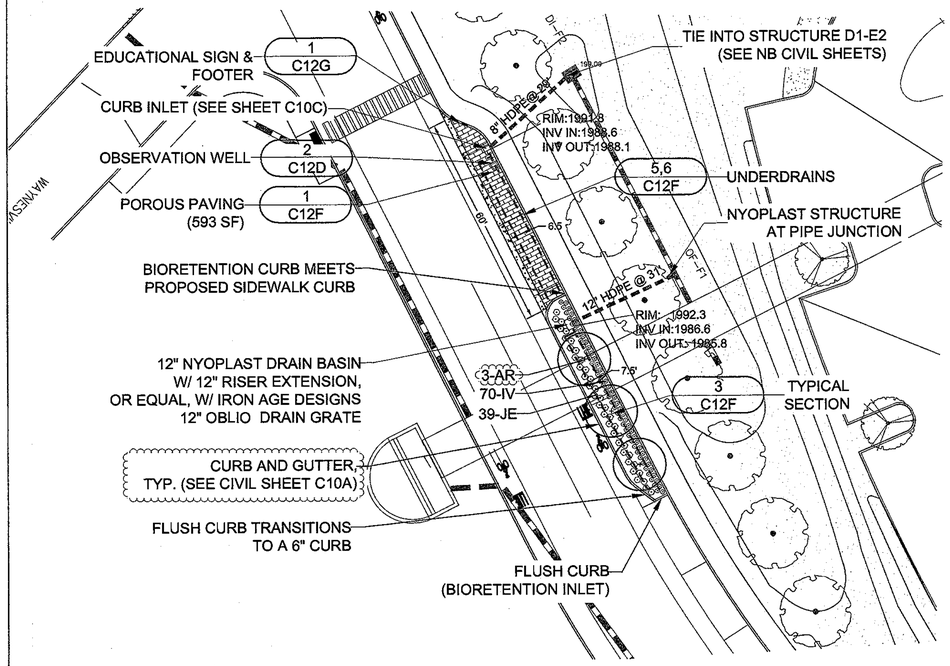
STORMWATER BMP PLAN SERIES
TRUCK PARKING SWALE GRADING
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C12C

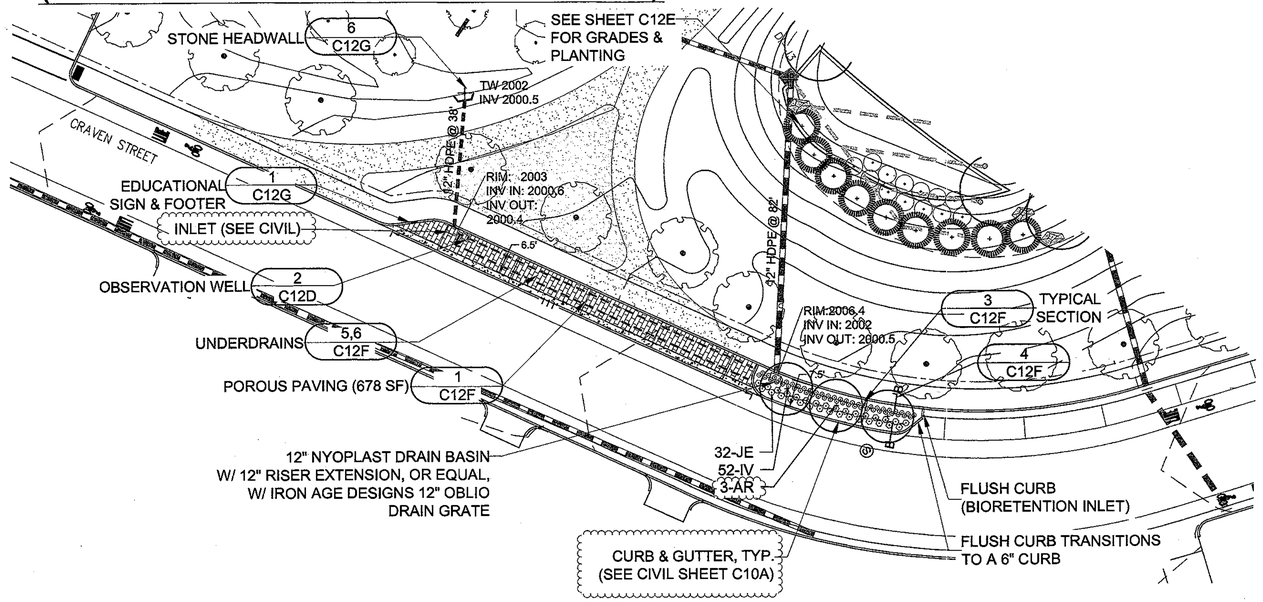
GREEN STREETS PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
IV	Iris virginica	Blue flag iris	122	1 Gallon	18" O.C.
JE	Juncus effusus	Soft rush	71	1 Gallon	3'-0" O.C.
Trees					
AR	Acer rubrum 'Armstrong'	Columnar red maple	6	2-1/2" cal.	As shown

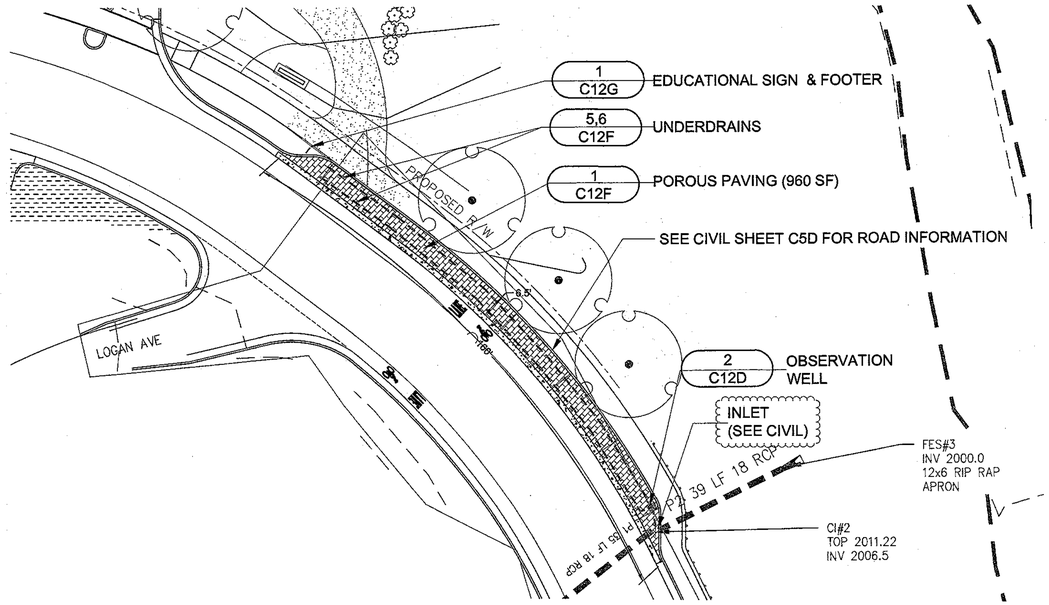
GREEN STREETS BIORETENTION & POROUS PAVING AREA 1 (APPROX ROAD STATIONING 26+00)

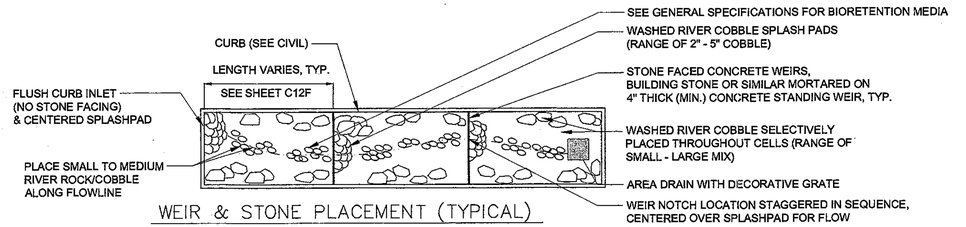


GREEN STREETS BIORETENTION & POROUS PAVING AREA 2 (APPROX ROAD STATIONING 31+00)



GREEN STREETS POROUS PAVING AREA 3 (APPROX ROAD STATIONING 36+00)

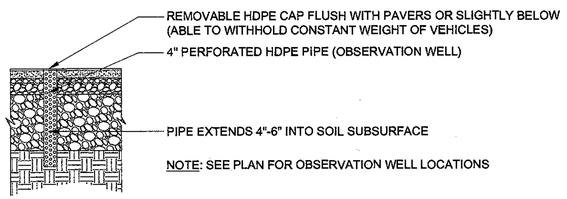




WEIR & STONE PLACEMENT (TYPICAL)

1 GREEN STREET BIORETENTION - TYPICAL PLAN VIEW

NOT TO SCALE



2 OBSERVATION WELL (POROUS PAVERS)

NOT TO SCALE

SCALE 1" = 20'

20 5 0 20 40 60

FOR CONSTRUCTION

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

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Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS

STORMWATER BMP PLAN SERIES
GREEN STREETS
CITY OF ASHEVILLE, NORTH CAROLINA

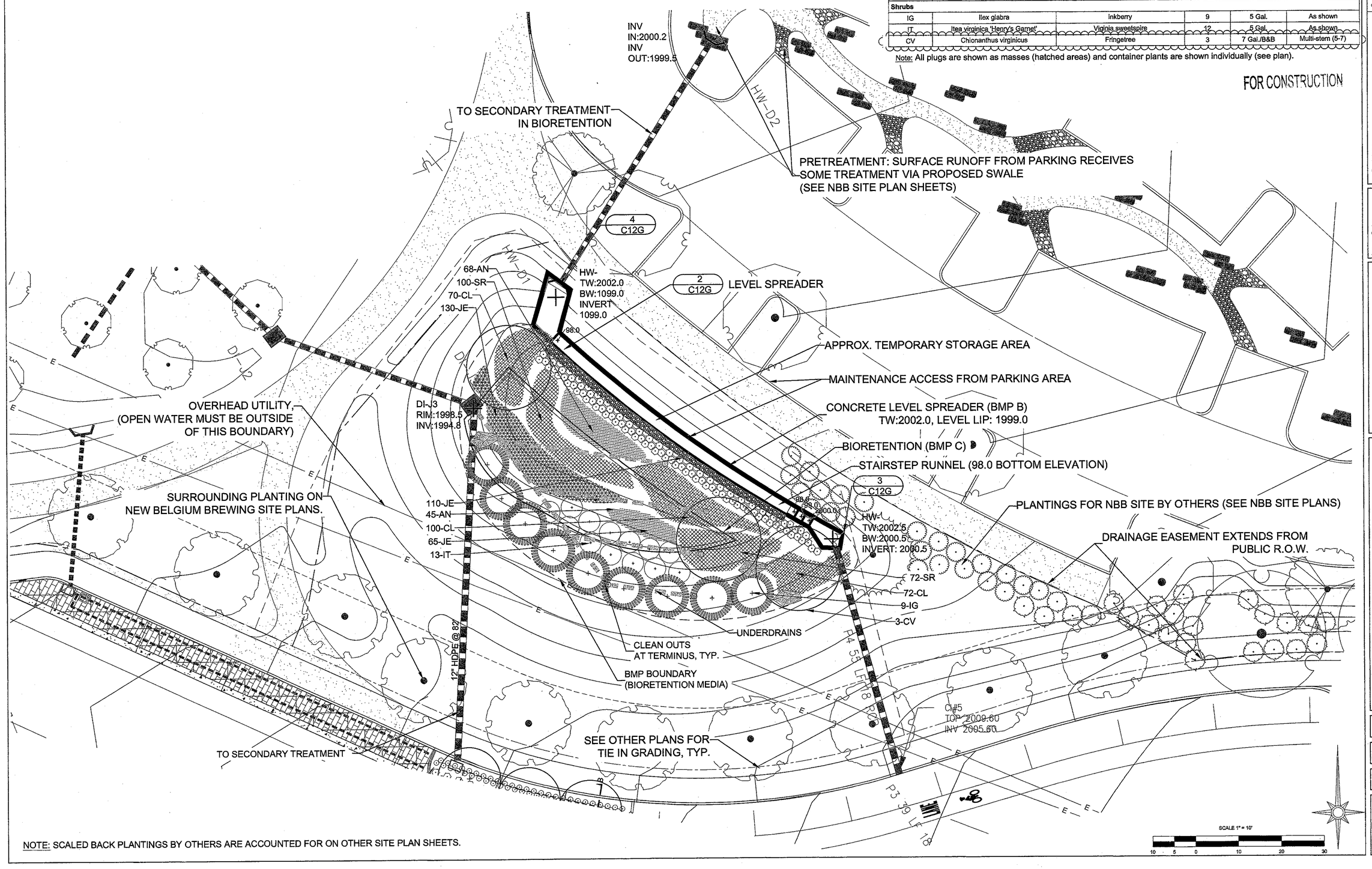
Vertical Scale: N/A
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C12D

BIORETENTION PLANTING SCHEDULE

Symbol	Species	Common Name	Quantity	Size	Comments
Perennials/Forbs					
CL	Chasmanthium latifolium	River oats	242	Plug	18" O.C.
AN	Aster novae-angliae	New England aster	113	Plug	18" O.C.
SR	Solidago rigida	Goldenrod	172	Plug	18" O.C.
JE	Juncus effusus	Soft rush	185	Plug	18" O.C.
JE	Juncus effusus	Soft rush	110	1 Gallon	As shown
Shrubs					
IG	Ilex glabra	Inkberry	9	5 Gal.	As shown
IT	Itea virginica 'Henry's Garnet'	Viginia sweetspire	12	5 Gal.	As shown
CV	Chionanthus virginicus	Fringetree	3	7 Gal./B&B	Multi-stem (5-7)

Note: All plugs are shown as masses (hatched areas) and container plants are shown individually (see plan).

FOR CONSTRUCTION



NOTE: SCALED BACK PLANTINGS BY OTHERS ARE ACCOUNTED FOR ON OTHER SITE PLAN SHEETS.

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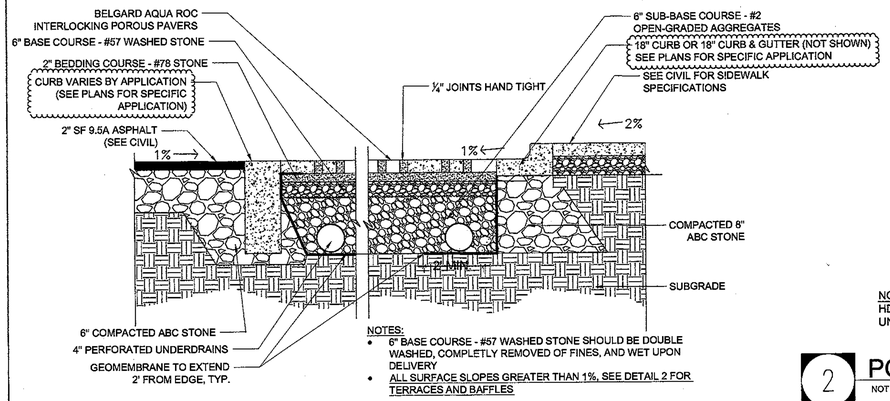
CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole Jenest & Stone

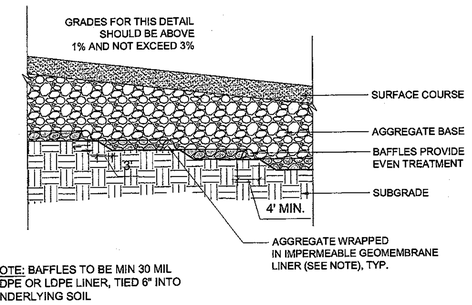
CRAVEN STREET IMPROVEMENTS
STORMWATER BMP PLAN SERIES
VISITOR PARKING BIORETENTION
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: 20'
Commission Number: 3267
Sheet No.: C12E



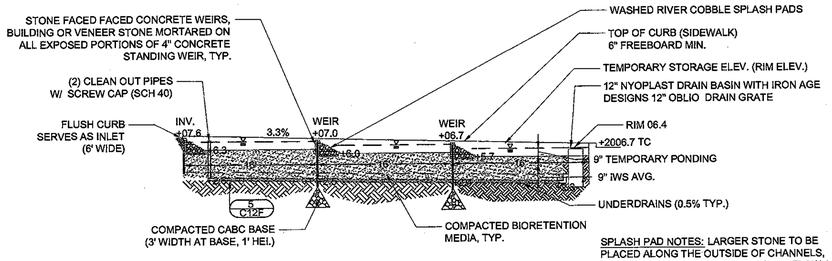
NOTES:
- 6" BASE COURSE - #57 WASHED STONE SHOULD BE DOUBLE WASHED, COMPLETLY REMOVED OF FINES, AND WET UPON DELIVERY
- ALL SURFACE SLOPES GREATER THAN 1%, SEE DETAIL 2 FOR TERRACES AND BAFFLES

1 POROUS PAVING - TYPICAL SECTION
NOT TO SCALE



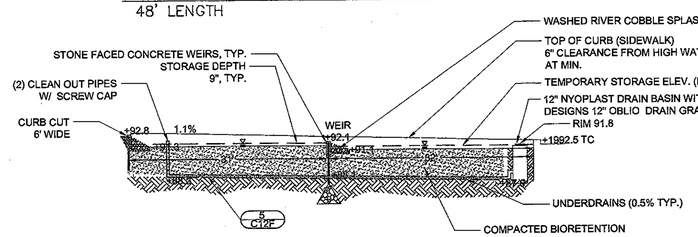
NOTE: BAFFLES TO BE MIN 30 MIL HDPE OR LDPE LINER, TIED 6" INTO UNDERLYING SOIL

2 POROUS PAVING - TERRACES AND BAFFLES
NOT TO SCALE



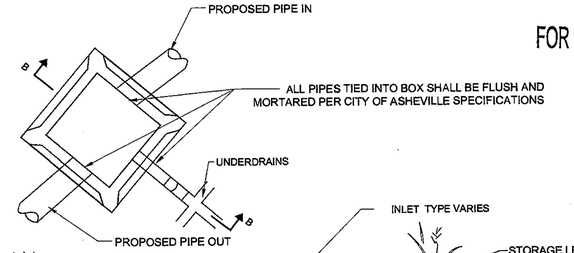
GREEN STREET BIORETENTION 1
48' LENGTH

SPLASH PAD NOTES: LARGER STONE TO BE PLACED ALONG THE OUTSIDE OF CHANNELS, NEAR NEAR CURB TO ALLOW PROPER FLOW

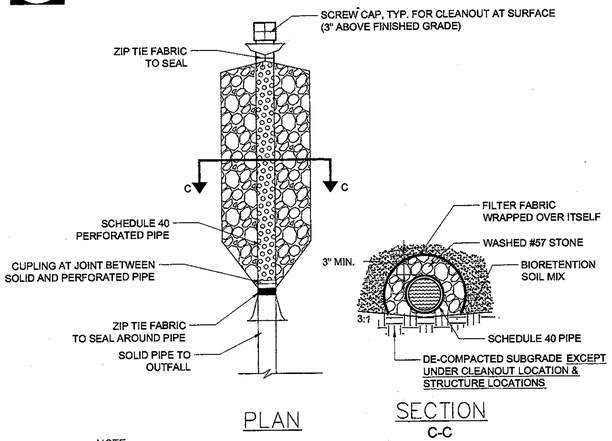


GREEN STREET BIORETENTION 2
63' LENGTH

3 GREEN STREET BIORETENTION - LONGITUDINAL SECTION
NOT TO SCALE

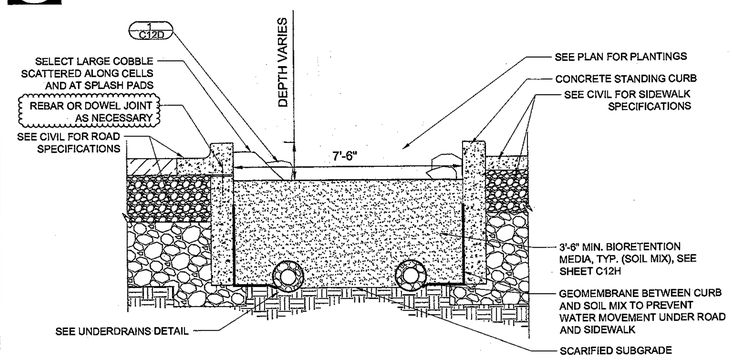


PLAN



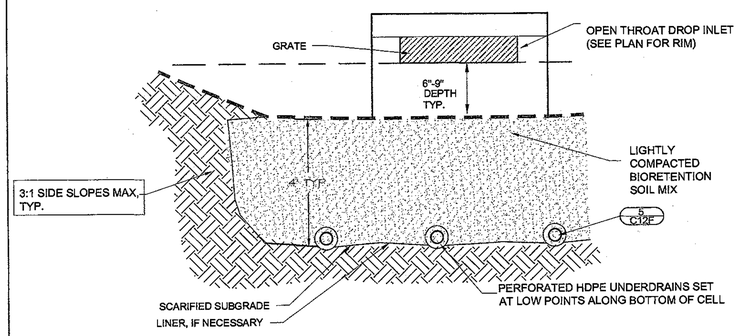
PLAN SECTION C-C

NOTE:
1. CONTRACTOR SHALL GRADE SUBGRADE AND INSTALL PIPE TO DRAIN @ −1% SLOPE MIN FOR BIORETENTION AND −0.5% FOR POROUS PAVING.



4 GREEN STREET BIORETENTION - SECTION (B-B)
NOT TO SCALE

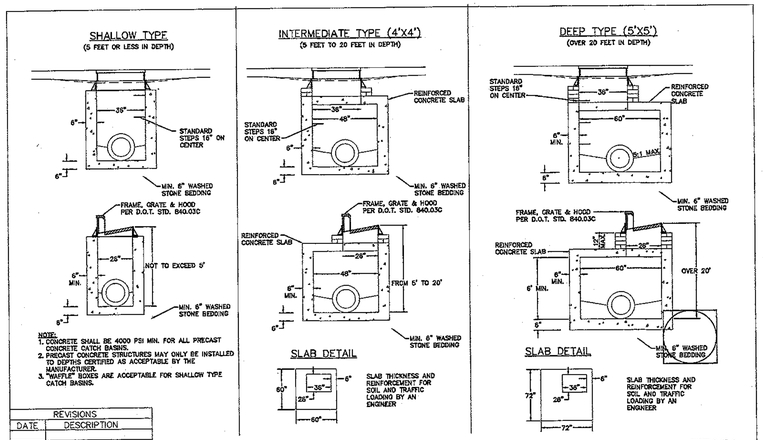
NOTES:
1. CONTRACTOR TO TEST INFILTRATION RATES OF BIORETENTION BEFORE CONSTRUCTION - METHOD AND FINAL RESULTS TO BE APPROVED BY LANDSCAPE ARCHITECT BEFORE CONSTRUCTION OF BMP (SEE SPECIFICATIONS FOR DETAILS PERTAINING TO INFILTRATION TEST RESULTS).
2. SEE SHEET C12H FOR BIORETENTION MEDIA (SOIL MIX) & PLANTING SPECIFICATIONS.



IMPORTANT: BIO-RETENTION NOT TO BE CONSTRUCTED UNTIL SITE IS COMPLETELY STABILIZED- SEDIMENTATION IN THE SYSTEM WILL RENDER THE SYSTEM NON-FUNCTIONAL

7 BIORETENTION (TYP. SECTION)
SCALE: NOT TO SCALE

5 UNDERDRAINS
NOT TO SCALE



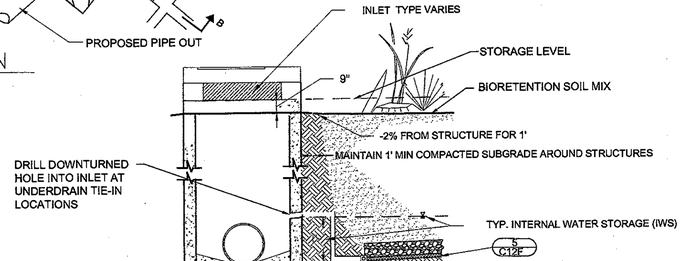
REVISIONS	
DATE	DESCRIPTION

SHEET 2 OF 2

CITY OF ASHEVILLE, N.C. ENGINEERING DEPARTMENT	PRECAST CONCRETE CATCH BASIN	STD. No. 8.03

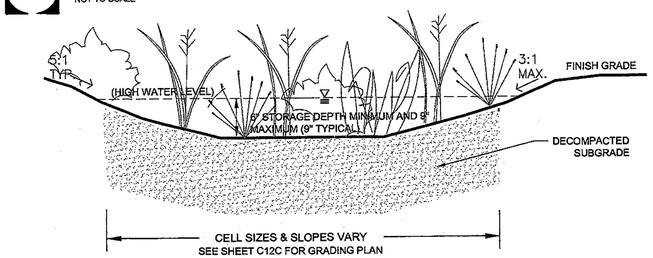
8 DROP INLET
SCALE: NOT TO SCALE

6 UNDERDRAIN CONNECTION TO STRUCTURES
NOT TO SCALE



SECTION B-B

9 SWALE (TYPICAL SECTION)
SCALE: NOT TO SCALE



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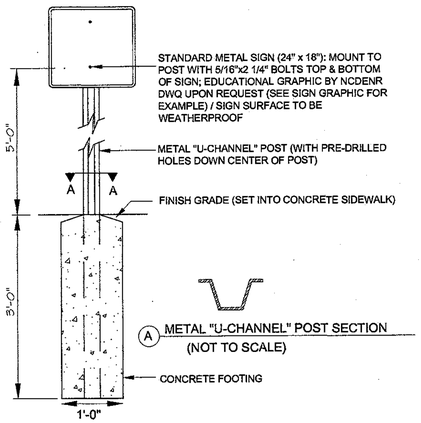
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

FOR CONSTRUCTION

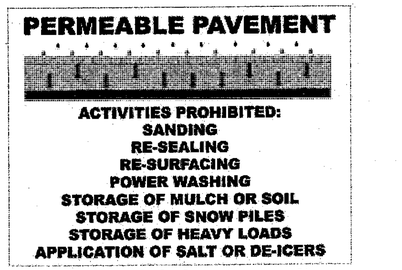
CRAVEN STREET IMPROVEMENTS
STORMWATER BMP DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C12F

FOR CONSTRUCTION



A METAL "U-CHANNEL" POST SECTION
(NOT TO SCALE)

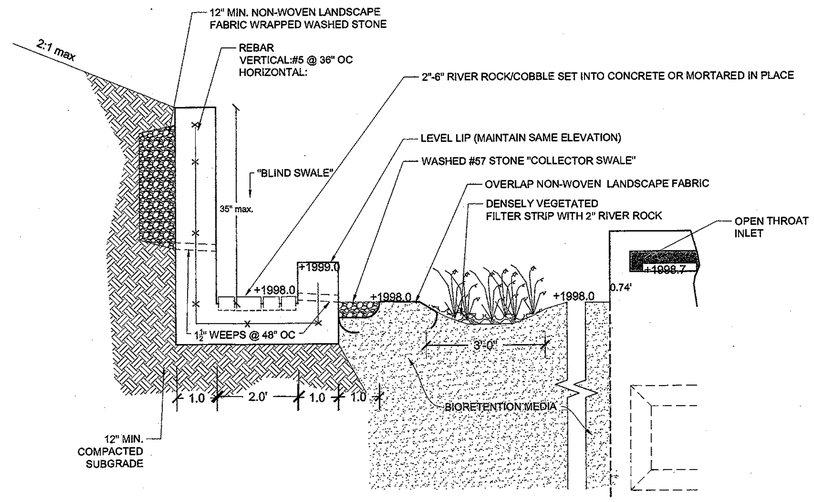


SIGN GRAPHIC (OR EQUAL)

* High resolution graphic to be used for sign

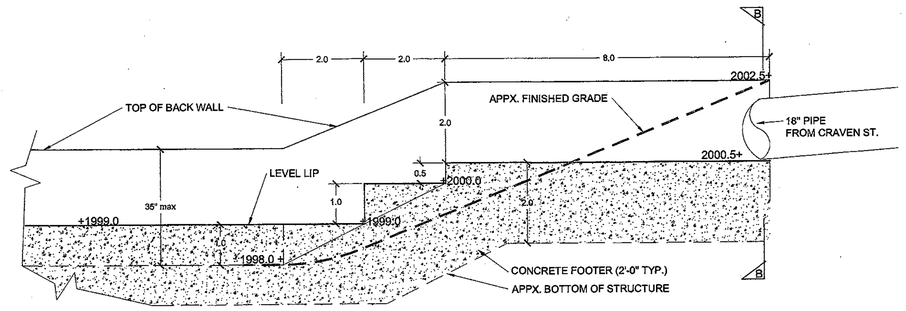
1 POROUS PAVER SIGN - POST WITH FOOTER

NOT TO SCALE



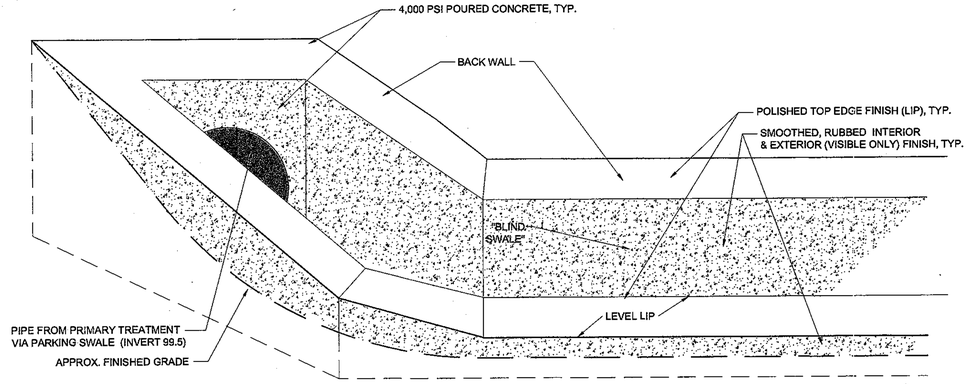
2 LEVEL SPREADER - 300 PSI FIBER EMBEDDED CONCRETE

NOT TO SCALE



3 LEVEL SPREADER - RUNNEL (FROM CRAVEN STREET) - CROSS SECTION

NOT TO SCALE



4 LEVEL SPREADER - PERSPECTIVE (FROM PARKING AREA)

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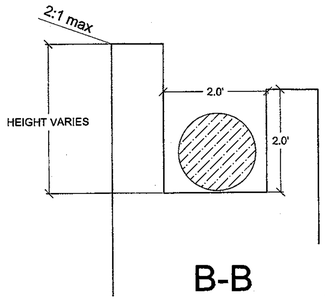
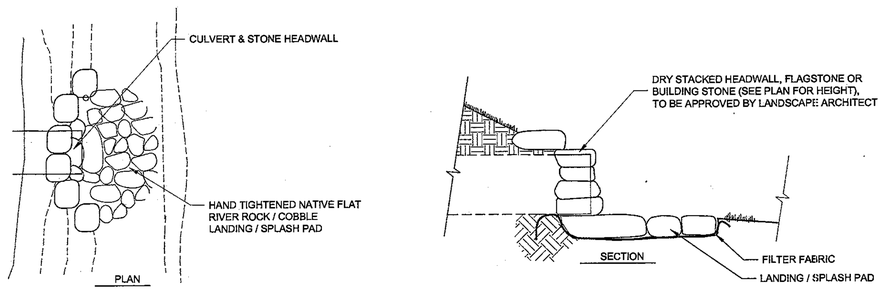


5 LEVEL SPREADER - SECTION (B-B)

NOT TO SCALE



6 STONE HEADWALL

NOT TO SCALE

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

Revisions	Date
MSD ADJUSTMENT	5.9.14
RE BID	5.27.14

Issue Date: 5/27/2014
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Designed By: EE
Checked By: DT
Date: 12/6/2013

Matternn & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
Cole-Jenest & Stone

CRAVEN STREET IMPROVEMENTS
BMP DETAILS
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C12G

NOTES & GENERAL SPECIFICATIONS (STORMWATER, STREAM & GREENWAY)

A. GENERAL NOTES

1. Where conflicts occur between Notes, Drawings, or Specifications, the Contractor shall not proceed with the affected work until the Landscape Architect issues a clarification.

B. CONCRETE

2. Unless otherwise specified, concrete shall have natural sand fine aggregate, embedded fiberglass, and normal weight coarse aggregates conforming to ASTM C33, Type I Portland Cement conforming to ASTM C150, and shall have the following minimum compressive strength (f'c) at 28 days:
3. Footings 3000 psi w/ (Entrained Air & Fly Ash optional)
4. Slabs 4000 psi w/ 5% Entrained Air and Fly Ash
5. Exterior walks 4000 psi w/ 5% Entrained Air and Fly Ash
6. All concrete shall be made in accordance with approved design mixes as required for the job.
7. All concrete shall contain entrained air in accordance with ACI 318, Table 4.2.1, U.O.N.
8. Concrete that arrives at the jobsite with a slump greater than 5" shall be rejected. Concrete with a slump less than 3" shall have an approved super-plasticizer added such that the minimum 3" slump may be achieved. The addition of water at the jobsite, beyond that held-back at the concrete plant, for the purpose of increasing the slump is prohibited.
9. Schedule of Concrete Finishes (*unless otherwise specified on plans*):
   - Slabs: Non-slip Broom Finish.
   - Exterior sidewalks and paths: Non-slip Broom Finish.
   - All unexposed concrete surfaces: U.O.N. Rough Form Finish.
   - All exposed concrete surfaces: U.O.N. Smooth Rubbed Finish.
10. The Contractor shall be responsible for furnishing and installing anchor bolts, clips, inserts, connection plates, sleeves, slots, and other required items in accordance with the Contract Drawings, and in cooperation with other trades prior to placing the concrete.

Control joints to be grooved when concrete is still wet and pliable (1/8" - 1/16" width by 1/4" deep) and placed at a minimum of every 5' and maximum of every 12' of concrete surface or pad.

C. CONCRETE REINFORCEMENT

16. Concrete reinforcement bars shall conform to ASTM A615, Grade 60. Reinforcement designated as continuous shall lap 36 bar diameters at splices, unless noted otherwise.
17. All concrete reinforcement bars shall be accurately and securely tied and anchored in place to prevent dislocation during the concrete placement operation.
18. Minimum concrete cover protection for reinforcement bars shall conform to the American Concrete Institute Committee 318, Section 7.7, unless noted otherwise.

D. STONE AND ROCK

20. All stone and rock materials are to be washed before being delivered to the project site.
21. Samples of each type of rock, including river rock, cobble, boulders, and fieldstone are to be approved on site by Landscape Architect.
22. All stone and rock is to be of North Carolina or Tennessee origin, generally rounded in appearance, and mottled brown/gray in color (typical majority color), unless otherwise specified.
23. All river rock and cobble is to be Catawba Brown, Nolichucky, or similar in appearance to mottled light brown, rounded, river rock.
24. All river rock is to follow the categories: small river rock (under 3"), medium river rock and cobble (4"-7"), and large river rock and cobble (8"-12"). If unspecified, assume a mix of small, medium, and large river rock.
25. All fieldstone to be of the same origin, either Tennessee fieldstone, Crab orchard (brown), or similar (mottle light brown, typ.).
26. Stone for the stream shall be free of machine marks, scratches, or disfigurations.
27. Stone for the stream, including stone walls, boulders, and the arch culvert stone facing, *to all be planted with moss*. See Planting & Revegetation Specifications (Section 5.5) for directions on how to make and apply moss growth mixture.

E. MISC. ITEMS

28. Epoxy for the setting of dowels or anchor bolts shall be "PE 1000" as manufactured by Powers Fasteners, Inc., New Rochelle, NY, or an approved equivalent. Installation of the dowels/anchor bolts shall be performed in strict accordance with the manufacturer's written instructions.
29. All grout shall be non-shrink, equal to "Masterflow 928" as manufactured by MBTBASF.
30. All paint for crosswalk striping to be NC DOT approved reflective white paint in accordance with MUTCD.
31. All pedestrian and greenway signage to be installed by Owner and according to Owner specifications.

F. PAVERS

32. Porous pavers to be Belgard Aqua Roc porous pavers laid in runningbond pattern. Color to be chosen on site - Contractor to bring color samples to site for selection by Landscape Architect.
33. Trailhead and greenway pavers to be Stepstone, Inc. Narrow Modular Pavers. Color to be chosen on site - Contractor to bring three selected color samples to site for selection by Landscape Architect.

G. PLANTING MATERIALS

34. Call 811 utility locations prior to digging.
35. Contractor shall verify all quantities, measurements and site conditions. No plant substitutions allowed unless written permission from Equinox is given.
36. All plants, materials, planting and seeding activities shall conform to landscape industry standards. Comply with sizing and grading standards of the latest edition of "American Standard of Nursery Stock". Provide stock true to botanical name and legibly tagged.
37. Stockpile location(s) to be approved by Landscape Architect.
38. Keep plant species moist and shaded until installation. Do not leave in the sun or let plants dry out. Saturate plants after installation. Plants shall not be delivered on-site prior to 5 days before installation.
39. Dig, pack, transport and handle all plants with care to ensure protection from injury. Store plants in the manner necessary to accommodate their horticultural requirements. Heel-in plants if necessary to protect root balls and keep from drying out.
40. All plants to be inspected by Equinox prior to installation. If any plants are in poor condition, unhealthy looking, diseased, or dying the contractor will replace as requested by Equinox or the Owner.
41. During installation, the contractor shall notify Equinox of any conditions which may be harmful to plant life, such as hazardous materials, etc. Equinox shall make recommendations to address the specific situation.
42. Contractor to remove all stones over 1" in dia. and all construction debris including gravel, concrete, roots, and other material that may be harmful or prevent proper establishment and or maintenance of planting areas (See Planting & Revegetation Specifications for soil and bed preparation).
43. For new planting areas, contractor shall remove all pavement, gravel sub-base, and construction debris: remove compacted soil and add 24" weed free planting soil for plants (See Planting & Revegetation Specifications for mix requirements).
44. In areas where construction material is embedded in the soil, contractor shall remove contaminated soil to a depth of 8" and add fill with clean, weed-free planting soil.
45. Large maturing trees shall not be planted under overhead power lines or within sewer Rights-of-Way. Contractor shall contact Landscape Architect to resolve any issues before planting.
46. For all B&B trees, root ball shall remain moist at all times and should retain shape when removing top 1/2 -2/3 of wire basket for transplanting. Contractor shall remove top 1/2 of burlap from root ball.
47. All plantings to be watered after planting immediately.
48. All container and B&B trees and shrubs to be guaranteed for 1 year (minimum).
49. All planting beds, and container trees and shrubs to be mulched with double ground hardwood mulch, unless otherwise specified.
50. Contractor to water plants until construction is complete or plants are established (See Planting & Revegetation Specifications for more information).
51. If there is a discrepancy between the quantity of plants shown on the plan and the quantities in the plant schedule use the higher number of plants. If this occurs notify the project Landscape Architect.

H. STORMWATER BMPS

FOR CONSTRUCTION

52. All planting beds, trees, and shrubs to be mulched with double ground hardwood mulch, unless otherwise specified.
53. Green street bioretention cells to be mulched with a top dressing of bioretention media. All other bioretention to be mulched with aged, hardwood mulch.
54. Contractor to test infiltration rates of all stormwater bmp locations (bioretention, swales, and porous paving locations) before construction - method and final results to be approved by Landscape Architect before construction of bmp. See additional specifications for recommended testing method.
55. Bioretention media (soil mix) shall consist of Stalite expanded slate MS-16 lightweight sand (85-88% sand fraction) and compost (screed to minus 1/2")) mechanically mixed. This mix is only to be used for bioretention areas.
56. Phosphorus index of bioretention soil mix must fall between 10 - 30 ppm and be tested by Contractor prior to installation of soil mx.
57. Slightly compact the bioretention soil mix within the bioretention cell to avoid long term settling and to achieve the required drainage rate of approx 4-6 inches per hour.
58. Thoroughly water existing soil to ensure drainage within 24 hours before adding bioretention soil mix media. if drainage doesn't occur within 24 hours, aerate soil and retest.
59. Sedimentation of the system will cause failure, therefore, install soil mix only after all sediment and erosion on-site is controlled and site is stabilized and seeded.
60. Install all bioretention media (soil mix) only after all surrounding area has been stabilized and seeded.
61. Planting holes to be amended with compost (1/3 of hole) and mixed into soil media.
62. After all planting and seeding has occured, weed bioretention cells (if necessary) and topdress with 2" of Stalite medium for all cells along Craven street & top dress with 2.5" of mulch for all other areas.

See Planting & Revegetation Specifications for more information.

1. USE A SPADE AND CUT IN SOIL.
2. REMOVE SPADE AND INSERT SEEDLING SO THAT THE ROOT COLLAR IS JUST BELOW GROUND SURFACE WITH ROOTS FACING STRAIGHT DOWN IN THE PLANTING HOLE.
3. INSERT SPADE 3 INCHES TO ONE SIDE OF THE SEEDLING/PLUG AND PULL HANDLE TO CLOSE THE BOTTOM OF THE HOLE.
4. PUSH HANDLE OF SPADE FORWARD TO CLOSE THE TOP OF THE HOLE. OPEN PLANTING HOLE LARGE ENOUGH TO ACCOMMODATE ROOTS.
5. REMOVE SPADE AND CAREFULLY CLOSE THE OPENING BY TAMPING GENTLY WITH A TAMPER OR HEEL BEING CAREFUL NOT TO INJURE THE SEEDLING.

1 BARE ROOT SEEDLING PLANTING

NOT TO SCALE

NOTES:
1. WATER THOROUGHLY IMMEDIATELY AFTER PLANTING AND WATER WEEKLY UNTIL ESTABLISHED.
2. NO FERTILIZER IS NECESSARY DURING PLANTING.

3 SHRUB PLANTING

SCALE: NOT TO SCALE

NOTES:
1. WATER THOROUGHLY IMMEDIATELY AFTER PLANTING AND WATER WEEKLY UNTIL ESTABLISHED.
2. NO FERTILIZER IS NECESSARY DURING PLANTING.

2 TREE PLANTING

SCALE: NOT TO SCALE

NOTES:
1. WATER THOROUGHLY IMMEDIATELY AFTER PLANTING AND WATER WEEKLY UNTIL ESTABLISHED.
2. NO FERTILIZER IS NECESSARY DURING PLANTING.

4 PERENNIAL PLANTING

SCALE: NOT TO SCALE

NOTES:
1. INSTALL CUTTINGS WITHIN 48 HOURS OF HARVESTING (SEE SPECS).
2. INSTALL STAKES AFTER EROSION CONTROL FABRIC, IF APPLICABLE, AND/OR SOD IS IN PLACE.
3. PLANT IN TRIANGULAR PATTERN AT 2-1/2' O.C.

5 LIVESTAKE PLANTING

SCALE: NOT TO SCALE

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 1542 DAVID P. TUCH

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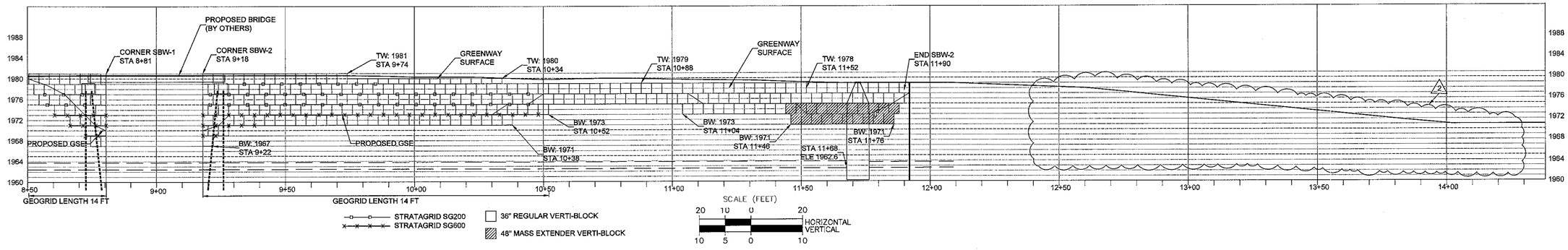
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
EQUINOX ENVIRONMENTAL
ColeJenest & Stone

CRAVEN STREET IMPROVEMENTS
GENERAL NOTES & SPECIFICATIONS STORMWATER, STREAM & GREENWAY
CITY OF ASHEVILLE, NORTH CAROLINA

Vertical Scale: N/A
Horizontal Scale: N/A
Commission Number: 3267
Sheet No.: C12H

FOR CONSTRUCTION

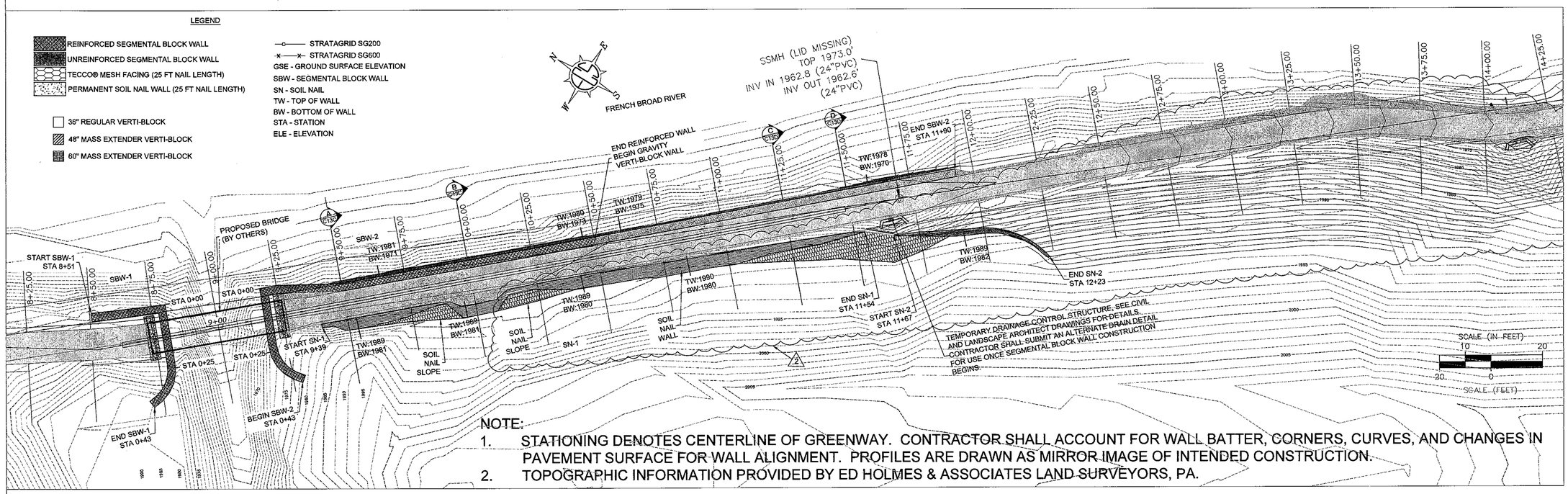
SEGMENTAL BLOCK RETAINING WALL (SBW-1 AND SBW-2) PROFILES



LEGEND

- REINFORCED SEGMENTAL BLOCK WALL
- UNREINFORCED SEGMENTAL BLOCK WALL
- TECCO® MESH FACING (25 FT NAIL LENGTH)
- PERMANENT SOIL NAIL WALL (25 FT NAIL LENGTH)
- 36" REGULAR VERTI-BLOCK
- 48" MASS EXTENDER VERTI-BLOCK
- 60" MASS EXTENDER VERTI-BLOCK
- STRATAGRID SG200
- STRATAGRID SG600

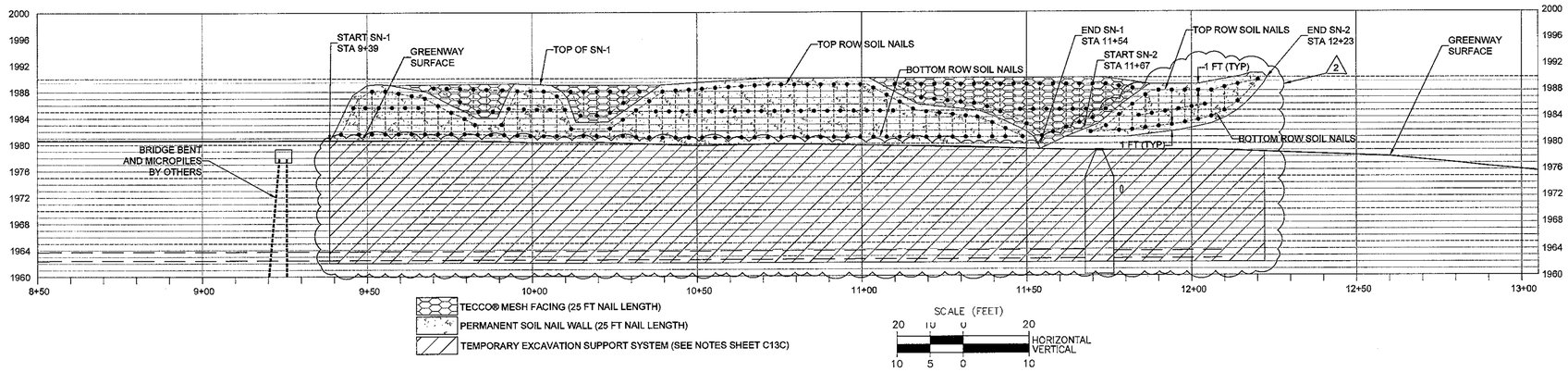
GSE - GROUND SURFACE ELEVATION
SBW - SEGMENTAL BLOCK WALL
SN - SOIL NAIL
TW - TOP OF WALL
BW - BOTTOM OF WALL
STA - STATION
ELE - ELEVATION



NOTE:

1. STATIONING DENOTES CENTERLINE OF GREENWAY. CONTRACTOR SHALL ACCOUNT FOR WALL BATTER, CORNERS, CURVES, AND CHANGES IN PAVEMENT SURFACE FOR WALL ALIGNMENT. PROFILES ARE DRAWN AS MIRROR IMAGE OF INTENDED CONSTRUCTION.
2. TOPOGRAPHIC INFORMATION PROVIDED BY ED HOLMES & ASSOCIATES LAND SURVEYORS, PA.

PERMANENT SOIL NAIL WALL (SN-1 AND SN-2) PROFILES



NORTH CAROLINA PROFESSIONAL SEAL 039550 ENGINEER MARK F. PLOTKIN 5/23/14

Revisions		Date
0	ISSUED FOR PERMIT	01/24/2014
1	ISSUED FOR CONSTRUCTION	03/21/2014
2	ISSUED FOR MODIFIED GRADING AND TEMPORARY EXCAVATION SUPPORT	05/23/2014

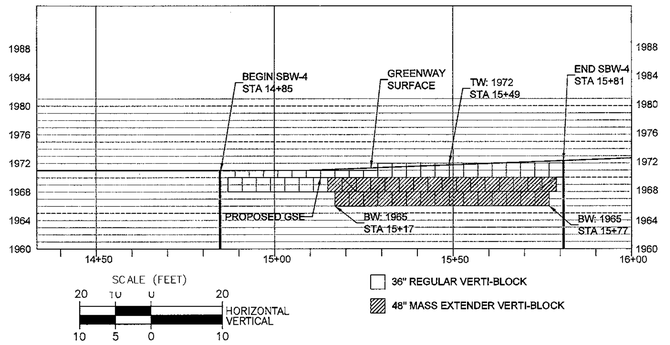
Issue Date: 05/23/14
Drawn By: MKF
Designed By: MFP
Checked By: SJG
Date: 05/23/14

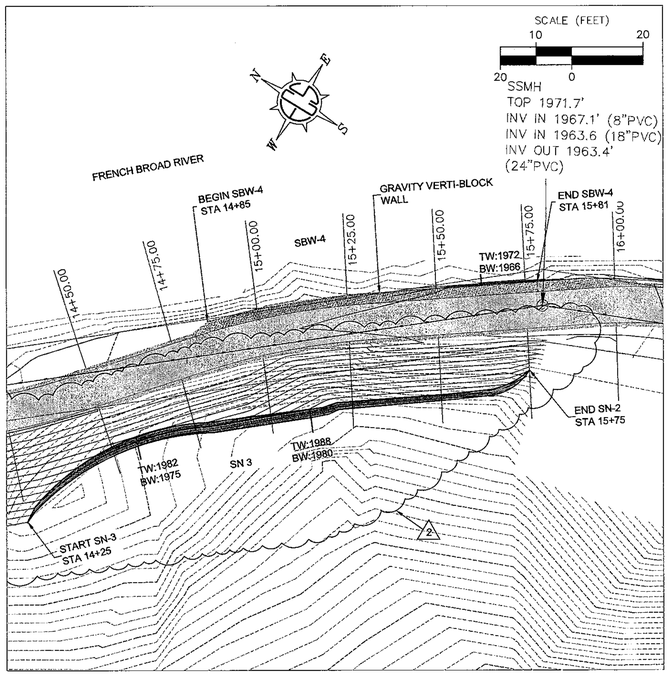
Mattern & Craig
CONSULTING ENGINEERS + SURVEYORS

CRAVEN STREET IMPROVEMENTS
RETAINING WALL
PLANS AND PROFILES

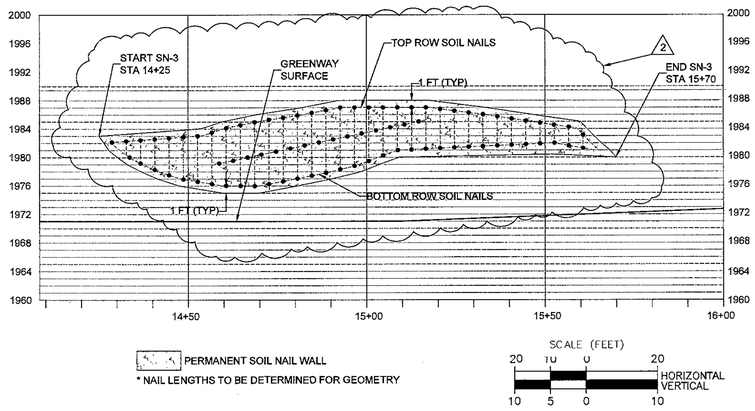
Vertical Scale: AS SHOWN
Horizontal Scale: AS SHOWN
Commission Number:
Sheet No.: C13A

SEGMENTAL BLOCK RETAINING WALL (SBW-4) PROFILE





SOIL NAIL WALL (SN-3) PROFILE



LEGEND

- REINFORCED SEGMENTAL BLOCK WALL
- UNREINFORCED SEGMENTAL BLOCK WALL
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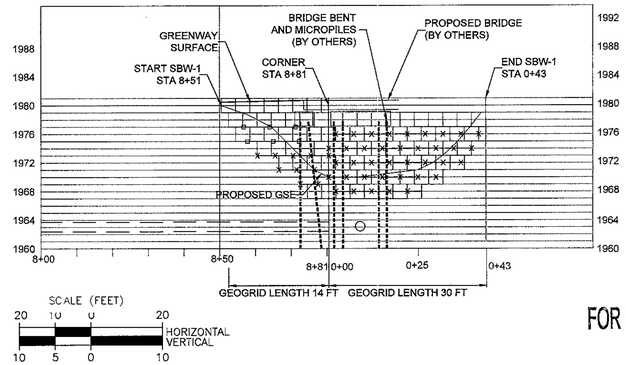
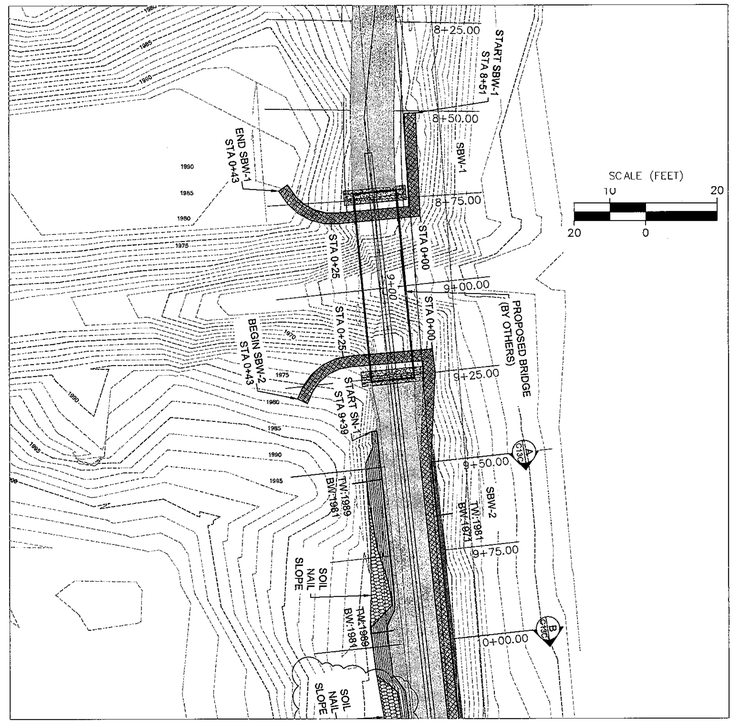
NOTE:

1. STATIONING DENOTES CENTERLINE OF GREENWAY. CONTRACTOR SHALL ACCOUNT FOR WALL BATTER, CORNERS, CURVES, AND CHANGES IN PAVEMENT SURFACE FOR WALL ALIGNMENT. PROFILES ARE DRAWN AS MIRROR IMAGE OF INTENDED CONSTRUCTION.
2. TOPOGRAPHIC INFORMATION PROVIDED BY ED HOLMES & ASSOCIATES LAND SURVEYORS, PA.

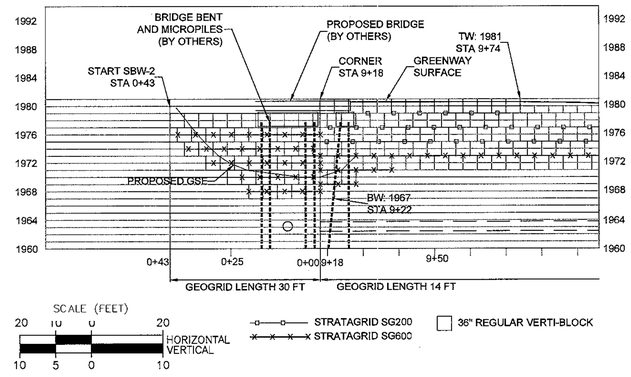
BRIDGE BENT RETAINING WALL (SBW-1) PROFILE



FOR CONSTRUCTION



BRIDGE BENT RETAINING WALL (SBW-2) PROFILE



NORTH CAROLINA PROFESSIONAL SEAL 039550 ENGINEER KEVIN F. LAWLOR 5/23/14

Revisions	Date
0 ISSUED FOR PERMIT	01/24/2014
1 ISSUED FOR CONSTRUCTION	03/31/2014
2 ISSUED FOR MODIFIED GRADING AND TEMPORARY EXCAVATION SUPPORT	05/23/2014

Issue Date: 05/23/14

Drawn By: MKF
Designed By: MFP

Checked By: SJG
Date: 05/23/14

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS

CRAVEN STREET IMPROVEMENTS
RETAINING WALL
PLANS AND PROFILES

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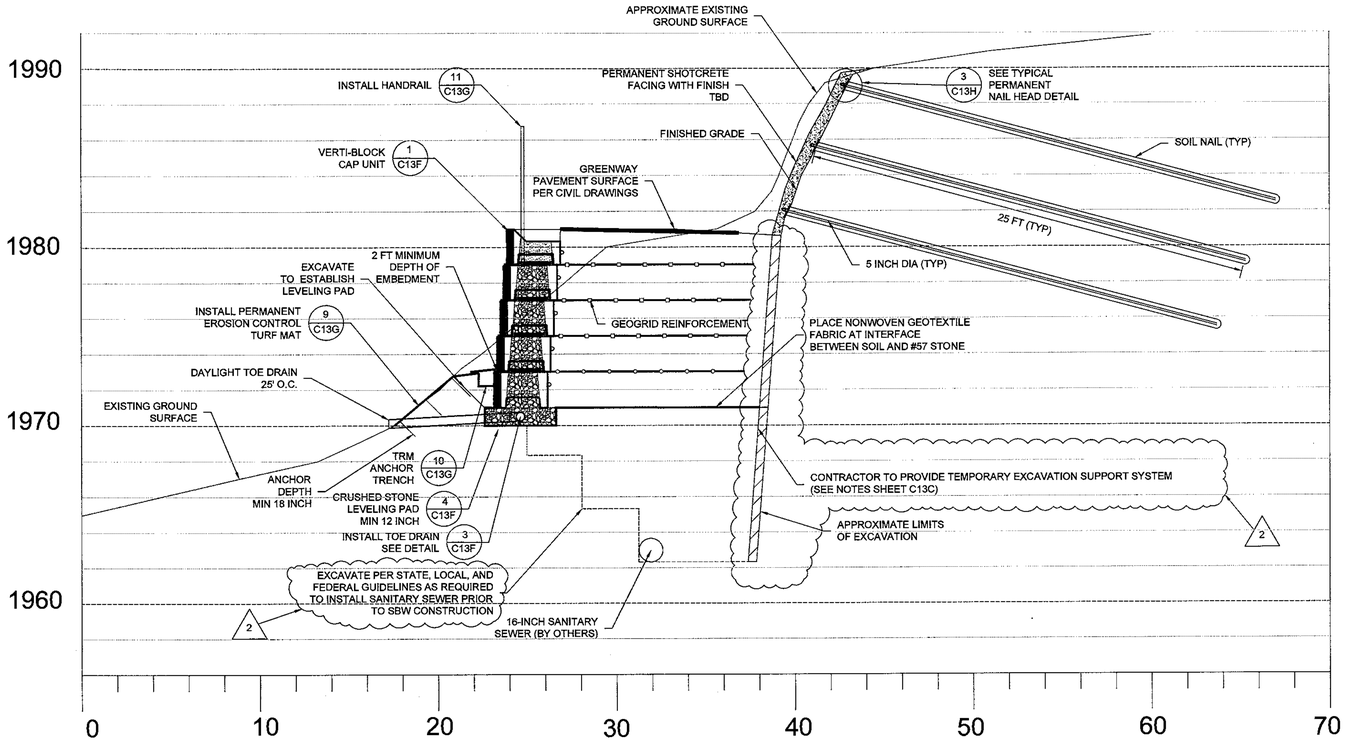
Horizontal Scale: AS SHOWN

Commission Number:

Sheet No.:

C13B

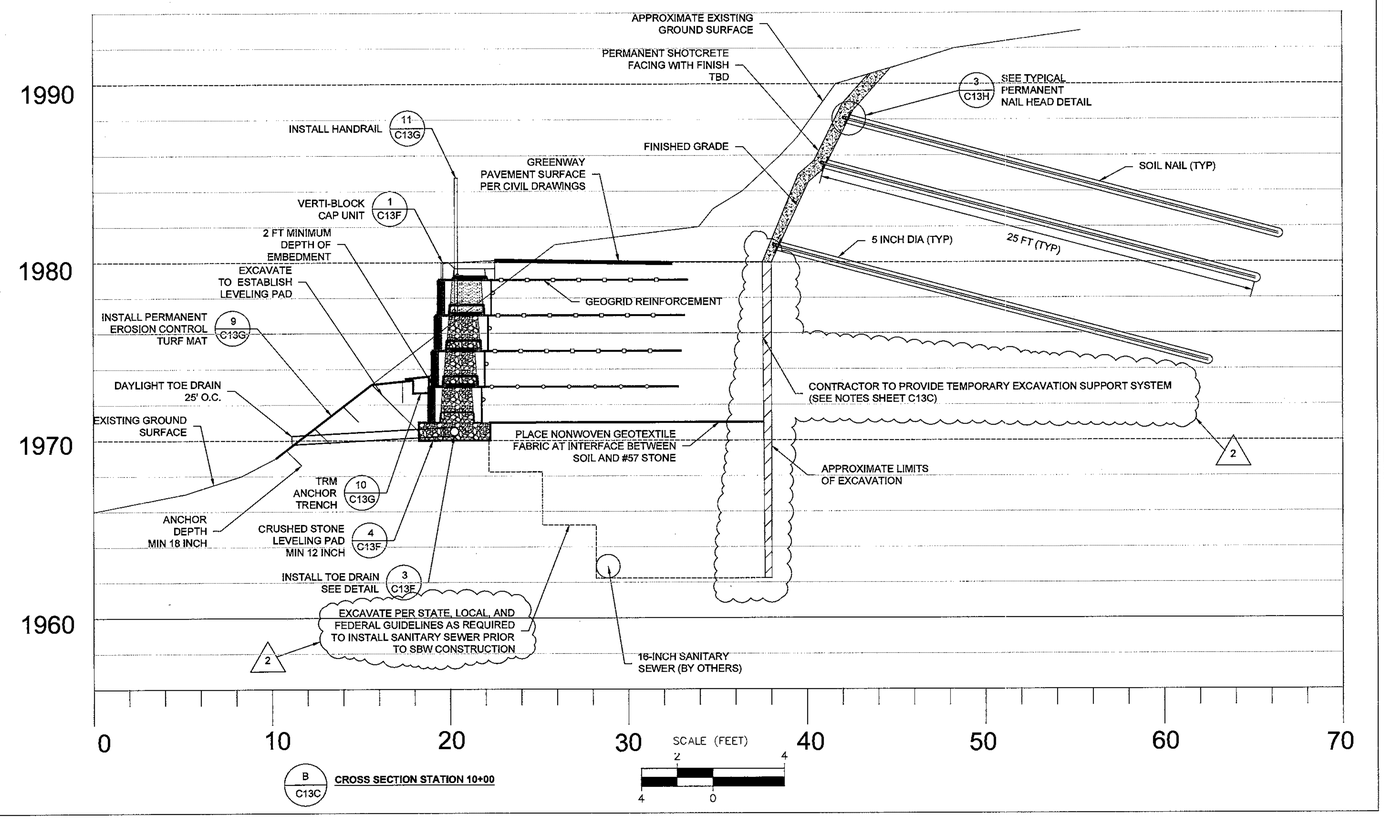
FOR CONSTRUCTION



A C13C **CROSS SECTION STATION 9+50**

TEMPORARY EXCAVATION SUPPORT SYSTEM (TESS) NOTES:

1. CONTRACTOR TO PROVIDE TESS DESIGN TO ALLOW FOR THE INSTALLATION OF THE 16-INCH SANITARY SEWER WHILE PROTECTING SOIL NAIL WALL AND/OR SOIL NAIL SLOPE.
2. TESS SHALL CONSIST OF A CANTILEVER OR ANCHORED WALL OF SUFFICIENT RIGIDITY TO LIMIT SOIL NAIL WALL/SOIL NAIL SLOPE DISTURBANCE. OTHER SYSTEMS MAY BE CONSIDERED PROVIDED EXCAVATION BELOW TOE OF SOIL NAIL WALL/SOIL NAIL SLOPE IS LIMITED TO 4 FEET.
3. THE TESS SHALL BE DESIGNED BY A LICENSED BY A PROFESSIONAL ENGINEER REGISTERED IN ONRTH CAROLINA AND EXPERIENCED IN THE DESIGN OF EARTH RETENTION SYSTEMS.
4. TESS IS REQUIRED IF SOIL NAIL WALL CONSTRUCTION PRECEDES SEWER EXCAVATION. THE TESS MAY BE ELIMINATED IF THE SEWER INSTALLATION PRECEDES WALL CONSTRUCTION. THE ELIMINATION OF THE TESS DOES NOT ALLEVIATE THE CONTRACTOR FROM COMPLYING WITH OSHA EXCAVATION REQUIREMENTS.
5. THE TESS REQUIREMENT MAY BE REDUCED OR ELIMINATED SHOULD THE CONTRACTOR MODIFY CONSTRUCTION SEQUENCE OR METHODS TO LIMIT WALL DISTURBANCE. METHODS OF MODIFYING SEQUENCE MAY INCLUDE INSTALLING SEWER WITH JACK AND BORE OR OTHER TUNNELING METHODS.
6. CONTRACTOR SHALL SUBMIT THE TESS DRAWINGS WITH SUPPORTING CALCULATIONS, OR ALTERNATE MEANS AND METHODS TO THE ENGINEER FOR REVIEW.
7. THE MODIFICATION OF CONSTRUCTION SEQUENCE OR SEWER INSTALLATION METHODS MAY RESULT IN MOVEMENT OF THE EXISTING SLOPE FACE. THE CONTRACTOR SHALL NOTIFY ECS IF SLOPE FACE MOVEMENT OCCURS.



B C13C **CROSS SECTION STATION 10+00**

NORTH CAROLINA PROFESSIONAL SEAL 039550 5/23/14 ENGINEER MARC R. FLORIO

Revisions		Date
0	ISSUED FOR PERMIT	01/24/2014
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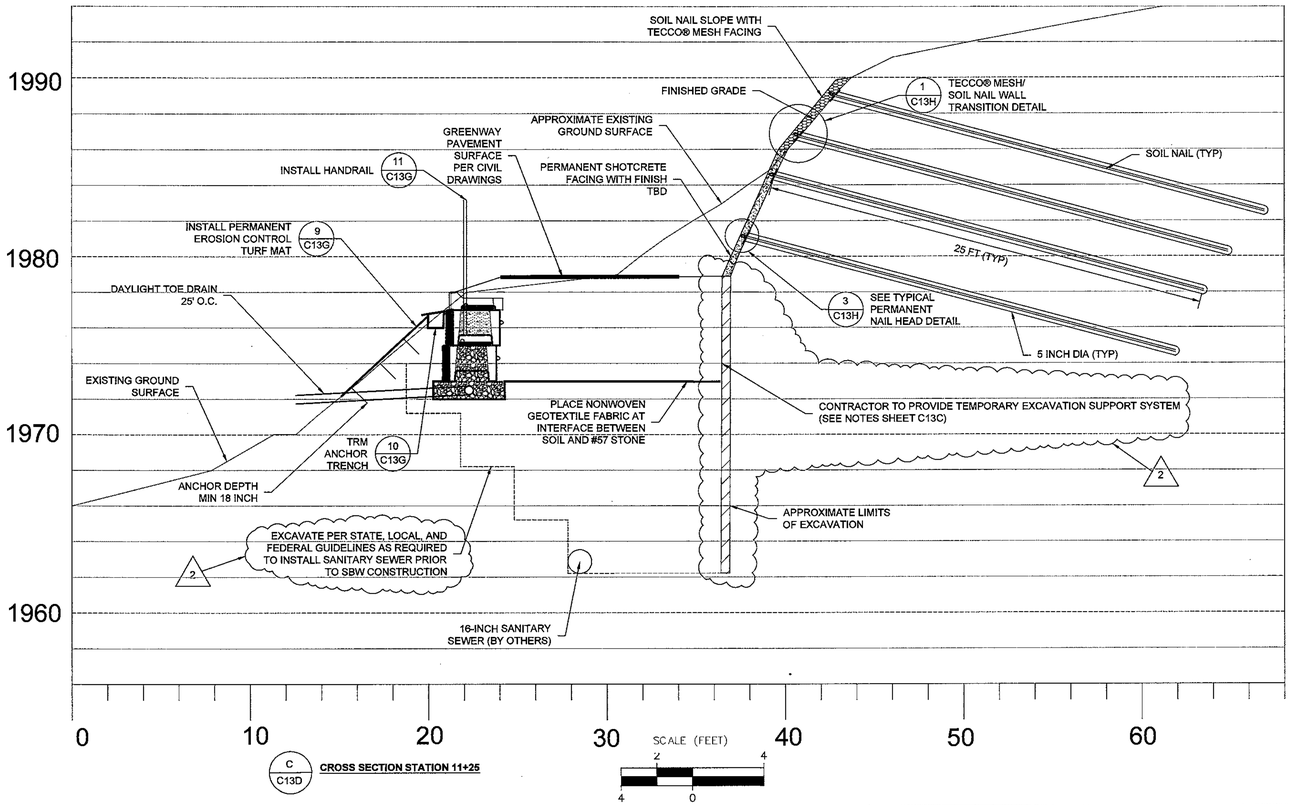
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS
ECS

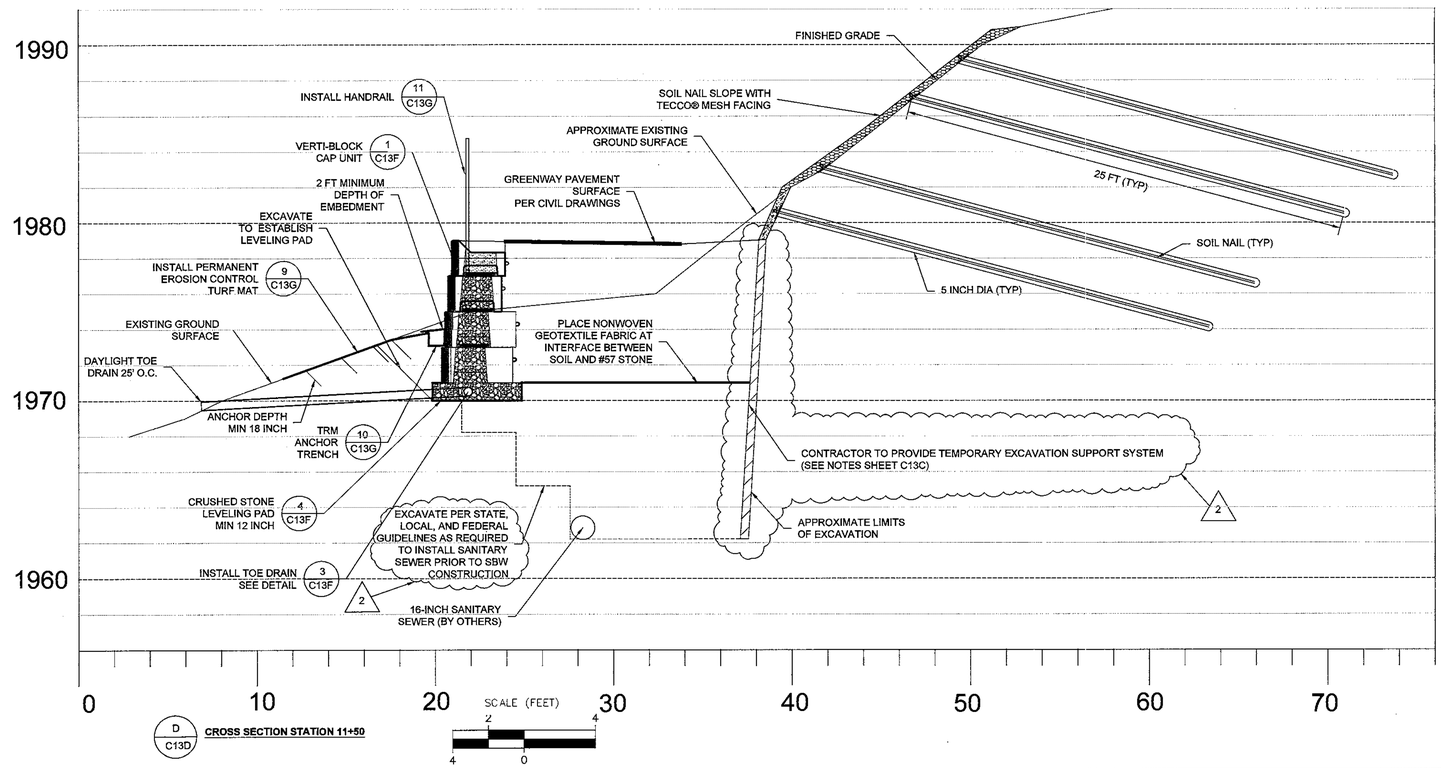
CRAVEN STREET IMPROVEMENTS
CROSS SECTIONS

Vertical Scale: AS SHOWN
Horizontal Scale: AS SHOWN
Commission Number:
Sheet No.: C13C

FOR CONSTRUCTION



C C13D CROSS SECTION STATION 11+25



D C13D CROSS SECTION STATION 11+50

NORTH CAROLINA PROFESSIONAL SEAL 039550 ENGINEER MARC F. PLOTKIN 5/23/14

Revisions		Date
0	ISSUED FOR PERMIT	01/24/2014
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Designed By: MFP

Checked By: SJG

Date: 05/23/14

Mattern & Craig CONSULTING ENGINEERS • SURVEYORS

ECS

CRAVEN STREET IMPROVEMENTS
CROSS SECTIONS

Vertical Scale: AS SHOWN

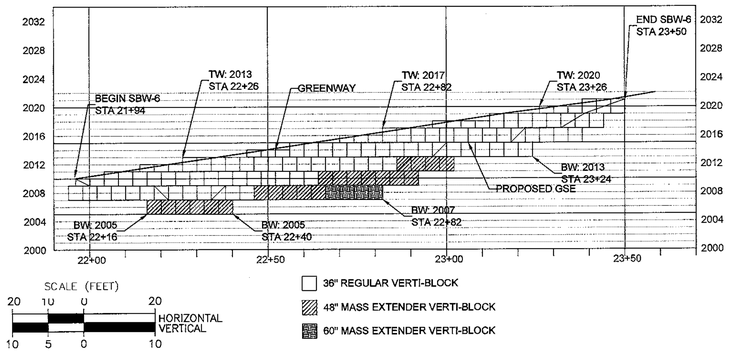
Horizontal Scale: AS SHOWN

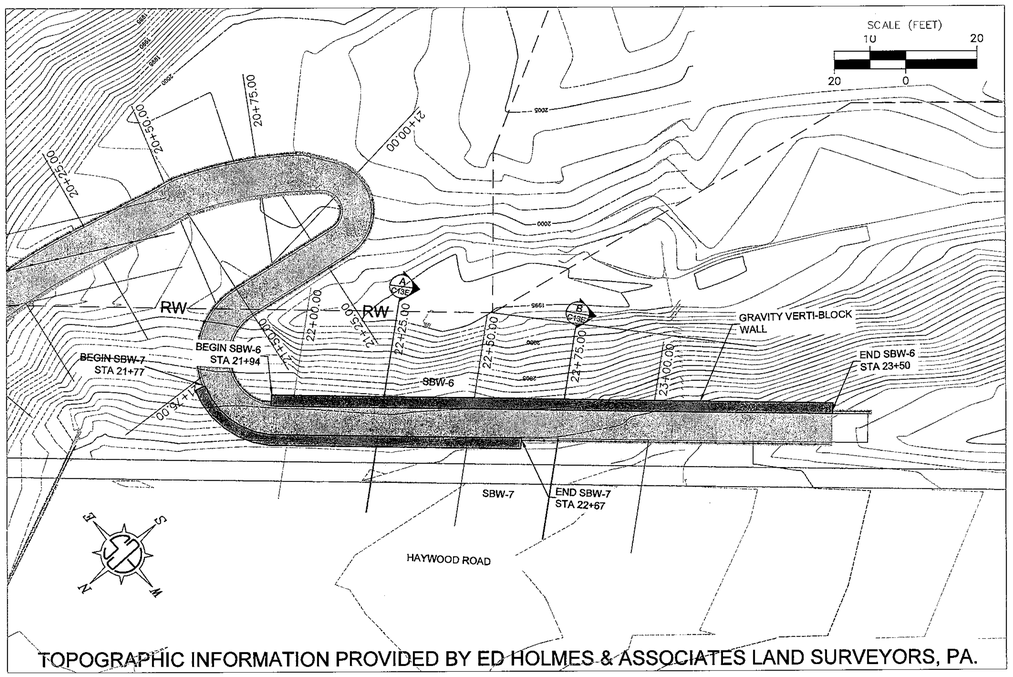
Commission Number:

Sheet No.: C13D

FOR CONSTRUCTION

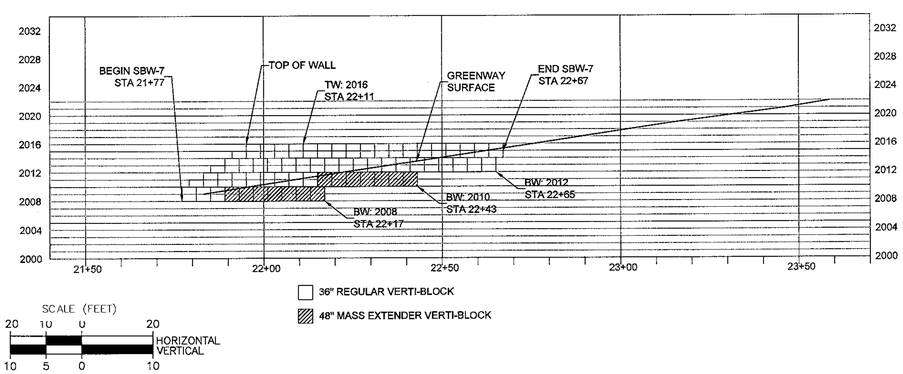
SEGMENTAL BLOCK RETAINING WALL (SBW-6) PROFILE

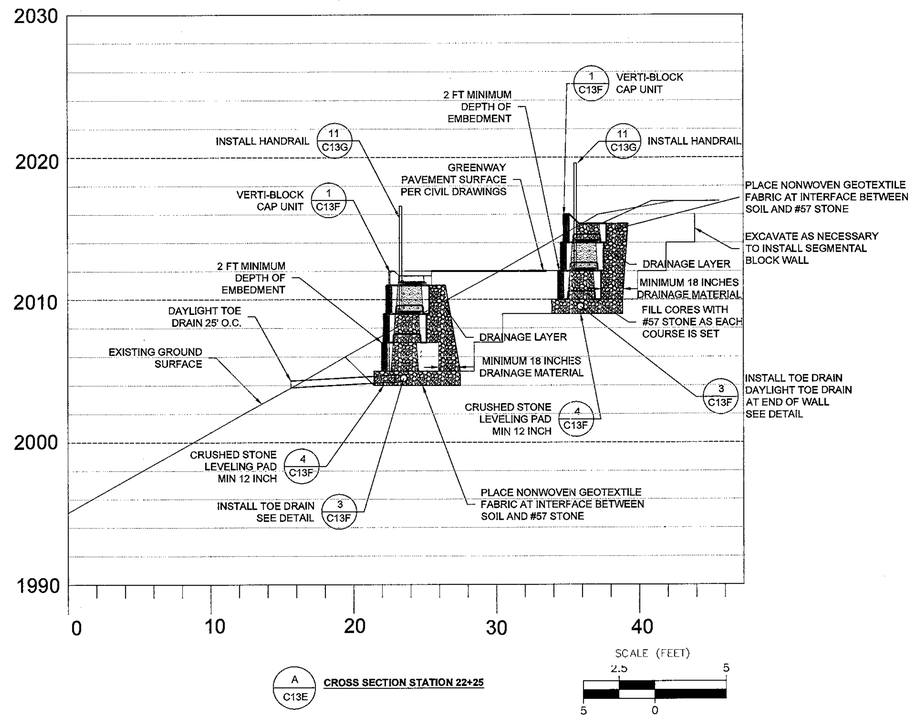




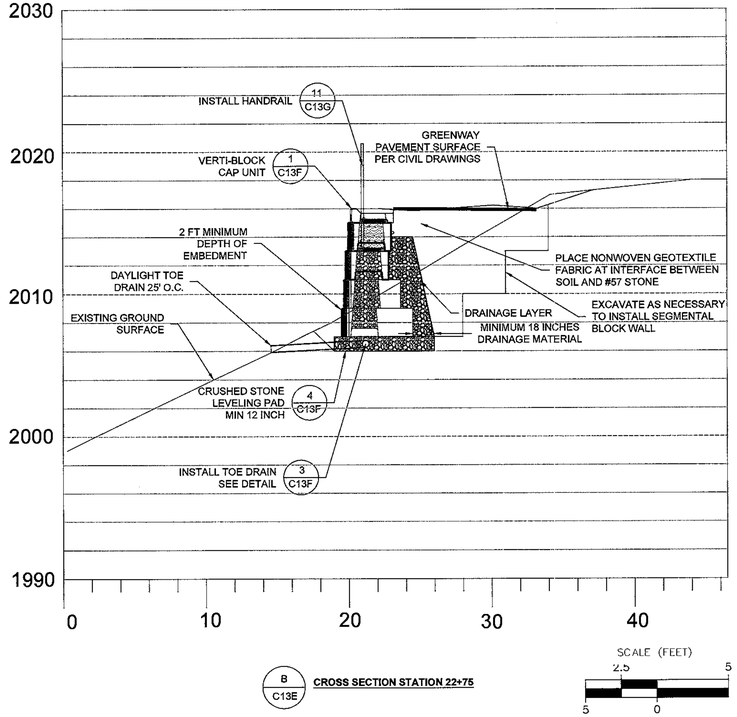
TOPOGRAPHIC INFORMATION PROVIDED BY ED HOLMES & ASSOCIATES LAND SURVEYORS, PA.

SEGMENTAL BLOCK RETAINING WALL (SBW-7) PROFILE





A C13E **CROSS SECTION STATION 22+25**



B C13E **CROSS SECTION STATION 22+75**

NORTH CAROLINA PROFESSIONAL SEAL 039550 ENGINEER MARC F. PLOTKIN 5/23/14

Revisions	Date
0 ISSUED FOR PERMIT	01/24/2014
1 MODIFIED PER NCDOT COMMENTS	02/18/2014
2 ISSUED FOR CONSTRUCTION	03/31/2014

Issue Date: 05/23/14

Drawn By: MKF
Designed By: MFP

Checked By: SJG
Date: 05/23/14

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
ECS

CRAVEN STREET IMPROVEMENTS
HAYWOOD ROAD CONNECTOR
PROFILES AND SECTIONS

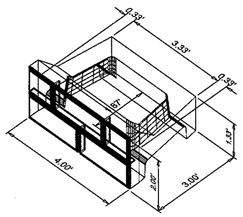
Vertical Scale: AS SHOWN

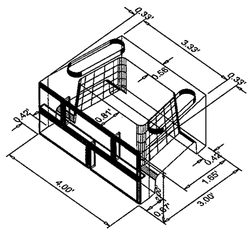
Horizontal Scale: AS SHOWN

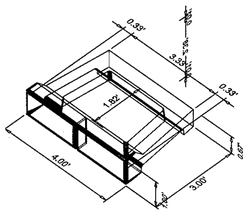
Commission Number:

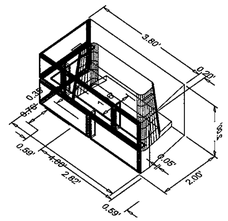
Sheet No.: C13E

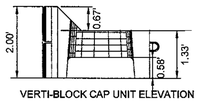
FOR CONSTRUCTION



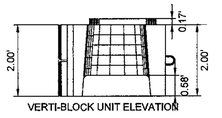






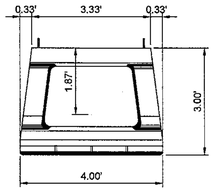


VERTI-BLOCK CAP UNIT ELEVATION

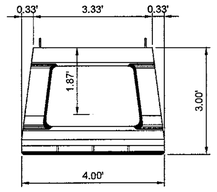


VERTI-BLOCK UNIT ELEVATION

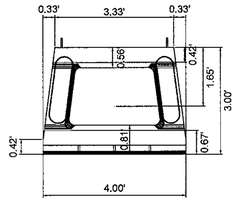
VERTI-BLOCK HALF STEP CAP UNIT ELEVATION



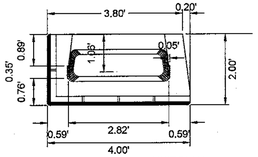
VERTI-BLOCK CAP UNIT PLAN



VERTI-BLOCK UNIT PLAN

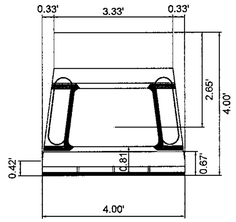


VERTI-BLOCK HALF STEP CAP UNIT PLAN

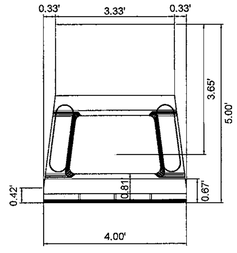


VERTI-BLOCK CORNER UNIT PLAN

1/C13F **GENERAL BLOCK DIMENSIONS**
NOT TO SCALE

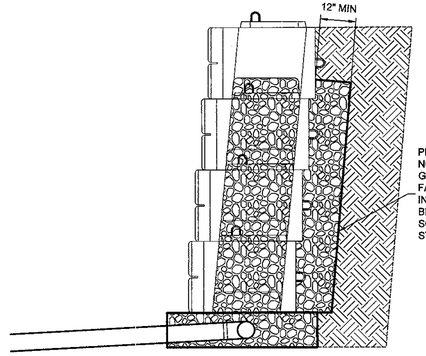


VERTI-BLOCK 48" MASS EXTENDER UNIT PLAN

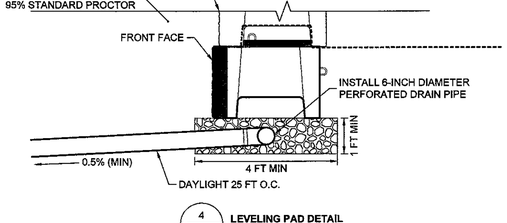


VERTI-BLOCK 60" MASS EXTENDER UNIT PLAN

2/C13F **MASS EXTENDER BLOCK DIMENSIONS**
NOT TO SCALE

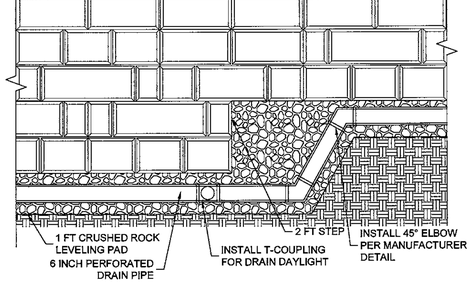


3/C13F **DRAIN DETAIL WITH FABRIC**
NOT TO SCALE

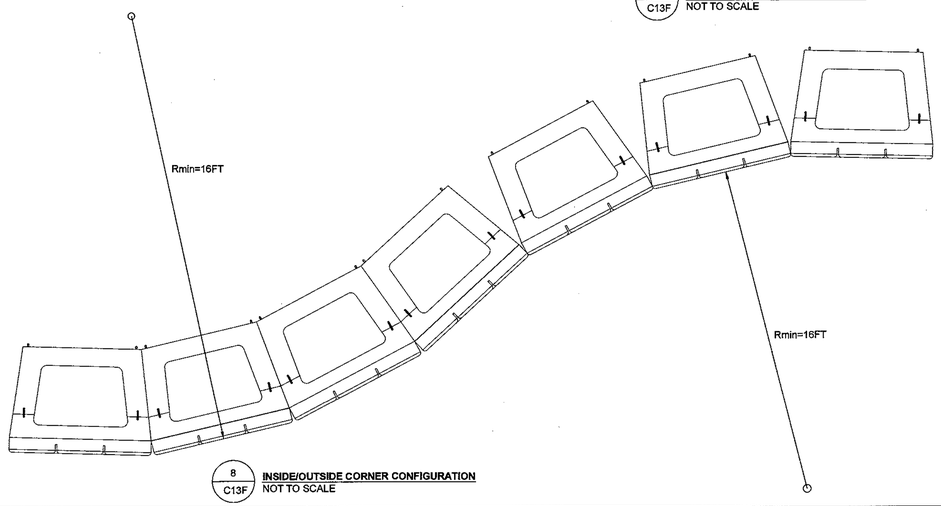


4/C13F **LEVELING PAD DETAIL**
NOT TO SCALE

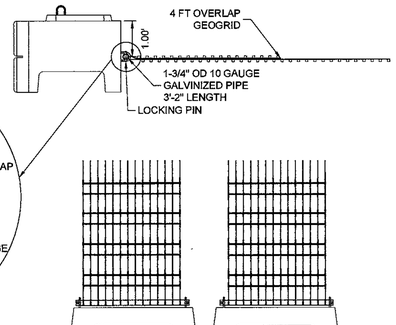
NOTE: LEVELING PAD SHALL BE A MINIMUM OF 1 FOOT WIDER THAN THE LOWEST BLOCK. FOR MASS EXTENDER UNITS, LEVELING PAD WIDTH SHALL BE INCREASED.

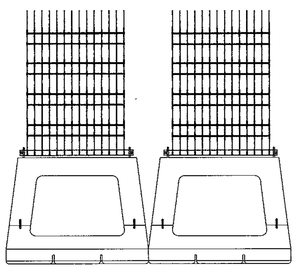


5/C13F **BOTTOM OF WALL ELEVATION STEP**
NOT TO SCALE

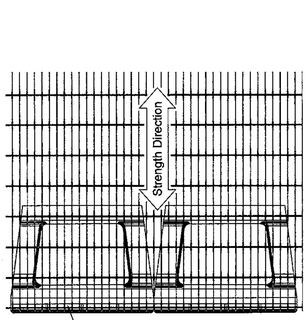


8/C13F **INSIDE/OUTSIDE CORNER CONFIGURATION**
NOT TO SCALE

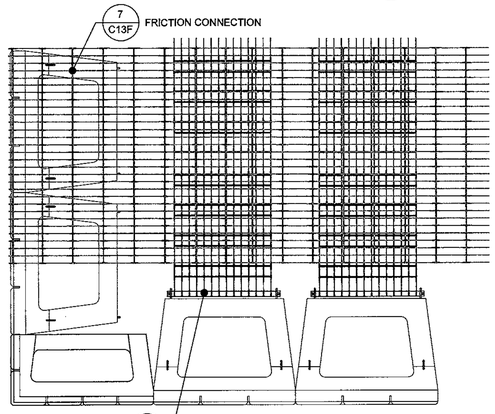




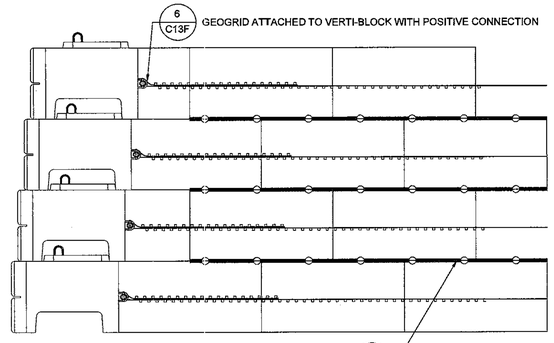
6/C13F **GRID/BLOCK POSITIVE CONNECTION DETAIL**
NOT TO SCALE



7/C13F **GRID/BLOCK FRICTION CONNECTION DETAIL**
NOT TO SCALE



PLAN VIEW



ELEVATION VIEW

9/C13F **GEOGRID INSTALLATION AT CORNERS-PLAN VIEW**
NOT TO SCALE

NORTH CAROLINA PROFESSIONAL SEAL 039550 3-31-14 ENGINEER PETER F. LOTHIAN

Revisions	Date
0 ISSUED FOR PERMIT	01/24/2014
1 ISSUED FOR CONSTRUCTION	03/31/2014

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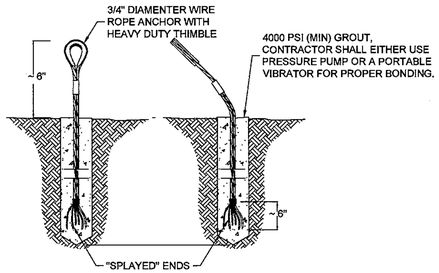
Drawn By: MKF
Designed By: MFP
Checked By: SJG
Date: 03/31/14

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
EGS

CRAVEN STREET IMPROVEMENTS
TYPICAL SEGMENTAL BLOCK WALL DETAILS

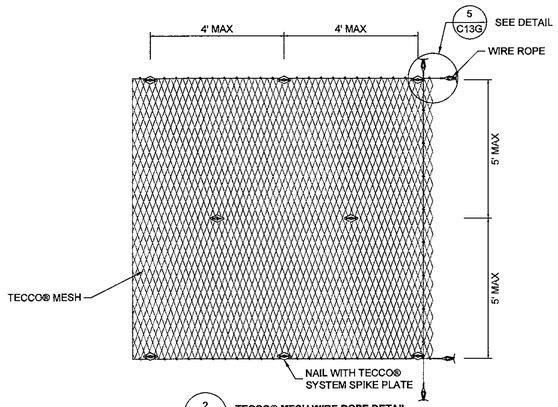
Vertical Scale: AS SHOWN
Horizontal Scale: AS SHOWN
Commission Number:
Sheet No.: C13F

FOR CONSTRUCTION

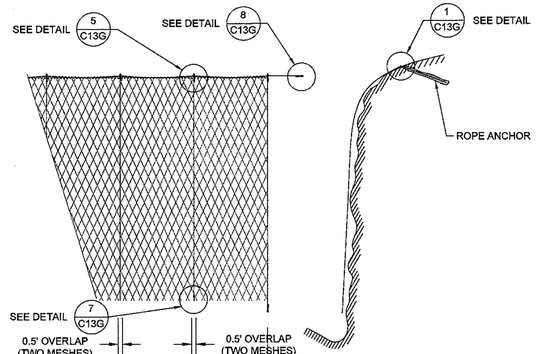


1 / C13G **ROPE ANCHOR INSTALLATION DETAIL**
NOT TO SCALE

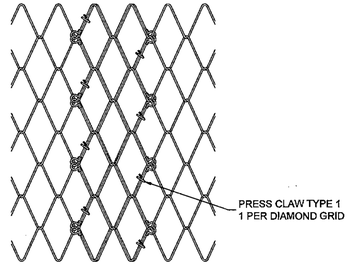
NOTES:
1. DRILL ANCHOR HOLES TO A DIAMETER AND DEPTH DETERMINED BY THE DRAPE CONTRACTOR TO ACHIEVE REQUIRED PULLOUT STRENGTH
2. WIRE ROPE ANCHORS ENDS TO BE "SPLAYED" BEFORE SETTING IN GROUT.



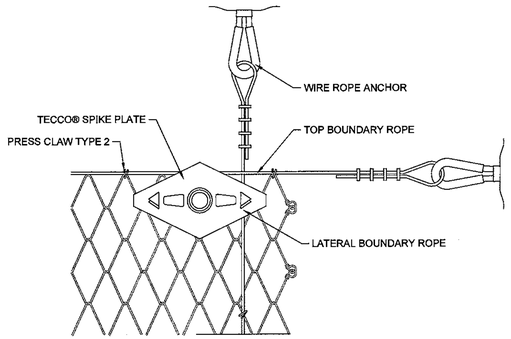
2 / C13G **TECCO® MESH WIRE ROPE DETAIL**
NOT TO SCALE



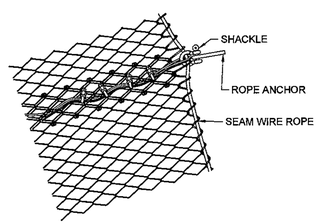
3 / C13G **TECCO® MESH INSTALLATION DETAIL**
NOT TO SCALE



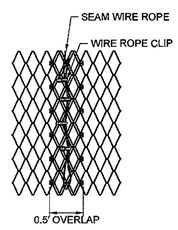
4 / C13G **OVERLAP DETAIL - PLAN VIEW**
NOT TO SCALE



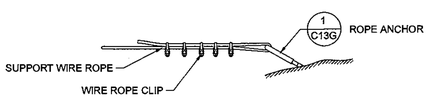
5 / C13G **SPIKE PLATE CONNECTION DETAIL**
NOT TO SCALE



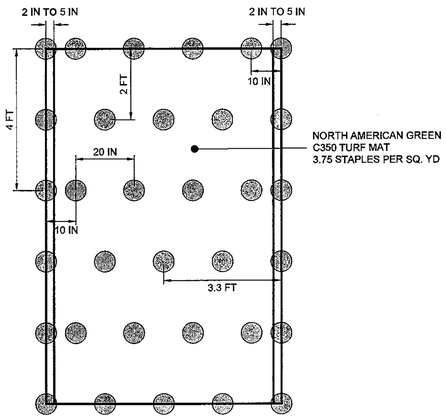
6 / C13G **SPLICE DETAIL - PLAN VIEW**
NOT TO SCALE



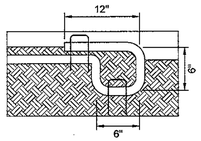
7 / C13G **SPLICE OVERLAP DETAIL**
NOT TO SCALE



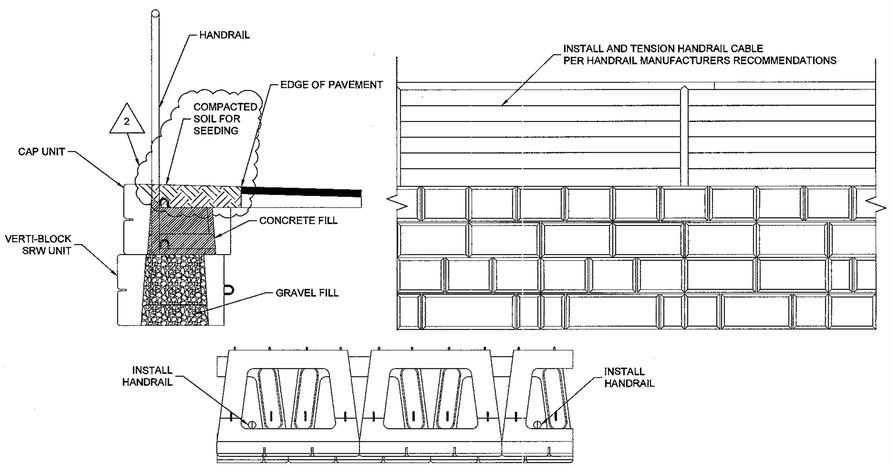
8 / C13G **SPLICE DETAIL - SECTION VIEW**
NOT TO SCALE



9 / C13G **TURF MAT ANCHOR STAPLING DETAIL**
NOT TO SCALE



10 / C13G **TRM ANCHOR TRENCH**
NOT TO SCALE



11 / C13G **HANDRAIL INSTALLATION DETAIL**
NOT TO SCALE

NORTH CAROLINA PROFESSIONAL SEAL 039550 5/23/14 ENGINEER WATER RESOURCES

Revisions		Date
0	ISSUED FOR PERMIT	01/24/2014
1	ISSUED FOR CONSTRUCTION	03/31/2014
2	ISSUED FOR MODIFIED GRADING AND TEMPORARY EXCAVATION SUPPORT	05/23/2014

Issue Date: 05/23/14
Drawn By: MKF
Designed By: MFP
Checked By: SJG
Date: 05/23/14

Mattern & Craig
CONSULTING ENGINEERS • SURVEYORS
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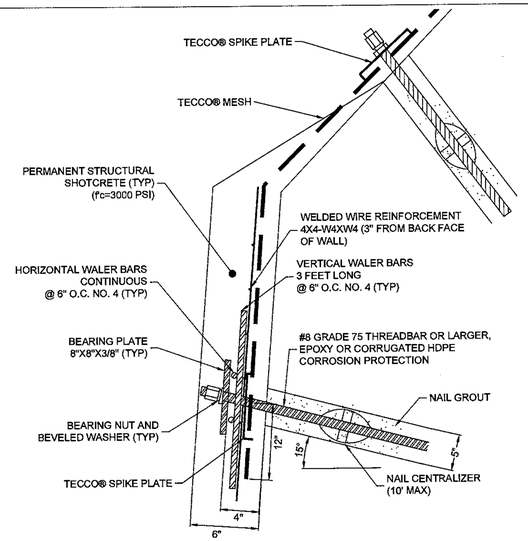
CRAVEN STREET IMPROVEMENTS
TYPICAL TECCO® MESH AND SEGMENTAL BLOCK WALL DETAILS

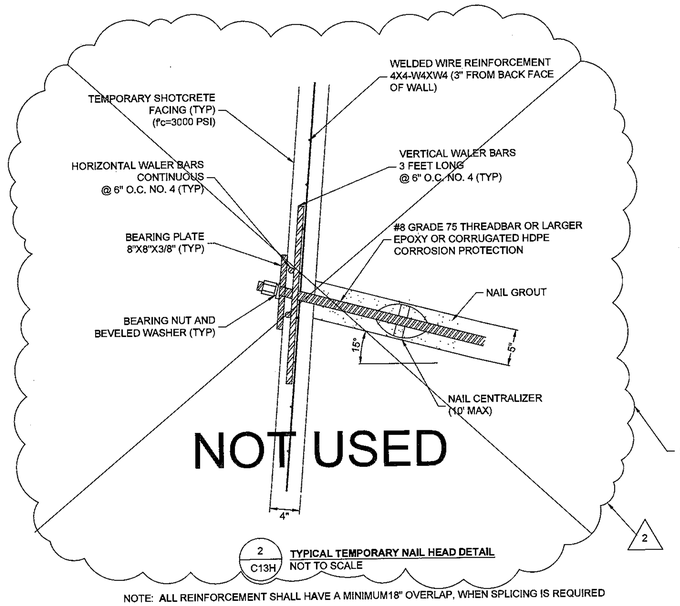
Vertical Scale: AS SHOWN
Horizontal Scale: AS SHOWN
Commission Number:

Sheet No.:
C13G



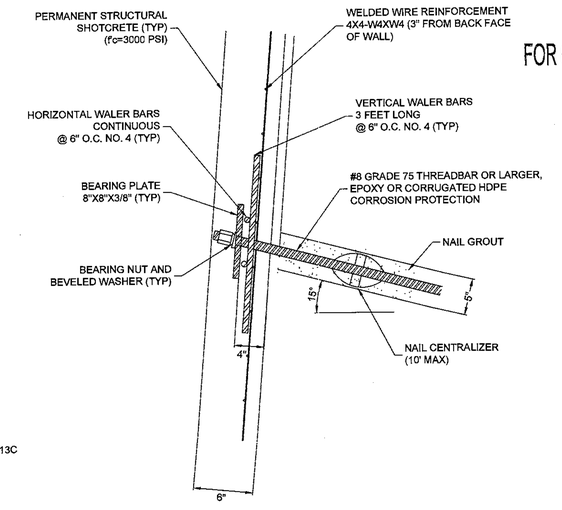
1 / C13H **TECCO® MESH/SOIL NAIL WALL TRANSITION DETAIL**
NOT TO SCALE

NOTE: ALL REINFORCEMENT SHALL HAVE A MINIMUM18" OVERLAP, WHEN SPLICING IS REQUIRED



2 / C13H **TYPICAL TEMPORARY NAIL HEAD DETAIL**
NOT TO SCALE

NOTE: ALL REINFORCEMENT SHALL HAVE A MINIMUM18" OVERLAP, WHEN SPLICING IS REQUIRED



3 / C13H **TYPICAL PERMANENT NAIL HEAD DETAIL**
NOT TO SCALE

NOTE: ALL REINFORCEMENT SHALL HAVE A MINIMUM18" OVERLAP, WHEN SPLICING IS REQUIRED

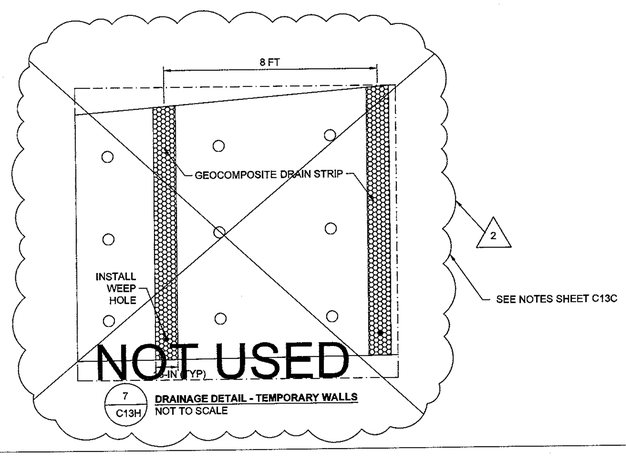
4 / C13H **DRAINAGE DETAIL - PERMANENT WALLS**
NOT TO SCALE

5 / C13H **FACING REINFORCEMENT - PERMANENT WALLS**
NOT TO SCALE

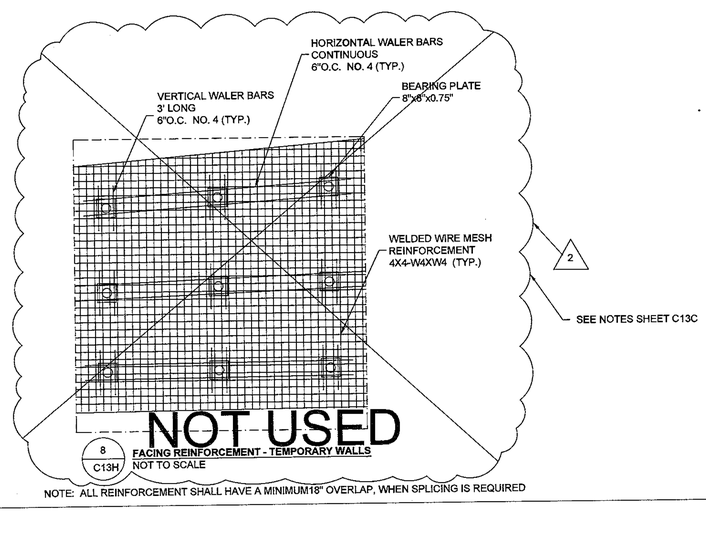
NOTE: ALL REINFORCEMENT SHALL HAVE A MINIMUM18" OVERLAP, WHEN SPLICING IS REQUIRED

6 / C13H **TYPICAL TOE DRAIN AND WEEP HOLE**
NOT TO SCALE

NOTE: FINAL GRADING AND RESTORATION AT TOE OF SOIL NAIL WALL SHALL ESTABLISH POSITIVE DRAINAGE AWAY FROM TOP OF MSE WALL AND PREVENT PONDING WATER DURING RAIN EVENTS. FINAL GRADING BY OTHERS.



7 / C13H **DRAINAGE DETAIL - TEMPORARY WALLS**
NOT TO SCALE



8 / C13H **FACING REINFORCEMENT - TEMPORARY WALLS**
NOT TO SCALE

NOTE: ALL REINFORCEMENT SHALL HAVE A MINIMUM18" OVERLAP, WHEN SPLICING IS REQUIRED

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039550 5/23/14 MARC R. PLOTNICK

Revisions		Date
0	ISSUED FOR PERMIT	01/24/2014
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CRAVEN STREET IMPROVEMENTS
SOIL NAIL WALL DETAILS

Vertical Scale:
Horizontal Scale:
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Sheet No.:
C13H

1.0 GENERAL

1. ON DRAWING SHEETS C13A TO C13J, THE TERMS ENGINEER, ENGINEERS, DESIGNER, OR DESIGNERS REFERS TO ECS CAROLINAS, LLP (ECS).

2. THE CONSTRUCTION OF THE SOIL NAIL WALLS, SOIL NAIL SLOPES, THE MECHANICALLY STABILIZED EARTH (MSE) WALLS, AND GRAVITY RETAINING WALLS SHOWN ON THESE PLANS SHALL BE MONITORED AND TESTED BY ECS ON A FULL TIME BASIS TO CONFIRM THAT THE CONSTRUCTION IS IN ACCORDANCE WITH THE INTENT OF THE DESIGN.

3. UNLESS INDIVIDUALLY IDENTIFIED, THE TERM WALL OR WALLS REFERS TO ANY SOIL NAIL WALL, SOIL NAIL SLOPE, MSE WALL OR GRAVITY RETAINING WALL SHOWN ON THESE DRAWINGS.

4. IF THE ELEVATION, LOCATION, SURCHARGE LOADING, OR GRADING SURROUNDING THE WALLS CHANGE FROM THOSE DEPICTED ON THESE PLANS, ECS SHALL BE NOTIFIED SO THAT MODIFICATIONS TO THE GEOTECHNICAL DESIGN CAN BE MADE, IF NECESSARY.

5. THE FINAL GRADES SURROUNDING THE WALLS SHALL NOT BE MODIFIED WITHOUT NOTIFYING THE ENGINEER. ANY MODIFICATION TO THE GRADES BELOW OR ABOVE THE WALL MAY POSE CONSIDERABLE RISK TO THE PERFORMANCE/STABILITY OF THE WALLS.

6. SITE PLAN ADAPTED FROM SURVEY PROVIDED BY ED HOLMES & ASSOCIATES LAND SURVEYORS, PA.

7. ECS SHOULD OBSERVE ALL WALL CONSTRUCTION ACTIVITIES TO CONFIRM THAT THE SITE CONDITIONS ARE CONSISTENT WITH THE DESIGN PARAMETERS.

8. WHERE DISCREPANCIES ARE NOTED WITHIN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF SUCH DISCREPANCIES IN WRITING. FOR SOIL NAIL WALL CONSTRUCTION, DRAWING SHEETS WITH C13A THROUGH C13J SHALL SUPERSEDE ALL OTHER DOCUMENTS.

9. THESE PLANS SHALL NOT BE SCALED OR USED FOR LOCATION OF PAVEMENTS, STRUCTURES OR WALLS. THE GENERAL CONTRACTOR SHALL PROVIDE LAYOUT AND COORDINATION AS NEEDED BY THE WALL CONTRACTORS.

10. THE WALL CONTRACTOR(S) SHALL FIELD VERIFY EXISTING GRADES ALONG THE WALL ALIGNMENT PRIOR TO EXCAVATION FOR THE WALLS AND SANITARY SEWER.

A. RESPONSIBILITY FOR CONSTRUCTION COMPLIANCE

1. THE CONTRACTOR MUST PROVIDE FOR THE CONSTRUCTION OF THE WALL(S) IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, PLANS AND SPECIFICATIONS. THE CONTRACTOR IS ALSO RESPONSIBLE FOR THE VERIFICATION OF LINE, GRADE AND OTHER PHYSICAL FEATURES.

2. CONTRACTOR SHALL ENSURE WALL(S) ARE ALONG THE PROPER ALIGNMENT, AND WITHIN APPROPRIATE PROPERTY BOUNDARIES, AND CONSTRUCTION EASEMENTS.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE QUALITY OF THE WORK. INSPECTION, MONITORING, AND TESTING BY THE OWNER, THEIR DESIGNATED REPRESENTATIVE, OR ECS ARE SOLELY AT THE DISCRETION OF THE OWNER, AND IN NO WAY RELIEVE THE CONTRACTOR OF SOLE RESPONSIBILITY FOR MAINTAINING A QUALITY CONTROL PLAN.

4. CONTRACTOR SHALL VERIFY EXISTING TOPOGRAPHY PRIOR TO START OF WORK.

5. CONTRACTOR SHALL CONTACT THE LOCAL "ONE CALL SOURCE" A MINIMUM OF THREE (3) DAYS PRIOR TO START OF WORK.

6. CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING A SOIL EROSION AND SEDIMENTATION PLAN IN ACCORDANCE WITH STATE, LOCAL AND FEDERAL GUIDELINES.

7. THE CONTRACTOR SHALL PROVIDE ALL LABOR, EQUIPMENT, AND MATERIALS TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THE REQUIREMENTS OF THESE PLANS AND SPECIFICATIONS NUMBERED SHEETS C13A THROUGH C13J OR AS DIRECTED BY THE ENGINEER. DURING THE COURSE OF THE CONSTRUCTION. ALTERNATIVES TO, OR CHANGES IN, THE PLANS AND SPECIFICATIONS MUST BE APPROVED BY THE ENGINEER PRIOR TO COMMENCEMENT OF WORK.

8. APPROXIMATE FIELD LOCATIONS OF EXISTING UTILITIES, FOUNDATIONS AND OTHER STRUCTURES IDENTIFIED TO THE ENGINEER ARE SHOWN ON THESE DRAWINGS. THE ENGINEER IS NOT RESPONSIBLE FOR FIELD VERIFYING THESE LOCATIONS AND DAMAGE TO IDENTIFIED AND UNIDENTIFIED UTILITIES AND FOUNDATIONS. THE CONTRACTOR SHALL FIELD VERIFY LOCATIONS AND ELEVATIONS OF ALL UTILITIES WITHIN 50 FEET BEHIND AND IN FRONT OF WALLS.

9. WALL HEIGHTS SHOWN ARE BASED ON INFORMATION AVAILABLE AT THE TIME OF DESIGN. IF THE ACTUAL WALL HEIGHTS ARE MORE THAN ONE FOOT GREATER THAN THE WALL HEIGHTS SHOWN ON THE DRAWINGS, THE WALL CONTRACTOR SHALL IMMEDIATELY INFORM THE ENGINEER IN WRITING OR HIS REPRESENTATIVE WHO WILL DETERMINE IF ADDITIONAL WALL MODIFICATIONS ARE REQUIRED.

10. THE CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS, GRADES AND DIMENSIONS AT THE SITE PRIOR TO WALL CONSTRUCTION. IF THE WALL CONTRACTOR DISCOVERS ANY ERRORS, OMISSIONS OR DISCREPANCIES, HE SHALL NOTE ALL SUCH ITEMS IN WRITING AND PROVIDE TO THE ENGINEER PRIOR TO CONTINUING WALL CONSTRUCTION. THE ENGINEER WILL THEN ISSUE INSTRUCTIONS AS HOW TO PROCEED.

11. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE SAFETY AND UNDER NO CIRCUMSTANCES SHALL THE ENGINEER BE RESPONSIBLE FOR CONSTRUCTION SITE SAFETY.

12. CONSTRUCTION OPERATIONS BEHIND AND IN FRONT OF PREVIOUSLY CONSTRUCTED PORTIONS OF WALLS SHALL BE RESTRICTED TO PREVENT DAMAGE TO EXISTING WALLS. ONLY LIGHT COMPACTION EQUIPMENT SHALL BE USED WITHIN 5 FEET BEHIND WALL TO PREVENT EXCESSIVE LATERAL STRESS ON CONSTRUCTED PORTIONS OF THE WALLS.

B. CLEARING AND SUBGRADE PREPARATION

1. CLEARING, GRUBBING END STRIPPING LIMITS SHALL BE PERFORMED IN ACCORDANCE WITH THE CIVIL DRAWINGS PREPARED BYMATTERN & CRAIG. ADDITIONAL GRUBBING MAY BE REQUIRED BEHIND THE MSE WALL REINFORCED ZONE FOR THE PLACEMENT AND COMPACTION OF RETAINED SOIL.

2. ALL EXISTING TOPSOIL, ROOT MATS, AND OTHER DELETERIOUS MATERIALS SHALL BE COMPLETELY REMOVED FROM THE CLEARING AND STRIPPING LIMITS.

3. PRIOR TO INITIATION OF FILL PLACEMENT, THE STRIPPED AREA SHALL BE OBSERVED AND EVALUATED BY AN ECS GEOTECHNICAL ENGINEER TO DETERMINE THE EXTENT OF ANY REQUIRED REMEDIAL WORK.

C. EXCAVATION SUPPORT AND SLOPES

1. TEMPORARY EARTH SLOPES SHALL BE NO STEEPER THAN 1.5H:1V OR AS APPLICABLE PER OSHA REQUIREMENTS.

2. EXCAVATION SHALL BE CONSTRUCTED, SHORED AND BRACED IN STRICT ACCORDANCE WITH CURRENT OSHA REQUIREMENTS. SITE SAFETY AND OF THE CONFORMANCE WITH OSHA REQUIREMENTS SHALL BE THE SOLE RESPONSIBILITY CONTRACTOR.

3. THESE DRAWINGS REQUIRE A TEMPORARY EXCAVATION SUPPORT SYSTEM TO ALLOW THE INSTALLATION OF THE STORM SEWER BENEATH PERMANENT SOIL NAIL WALLS AND SLOPES. THE OMMISION OF TEMPORARY EXCAVATION SYSTEMS ALONG OTHER PORTIONS OF THE GREENWAY OR STORM SEWER ALIGNMENT DOES NOT ALLEVIATE THE CONTRACTOR FROM PROVIDING SHORING, BRACING, SLOPING OR BENCHING IN COMPLIANCE WITH CURRENT OSHA REQUIREMENTS.

4. THE CONTRACTOR SHALL SUBMIT TEMPORARY EXCAVATION SUPPORT SYSTEM TO THE ENGINEER FOR CONSIDERATION. THE SUBMITTAL SHALL INCLUDE THE REQUIREMENTS ON SHEET C13C OF THIS DRAWING SET.

5. THE CONTRACTOR SHALL NOT STOCKPILE EXCAVATED MATERIALS OR EQUIPMENT IMMEDIATELY ADJACENT TO THE EXCAVATION WALLS OR SLOPES. ALL SUCH MATERIALS SHALL BE KEPT BACK FROM THE TOP OF THE EXCAVATION A MINIMUM DISTANCE EQUAL TO THE EXCAVATION DEPTH. WHERE EQUIPMENT OR MATERIALS MUST BE PLACED IMMEDIATELY ADJACENT TO THE EXCAVATION WALLS THE EXCAVATION WALLS SHALL BE DESIGNED FOR THE ANTICIPATED SURCHARGE LOADING, OR ADDITIONAL BRACING MUST BE PROVIDED TO SUPPORT THE ANTICIPATED SURCHARGE LOADING.

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D. DEWATERING AND SITE DRAINAGE

1. THE MSE WALL CONTRACTOR SHALL PROVIDE SUMP PIT AND PUMPING OPERATIONS AS REQUIRED FOR DEWATERING THE WALL AND SANITARY SEWER EXCAVATIONS.

2. THE WALL CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE SITE DRAINAGE DURING EARTHWORK OPERATIONS, INCLUDING PROVIDING FOR DRAINAGE OF SURFACE WATER AWAY FROM THE CONSTRUCTION AREAS, AND ENHANCEMENT OF NATURAL DRAINAGE PATHS WITHOUT INTERRUPTING ITS PATTERN.

3. PROVIDE POSITIVE DRAINAGE FROM BACK OF WALL AT ALL TIMES DURING CONSTRUCTION.

E. DESIGN CRITERIA

1. CONSTRUCT TECCO® STABILIZATION SYSTEM, SOIL NAIL WALLS, MSE WALLS, AND GRAVITY WALLS IN ACCORDANCE WITH THESE DRAWINGS.

2. THE DESIGN OF WALLS AND SLOPES FOR THIS PROJECT CONTEMPLATES, INTERNAL STABILITY, EXTERNAL STABILITY, COMPOUND AND GLOBAL STABILITY.

3. THE SOIL NAIL STRUCTURES HAVE BEEN DESIGNED IN ACCORDNACE WITH FEDERAL HIGHWAY ADMINSTRATION (FHWA) PROCEDURES.

4. MSE AND GRAVITY WALLS HAVE BEEN DESIGNED IN ACCORDANCE WITH FHWA AND NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA) RECOMMENDATIONS.

5. THE WALLS HAVE BEEN DESIGNED FOR FACTORS OF SAFETY FOR PERMANENT LOADING CONDITIONS OF1.5 FOR INTERNAL STABILITY, 1.5 FOR DIRECT SLIDING, 2.0 FOR OVERTURNING, AND 1.5 FOR COMPOUND AND LONG TERM GLOBAL STABILITY.

6. LONG TERM STABILITY OF THE WALLS CONSIDERS A MAXIMUM RIVER ELEVATION OF 1,964 FEET.

7. THE WALLS HAVE BEEN DESIGNED FOR FACTORS OF SAFETY OF 1.3 FOR TEMPORARY LOADING CONDITIONS SUCH AS SHORT TERM FLOOD CONDITIONS AND FOR INTERMEDIATE CONSTRUCTION STAGES. FLOOD DESIGN STAGE CONSIDERS INUNDATION OF THE MSE WALL ALONG THE FRENCH BROAD RIVER.

8. THE WALLS ARE DESIGNED FOR PERMANENT SURCHARGE LOADING OF 250 PSF TO ACCOUNT FOR LIGHT VEHICULAR LOADING.

9. TEMPORARY SURCHARGE LOADS ABOVE THE WALL DURING CONSTRUCTION HAVE BEEN ANTICIPATED. IF EQUIPMENT OR MATERIALS STORAGE ABOVE THE WALL IS ANTICIPATED TO BE GREATER THAN 250 PSF, THE SURCHARGE LOADING SHALL BE SUBMITTED IN WRITING FOR REVIEW AND APPROVAL. THIS DESIGN ASSUMES THE SLOPES ABOVE THE SOIL NAIL WALLS WILL BE ROUGH GRADED PRIOR TO SOIL NAIL WALL EXCAVATION.

10. THE SOIL NAIL WALL SYSTEM HAS BEEN DESIGNED FOR DEVELOPMENT OF ACTIVE EARTH PRESSURES. THEREFORE, SOME LATERAL MOVEMENT OF THE WALL FACE AND VERTICAL SETTLEMENT OF THE AREAS BEHIND THE WALL SYSTEM SHOULD BE ANTICIPATED.

11. THE SOIL NAIL WALL DESIGN INCLUDES TEMPORARY EXCAVATION TO A PLANNED EMBEDMENT OF ONE-FOOT BELOW THE SANITARY SEWER INVERT ELEVATION. IF EXCAVATIONS BELOW THIS ELEVATION ARE ANTICIPATED, THE PLANNED EXCAVATION SHALL BE SUBMITTED IN WRITING FOR REVIEW AND APPROVAL.

12. SOIL PARAMETERS USED IN THE DESIGN OF THE WALLS IS BASED ON INTERPRETATION OF SOIL BORINGS AND LABORATORY TESTING PERFORMED BY ECS.

13. GROUNDWATER IS NOT EXPECTED WITHIN THE EXCAVATION FOR THE SOIL NAIL WALL OR SOIL NAIL SLOPE. HYDROSTATIC PRESSURE IS NOT CONSIDERED IN THE DESIGN; HOWEVER, WEEP DRAINS WILL BE INSTALLED BEHIND ALL HARD FACINGS USED ON THE PROJECT. IF GROUNDWATER IS ENCOUNTERED, THE DESIGN ENGINEER MUST BE NOTIFIED TO MODIFY DESIGN IF REQUIRED.

14. THE SOIL NAILS HAVE BEEN DESIGNED FOR AN ULTIMATE BOND STRESS OF 5 PSI. INCREASED CAPACITIES IN THE EXISTING FILL SHALL NOT BE PERMITTED DUE TO THE HIGHLY VARIABLE NATURE OF THE FILL. THE CONTRACTOR MAY SUBMIT AN ALTERNATE DESIGN FOR SOIL NAILS EXTENDING INTO NATURAL SOILS. THE ALTERNATE DESIGN SHALL BEAR THE SIGNATURE AND SEAL OF A QUALIFIED NORTH CAROLINA PROFESSIONAL ENGINEER AND SUPPORTING CALCULATIONS SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW. INCREASED BOND CAPCITIES MUST BE DEMONSTRATED THROUGH VERIFICATION TEST.

15. MINIMUM NAIL LENGTHS ARE SHOWN ON THE WALL ELEVATION VIEWS SHOWN ON SHEETS C13A AND C13B.

2.0 MATERIALS

1. MSE WALL AND GRAVITY WALL FACING UNITS SHALL CONSIST OF VERTI-BLOCK CANYON LEDGE NUMBER 702 MASONRY UNITS. ALL RETAINING WALL FACING UNITS SHALL BE IN STRICT ACCORDANCE WITH THE LATEST SPECIFICATIONS FURNISHED BY VERTIBLOCK WALL SYSTEMS. NO FACING UNIT SUBSTITUTIONS SHALL BE PERMITTED.

2. GEOGRID REINFORCEMENT SHALL CONSIST OF STRATAGRID (SG200, SG500, OR SG600) BY STRATA SYSTEMS, INC. ALL GEOGRIDS SHALL BE IN STRICT ACCORDANCE WITH THE LATEST SPECIFICATIONS FURNISHED BY STRATA SYSTEMS, INC. NO GEOGRID REINFORCEMENT SUBSTITUTIONS SHALL BE PERMITTED.

3. GEOTEXTILES SHALL CONSIST OF MIRAFI 140N BY TENCATE GEOSYNTHETICS (TENCATE). ALL GEOTEXTILES SHALL BE IN STRICT ACCORDANCE WITH THE LATEST SPECIFICATIONS FURNISHED BY TENCATE.

4. CRUSHED STONE SHALL CONSIST OF NCDOT NO. 57 STONE CRUSHED AGGREGATE. CONTRACTOR SHALL SUBMIT A MATERIAL SOURCE AND GRADATION TO THE ENGINEER.

5. LEVELING PAD SHALL CONSIST OF A MINIMUM OF 8 INCHES OF CRUSHED STONE, OR OTHER AGGREGATE APPROVED BY THE ENGINEER.

6. FILL MATERIALS FOR THE RETAINED FILL ZONE AND REINFORCED FILL ZONE SHALL CONSIST OF SOILS HAVING A UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) DESIGNATION OF SM, SC, SP, SW, GM, GC, GP, OR GW, BE FREE OF ORGANIC MATTER, COBBLES GREATER THAN 3 INCHES IN MAXIMUM DIMENSION, OR DEBRIS, AND HAVE MAXIMUM LIQUID LIMIT AND PLASTICITY INDEX OF 30 AND 10, RESPECTIVELY. FURTHERMORE, THE REINFORCED AND RETAINED FILL ZONES SHALL CONSIST OF MATERIALS THAT MEET OR EXCEED THE REQUIREMENTS OF THE DESIGN PARAMETERS. SHEAR STRENGTH TESTING SHALL BE PERFORMED ON REPRESENTATIVE REINFORCED AND RETAINED ZONE SOILS PRIOR TO CONSTRUCTION TO VERIFY THAT THE DESIGN VALUES ARE ACHIEVED. CONTRACTOR SHALL SUBMIT MATERIAL SOURCES, PLASTICITY, GRADATIONS AND SHEAR STRENGTH TEST RESULTS TO THE ENGINEER.

7. UNACCEPTABLE FILL MATERIALS INCLUDE TOPSOIL, ORGANIC MATERIALS (OH, OL), PLASTIC SILTS AND CLAYS (CL, CH, ML AND MH), AND SOILS NOT MEETING THE CRITERIA OF THE PREVIOUS PARAGRAPH.

8. ON SITE SOILS MAY BE USED AS FILL MATERIALS IN THE RETAINED FILL ZONE PROVIDED THE MATERIALS MEET REQUIREMENTS OF THESE SPECIFICATIONS.

9. DRAINAGE PIPES SHALL CONSIST OF SCHEDULE 80 PVC PIPE. PERFORATIONS MAY CONSIST OF SLOTS OR HOLES. HOLE DIAMETER OR SLOT WIDTH SHALL BE SMALL ENOUGH TO PREVENT DRAINAGE STONE MOVEMENT INTO PIPE AND OF SUFFICIENT OPEN AREA TO NOT RESTRICT WATER INFLOW INTO THE PIPE. CONTRACTOR SHALL SUBMIT MATERIAL DATA SHEETS FOR SOLID AND PERFORATED PIPE TO THE ENGINEER FOR REVIEW.

10. SOIL NAIL-BARS SHALL CONSIST OF ASTM 615 GRADE 75 ALL-THREAD BARS. ALL SOIL NAIL BARS SHALL BE EPOXY COATED OR HOT DIP GALVANIZED. ALTERNATE CORROSION PROTECTION MEASURES RECOMMENDED BY THE MANUFACTURER MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

11. SOIL NAIL SLOPE FACING MATERIAL SHALL CONSIST OF TECCO® G65/3 MM WIRE MESH REINFORCMEENT AND SHALL BE SECURED WITH THE TECCO® SYSTEM SPIKE PLATE.

12. NAIL BAR NUT AND WASHER: TYPE MATERIAL AND SIZE COMPATIBLE WITH SOIL NAIL BAR AND EPOXY COATED OR HOT DIP GALVANIZED.

13. WALL DRAIN BOARDS SHALL CONSIST OF SITEDRAIN C-90 CHIMNEY DRAIN BY AMERICAN WICK DRAIN, OR EQUIVALANT.

14. CENTRALIZERS SHALL BE USED TO INSURE A MINIMUM GROUT COVER OF ABOUT ONE INCH MINIUMUM AROUND THE REBAR IN THE GROUTED SOIL NAILS. CENTRALIZERS SHALL BE SPACED NO MORE THAN 10 FT.

15. SHOTCRETE REINFORCING BARS SHALL CONFORM TO ASTM A36.

16. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.

17. STRUCTURAL STEEL SHAPES AND PLATES SHALL CONFORM TO ASTM A36.

18. CEMENT GROUT FOR SOIL NAILS SHALL BE BATCHED USING POTABLE WATER AND TYPE I/II PORTLAND CEMENT. GROUT SHALL BE PROPORTIONED, MIXED, PLACED AND CURED TO DEVELOP A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 2500 PSI, AND 3000 PSI AT 28 DAYS.

19. WEEP DRAINS CONSIST OF MINIMUM 2 INCH SCHEDULE 60 SOLID PVC PIPE CONNECTED TO THE DRAINBOARD USING APPROVED CONNECTIONS. SOIL NAIL WALL CONTRACTOR SHALL SUBMIT A CONNECTION DETAIL IN WRITING TO THE ENGINEER FOR APPROVAL.

20. SHOTCRETE MATERIALS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS AND SHALL CONSIST OF:
    A. PORTLAND CEMENT: ASTM C150. TYPE 1
    B. EXPOSED SHOTCRETE SHALL HAVE 5% TO 7% ENTRAINED AIR.
    C. AGGREGATES: CLEAN, WELL GRADED
    D. WATER: CLEAN, POTABLE WATER
    E. SHOTCRETE THICKNESS MEASURING PINS SHALL BE MADE OF STEEL AND SUITABLE TO WITHSTAND SHOTCRETING FORCE WITHOUT MOVEMENT.

B. HANDLING WALL MATERIALS

1. GEOGRIDS AND GEOTEXTILES ARE SHIPPED IN ROLL FORM. THE MSE WALL CONTRACTOR IS RESPONSIBLE FOR OFF-LOADING OF THE ROLLS. PRIOR TO THE REMOVAL OF THE LABELS, THE ROLLS SHOULD BE COLOR-CODED, TYPICALLY WITH SPRAY PAINT, BY THE CONTRACTOR ACCORDING TO TYPE ON THEIR EDGES.

2. VERTI-BLOCK WALL FACING UNITS ARE TYPICALLY SHIPPED ON PALLETS. FRACTURED OR DAMAGED BLOCKS SHALL NOT BE USED IN WALL CONSTRUCTION.

3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE QUANTITIES SHIPPED AND CONDITIONS OF THE MATERIALS.

4. IF CERTIFICATIONS ARE REQUIRED BY THE CONTRACT DOCUMENTS, THEY WILL BE SUPPLIED ALONG WITH THE MATERIAL THAT IS SHIPPED. IT IS THE MSE WALL CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE DESIGN ENGINEER IS PROVIDED THIS INFORMATION PRIOR TO THE START OF CONSTRUCTION.

5. ALL MATERIALS SHALL BE STORED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

6. PLACE SHOTCRETE IN ACCORDANCE WITH ACI 506R-90. PROVIDE COVERAGE FOR REINFORCING AND WELDED WIRE FABRIC AS SHOWN ON PLANS.

7. SUBMIT ACCURATE SHOTCRETE BATCH RECORDS DURING PRODUCTION AND PLACEMENT OF SHOTCRETE TO DESIGN ENGINEER WITHIN 48 HOURS OF PLACEMENT.

8. SHOTCRETE MIXING EQUIPMENT SHALL BE CAPABLE OF THOROUGHLY MIXING AGGREGATE, CEMENT, AND/OR WATER IN SUFFICIENT QUANTITY TO MAINTAIN CONTINUOUS PLACEMENT.

9. SHTOCRETE AIR SUPPLY SHALL BE CLEAN OR ADEQUATE FOR MAINTAINING SUFFICIENT NOZZLE VELOCITY FOR ALL PARTS OF WORK.

10. SHOTCRETE DELIVERY EQUIPMENT SHALL BE CAPABLE OF DISCHARGING AGGREGATE-CEMENT-WATER MIXTURE ACCURATELY, UNIFORMLY, AND CONTINUOUSLY THROUGH DELIVERY NOZZLE.

3.0 FOUNDATIONS

1. THE MSE WALL FOUNDATION SUBGRADE SOILS SHALL BE PREPARED IN ACCORDANCE WITH THE CLEARING AND SUBGRADE PREPARATION SECTION OF THESE SPECIFICATIONS.

2. THE BEARING CAPACITY OF THE SUBGRADE SUPPORTING MSE WALLS AND GRAVITY WALLS, INCLUDING MASONRY BLOCKS AND REINFORCED FILL ZONE, SHALL BE VERIFIED TO BE EQUAL TO OR GREATER THAN 4000 PSF AT THE TIME OF CONSTRUCTION BY AN ECS SOIL TECHNICIAN OR GEOTECHNICAL ENGINEER AT A MINIMUM FREQUENCY OF 25 FEET ON CENTER.

3. THE REQUIRED EMBEDMENT DEPTH FOR EACH SECTION OF WALL IS SPECIFIED ON THE DETAILS AND WALL PROFILE.

4. FOUNDATION SUBGRADE SOILS NOT MEETING THE MINIMUM BEARING REQUIREMENS SHALL BE IMPROVED AS DIRECTED IN THE FIELD BY THE ENGINEER.

4.0 COMPACTIVE EFFORT AND FILL PLACEMENT

1. LEVELING PAD - WHERE CRUSHED STONE IS USED, TAMP IN PLACE WITH A WALK BEHIND VIBRATORY PLATE COMPACTOR OR A FLAT PLATE TAMP.

2. NO. 57 STONE - TAMP AND COMPACT WITH A SMOOTH PLATE WALK-BEHIND VIBRATORY PLATE COMPACTOR.

3. REINFORCED FILL ZONE - THIS ZONE SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-698 STANDARD PROCTOR METHOD, TO NOT LESS THAN 5 FEET BEYOND THE ENDS OF THE GEOGRID. WHERE REINFORCED FILL CONSISTS OF CRUSHED STONE, THE CRUSHED STONE SHALL BE COMPACTED WITH A SMOOTH PLATE WALK BEHIND VIBRATORY PLATE COMPACTOR OR SMOOTH DRUM VIBRATORY ROLLER. REINFORCED FILL FOR ALL WALLS ADJACENT TO THE FRENCH BROAD RIVER (SBW-1 THROUGH SBW-5) SHALL CONSIST OF NO. 57 STONE.

4. RETAINED FILL ZONE - THIS ZONE SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-698 STANDARD PROCTOR METHOD.

5. SANITARY SEWER EXCAVATION BACKFILL SHALL MEET THE REQUIREMENTS OF THE RETAINED FILL SOILS OUTLINED IN THE MATERIALS SECTION OF THIS SPECIFICATION AN DSHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-968 STANDARD PROCTOR METHOD.

6. FILL MATERIALS SHALL NOT BE PLACED WHEN WET, FROZEN OR FROST HEAVED SOILS. ALL SUCH SOILS SHALL BE REMOVED PRIOR TO CONTINUATION OF FILL OPERATIONS.

7. FILL MATERIALS SHALL NOT CONTAIN FROZEN MATERIALS AT THE TIME OF PLACEMENT. ALL SUCH MATERIALS SHALL BE REMOVED PRIOR TO CONTINUATION OF FILL OPERATIONS.

8. FILL MATERIALS SHOULD BE PLACED IN LIFTS NOT EXCEEDING 6 INCHES IN LOOSE THICKNESS.

9. AT THE TIME OF COMPACTION, FILL SOILS SHALL BE WITHIN 3 PERCENT OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED IN ACCORDANCE WITH THE STANDARD PROCTOR METHOD.

10. ALL FILL AND BACKFILL OPERATIONS SHALL BE OBSERVED ON A FULL-TIME BASIS BY ECS TO DETERMINE IF MINIMUM PLACEMENT, MOISTURE AND COMPACTION REQUIREMENTS ARE BEING MET AND THAT MATERIALS MEETING OR EXCEEDING THE SPECIFICATION REQUIREMENTS ARE USED.

11. IN-PLACE DENSITY TESTS SHALL BE PERFORMED WITH A MINIMUM OF 1 TEST PER 500 SQUARE FEET OF SOIL FILL AREA OR EACH LIFT OF FILL PLACED. THE ELEVATION AND LOCATION OF THE TESTS SHOULD BE CLEARLY IDENTIFIED AT THE TIME OR FILL PLACEMENT.

12. GRANULAR SOILS (UNIFIED SOIL CLASSIFICATION SM, SC OR COARSER) SHALL BE COMPACTED WITH VIBRATORY COMPACTION EQUIPMENT.

13. CARE SHOULD BE EXERCISED REGARDING THE USE OF RELATIVELY HEAVY MACHINERY CLOSE TO THE WALL. LIGHTER HAND OPERATED COMPACTION WITHIN 5 FEET OF THE WALL.

14. THE FILL AREA SHALL BE GRADED AT THE END OF EACH DAY TO FACILITATE THE POSITIVE DRAINAGE OF SURFACE WATER ASSOCIATED WITH PRECIPITATION AWAY FROM IT.

5.0 CONSTRUCTION SEQUENCE

FOR CONSTRUCTION

A. GENERAL

1. CONTRACTOR SHALL COORDINATE AND SEQUENCE WORK IN SUCH A MANNER AS TO MINIMIZE DISTURBANCE OF PREVIOUSLY CONSTRUCTED WALLS.

2. EXCAVATE AND INSTALL PERMANENT SOIL NAIL WALLS AND SOIL NAILED SLOPES. INSTALLATION SEQUENCE SHALL COMPLY WITH SEQUENCING OUTLINED IN THE PERMANENT SOIL NAIL WALL AND SOIL NAIL SLOPE SECTIONS OF THIS SPECIFICATION.

3. EXCAVATE TO INSTALL SANITARY SEWER. WHERE SANITARY SEWER IS ADJACENT TO PERMANENT SOIL NAIL WALL(S) OR SOIL NAIL SLOPE(S) THE SEWER EXCAVATION SHALL COMPLY WITH THE SEQUENCE OUTLINED IN THE TEMPORARY SOIL NAIL WALL SECTIONS OF THIS SPECIFICATION.

4. BACKFILL SANITARY SEWER EXCAVATION TO DESIGN BOTTOM OF MSE AND GRAVITY WALL ELEVATIONS SHOWN ON THESE DRAWINGS.

5. CONSTRUCT MSE AND GRAVITY RETAINING WALLS.

6. FINISH GRADE AND CONSTRUCT GREENWAY SURFACE IN ACCORDANCE WITH THE CIVIL AND LANDSCAPE DRAWINGS.

7. FOR INDIVIDUAL WALLS NOT ADJACENT TO OTHER WALLS OR THE SANITARY SEWER, FOLLOW SEQUENCING OUTLINED IN APPLICABLE SECTIONS.

8. CONTRACTOR MAY SUBMIT ALTERNATE SEQUENCING FOR CONSIDERATION BY THE OWNER AND ENGINEER.

B. CONSTRUCTION SEQUENCE – SOIL NAIL SLOPES

1. ALL SPECIFICATIONS, DETAILS, AND CONSTRUCTION SHOULD BE IN ACCORDANCE WITH TECCO SLOPE STABILIZATION SYSTEM, SYSTEM MANUAL.

2. ALL LOOSE COLLUVIUM, DEBRIS AND UNDERGROWTH VEGITATION SHALL BE REMOVED PRIOR TO TECCO INSTALLATION. TREE REMOVAL SHALL BE IN ACCORDANCE WITH THE CIVIL AND LANDSCAPE ARCHITECTURE PLANS PREPARED BY MATTERN & CRAIG AND EQUINOX.

3. INSTALL SOIL NAILS. DRILL HOLES FOR SOIL NAILS TO THE MINIMUM DIAMETER INDICATED ON THE PLANS. PNEUMATIC, AUGER, AND WATER WASH DRILLING METHODS ARE ACCEPTABLE FOR SOIL NAIL INSTALLATION PROVIDED THE DESIGN BOND IS ATTAINED AND SOIL NAILS ARE INSTALLED TO THE SPECIFIED DIAMETER AND LENGTHS. DRILLING FLUID, MODIFIERS, ETC. SHALL NOT BE USED. THE CONTRACTOR SHOULD ANTICIPATE DRILLING THROUGH BOULDERS AND OTHER OBSTRUCTIONS INCLUDING CONCRETE, METAL, AND WOOD DEBRIS. CASING, DUPLEX DRILLING, OR OTHER APPROVED METHODS OF DRILLING SHALL BE UTILIZED TO INSTALL THE SOIL NAILS AND PREVENT COMMUNICATION OF AIR BETWEEN DRILL HOLES IF PNEUMATIC DRILLING METHODS ARE UTILIZED.

4. SELF DRILLING ANCHORS SHALL BE PERMITTED PROVIDED THE MINIMUM BOND CAPACITES ARE MET, MANUFACTURERS CORROSION PROTECTION REQUIREMENTS ARE MET, AND ANCHORS ARE INSTALLED WITH CENTRALIZERS PROVIDING MINIMUM REQUIRED GROUT COVER.

5. INSTALL SOIL NAIL BARS IN THE DRILLED HOLES. EACH SOIL NAIL SHALL HAVE CENTRALIZERS FIRMLY ATTACHED TO THE SOIL NAIL BAR TO MAINTAIN THE BAR IN THE CENTRAL PORTION OF THE DRILL HOLE.

6. TREMIE GROUT DRILL HOLES FROM THE BOTTOM OF THE DRILL HOLE TO THE FACE OF EXCAVATION. THE TREMIE GROUT TUBE MAY BE REMOVED OR LEFT IN PLACE. IT SHALL BE FILLED WITH GROUT. AT SOIL NAIL WALL CONTRACTOR'S OPTION, STEPS 5 AND 6 MAY BE REVERSED.

7. ANCHOR TOP OF WIRE MESH TO GROUND SURFACE WITH WIRE ROPE AS SHOWN ON THESE DRAWINGS.

8. PLACE TECCO® MESH OVER SOIL NAILS. WHEN SOIL NAIL SLOPES ARE CONSTRUCTED ABOVE SOIL NAIL WALLS, THE TECCO® MESH SHALL EXTEND VERTICALLY DOWNWARD OVER THE UPPERMOST SOIL NAIL ASSOCIATED WITH THE SOIL NAIL WALL. TECCO® MESH SHALL BE PLACED IN A MANNER THAT THE MESH REMAINS TAUGHT BETWEEN SOIL NAILS AND REMAINS TAUGHT ON SLOPE FACE.

9. TORQUING: AFTER ALLOWING GROUT TO CURE, TORQUE NUTS IN TECCO AREA TO A LOAD OF 8 KIPS TENSILE FORCE

C. SEQUENCE OF WORK – SOIL NAIL WALL

1. CONTRACTOR SHALL LINE DRILL ALONG WALL ALIGNMENT AND MATCHING PROPOSED WALL BATTER TO ASSIST IN CREATING UNIFORM EXCAVATION FACE. LARGE ROCKS, BOULDERS, RUBBLE AND OTHER OBSTRUCTIONS ARE ANTICIPATED WITHIN THE DEPTH OF EXCAVATION. THE CONTRACTOR SHOULD ANTICIPATE ADDITIONAL LINE DRILLING, SPLITTING, AND HOE-RAMMING TO CAREFULLY REMOVE PORTIONS OF BOULDERS AND RUBBLE TO CREATE A UNIFORM EXCAVATION FACE. BLASTING SHALL NOT BE PERMITTED.

2. EXCAVATE THE FIRST LIFT FOR SOIL NAIL CONSTRUCTION. THE FIRST LIFT OF EXCAVATION SHALL NOT EXCEED 4 FEET AND MAY NEED TO BE LESS IF UNSUITABLE CONDITIONS ARE ENCOUNTERED. IF CAVING AND SLOUGHING MATERIALS ARE ENCOUNTERED, THE EXCAVATION LIFT MAY BE REDUCED, SOIL NAILING PROCEDURES REVISED. THE DESIGNER SHALL BE CONTACTED TO REVIEW REVISIONS TO THE CONSTRUCTION SEQUENCE AND REVISE THE SOIL NAIL DESIGN IF NECESSARY. EXCAVATION METHODS SHALL NOT DISTURB PRIOR LIFTS.

3. LARGE DIMAETER DEBRIS INCLUDING BOULDERS, COBBLES, WOOD, CONCRETE OR METAL SHOULD BE ANTICIPATED DURING EXCAVATION. THE CONTRACTOR SHOULD BE PREPARED TO REMOVE OBSTRUCTIONS AS NECESSARY. VOIDS CREATED DURING DEBRIS REMOVAL SHOULD BE BACKFILLED WITH SHOTCRETE. THE ENGINEER SHOULD BE NOTIFIED IMMEDIATELY IF DEBRIS REMOVAL IMPACTS PREVIOUSLY PLACED SOIL NAILS OR SHOTCRETE FACING.

4. DRILL HOLES FOR SOIL NAILS TO THE MINIMUM DIAMETER INDICATED ON THE PLANS. PNEUMATIC, AUGER, AND WATER WASH DRILLING METHODS ARE ACCEPTABLE FOR SOIL NAIL INSTALLATION PROVIDED THE DESIGN BOND IS ATTAINED AND SOIL NAILS ARE INSTALLED TO THE SPECIFIED DIAMETER AND LENGTHS. DRILLING FLUID, MODIFIERS, ETC. SHALL NOT BE USED. THE CONTRACTOR SHOULD ANTICIPATE DRILLING THROUGH BOULDERS AND OTHER OBSTRUCTIONS INCLUDING CONCRETE, METAL AND WOOD DEBRIS. CASING, DUPLEX DRILLING, OR OTHER APPROVED METHODS OF DRILLING SHALL BE UTILIZED TO INSTALL THE SOIL NAILS AND PREVENT COMMUNICATION OF AIR BETWEEN DRILL HOLES IF PNEUMATIC DRILLING METHODS ARE UTILIZED.

5. SELF DRILLING ANCHORS SHALL BE PERMITTED PROVIDED THE MINIMUM BOND CAPACITES ARE MET, CORROSION PROTECTION REQUIREMENTS ARE MET, AND ANCHORS ARE INSTALLED WITH CENTRALIZERS PROVIDING MINIMUM REQURIED GROUT COVER.

6. INSTALL SOIL NAIL BARS IN THE DRILLED HOLES. EACH SOIL NAIL SHALL HAVE CENTRALIZERS FIRMLY ATTACHED TO THE SOIL NAIL BAR TO MAINTAIN THE BAR IN THE CENTRAL PORTION OF THE DRILL HOLE.

NORTH CAROLINA PROFESSIONAL SEAL 039550 5/23/14 ENGINEER MARC F. PLOTKIN

Revisions		Date
0	ISSUED FOR PERMIT	01/24/2014
1	ISSUED FOR CONSTRUCTION	03/31/2014
2	ISSUED FOR MODIFIED GRADING AND TEMPORARY EXCAVATION SUPPORT	05/23/2014

Issue Date: 05/23/14

Drawn By: MKF

Designed By: MFP

Checked By: SJG

Date: 05/23/14

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NOTES AND SPECIFICATIONS

Vertical Scale:

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7. TREMIE GROUT DRILL HOLES FROM THE BOTTOM OF THE DRILL HOLE TO THE FACE OF EXCAVATION. THE TREMIE GROUT TUBE MAY BE REMOVED OR LEFT IN PLACE. IT SHALL BE FILLED WITH GROUT. AT SOIL NAIL WALL CONTRACTOR'S OPTION, STEPS 6 AND 7 MAY BE REVERSED.

8. INSTALL SHOTCRETE REINFORCEMENT AND DRAINBOARD AS SPECIFIED. BOLSTERS OR OTHER APPROVED METHODS SHALL BE UTILIZED TO MAINTAIN THE LOCATION OF THE REINFORCEMENT DURING PLACEMENT OF SHOTCRETE. WELDED WIRE FABRIC AND DRAINBOARD SHALL BE LAPPED A MINIMUM THICKNESS AND COMPLETELY ENCASE REINFORCEMENT. INSTALL CONTINUOUS WELDED WIRE FABRIC WITH 8 INCH MINIMUM LAP HORIZONTALLY AND VERTICALLY. SHOTCRETE SHALL BE BATCHED, TRANSPORTED, APPLIED, AND CURED PER ACI GUIDELINES. SHOTCRETE SHALL BE APPLIED BY ACI OR ASA CERTIFIED NOZZLEMEN.

9. INSTALL BEARING PLATE OVER THE SOILS NAILS AND SECURELY TIGHTEN NUT AGAINST SHOTCRETE WITH A WRENCH.

10. REPEAT STEPS 2 THROUGH 9 UNTIL EXCAVATION SUBGRADE IS REACHED. THE EXCAVATION LIFT HEIGHT ON SUBSEQUENT LIFTS MAY NOT BE GREATER THAN 5 FEET. IF CAVING OR SLOUGHING SOILS ARE ENCOUNTERED, THE LIFT HEIGHT SHOULD BE DECREASED OR ALTERNATE PROCEDURES UTILIZED TO PERMIT INSTALLATION OF THE SOIL NAIL SYSTEM.

11. TIME SPANS REQUIRED FOR THE FOLLOWING OPERATIONS ARE AS FOLLOWS:
    A. INSTALL SOIL NAIL WITHIN 6 HOURS AFTER DRILLING AND 24 HOURS AFTER EXCAVATION.
    B. APPLY SHOTCRETE FACING WITHIN 48 HOURS AFTER EXCAVATION UNLESS FIELD CONDITIONS DICTATE A SHORTER DURATION IS NECESSARY.

12. AT SOIL NAIL WALL CONTRACTOR'S OPTION AND RISK, SOIL NAILS MAY BE INSTALLED AFTER APPLICATION OF THE FACING.

13. FOR PERMANENT SHOTCRETE WALLS A SHOTCRETE SURFACE FINISH WILL BE APPLIED OVER THE SOIL NAIL SHOTCRETE FACE. THE OWNER SHALL SPECIFY THE TEXTURE AND COLOR OF THE FINISH.

SHOTCRETE PLACEMENT:

1. SHOTCRETE SHALL NOT BE PLACED ON ANY SURFACE WHICH IS FROZEN, SPONGY OR WHERE FREE WATER IS PRESENT. WHEN THE AIR TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT AND IS STEADY OR FALLING, OR WHEN WEATHER CONDITIONS ARE SUCH THAT A SATISFACTORY PRODUCT CANNOT BE ACHIEVED. FRESHLY PLACED SHOTCRETE SHALL BE PROTECTED FROM FREEZING TEMPERATURES AFTER PLACEMENT USING CONCRETE INSULATING BLANKETS SECURELY ANCHORED AT THE TOP AND BOTTOM OF THE SHOTCRETE.

2. SHOTCRETE THICKNESS MEASURING PINS SHALL BE PLACED AT SUFFICIENT LOCATIONS TO CONTROL SHOTCRETE THICKNESS. OTHER MEASURING TECHNIQUES ARE ACCEPTABLE PROVIDED THE INTENT OF THIS REQUIREMENT IS MET.

3. PROVIDE ACCESS TO SHOTCRETE SURFACES FOR SHOTCRETING IN AN UNINTERRUPTED FASHION.

4. PROVIDE FOR PLACEMENT IN CLOSE QUARTERS, EXTENDED DISTANCES, OR AROUND UNUSUAL OBSTRUCTIONS WHERE PLACEMENT VELOCITIES AND MIX CONSISTENCY MUST BE ADJUSTED.

5. SHOTCRETE SHALL PROVIDE A COMPLETE COVER OVER THE WELDED WIRE FABRIC, SUPPORT CHAIRS OR SLAB BOLSTERS ARE TO BE USED AS REQUIRED TO HOLD THE REINFORCING AT THE REQUIRED LOCATION IN THE SHOTCRETE DEPTH.

6. APPLICATION OF THE SHOTCRETE SHALL BE PERFORMED PERPENDICULAR TO THE SURFACE IN ORDER TO SECURE MAXIMUM COMPACTION OF THE SHOTCRETE.

7. SHOTCRETE SHALL BE PLACED IN SEVERAL PASSES TO BUILD UP LAYERS AND COMPLETELY ENCASE THE REINFORCING, COVER THE BEARING PLATE AND NUT, AND PRODUCE A UNIFORM, PLANAR GUN FINISH. NAIL HEADS SHALL NOT BE APPARENT AFTER SHOTCRETE PLACEMENT. PLANAR TOLERANCE SHALL BE 1 INCH IN 10 FEET.

8. SHOTCRETE SHALL REACH INITIAL SET PRIOR TO THE APPLICATION OF SUCCESSIVE LAYERS; THE TOTAL MINIMUM THICKNESS SHALL BE WITHIN ½ INCH OF THE DESIGN THICKNESS SHOWN ON THE DRAWINGS. SHOTCRETE THICKNESS PINS AND/OR WIRE LINES SHALL BE USED TO CONFIRM ADEQUATE SHOTCRETE THICKNESS IS ATTAINED. WIRE LINES OR OTHER APPROVED METHOD SHALL BE USED TO DEVELOP A UNIFORM SHOTCRETE SURFACE.

9. REMOVE EXCESSIVE REBOUND THAT DOES NOT FALL CLEAR OF WORK PRIOR TO APPLICATION OF SHOTCRETE IN NEXT LIFT.

10. SHOTCRETE SHALL HAVE A SMOOTH GUNITE FINISH. THE FUTURE AESTHETIC TREATMENT OF THE SOIL NAIL WALL WILL BE ADDRESSED IN SUCH A MANNER THAT MEETS THE REQUIREMENTS OF THE CITY OF ASHEVILLE UDO AT A LATER DATE TO BE APPROVED THE CITY OF ASHEVILLE PLANNING DEPARTMENT AND COMPLY WITH AESTHETIC STANDARDS IN SECTION 7-10-2-5.

D. CONSTRUCTION SEQUENCE – MECHANICALLY STABILIZED EARTH WALLS AND GRAVITY WALLS

STEP 1 - EXCAVATION AND LEVELING PAD

A. WALL LAYOUT AND GENERAL EXCAVATION
   1. SURVEY STAKE WALL LOCATION AND GENERAL EXCAVATION LIMITS FOR WALL CONSTRUCTION.
   2. PERFORM GENERAL EXCAVATION FOR WALL AS REQUIRED.

B. LEVELING PAD CONSTRUCTION
   1. STAKE WALL LOCATION FOR LEVELING PAD EXCAVATION.
   2. EXCAVATE TRENCH TO CREATE THE MINIMUM LEVELING PAD THICKNESS AND TO THE MINIMUM WIDTH SHOWN ON THE DRAWINGS.
   3. INSTALL DRAIN PIPE WITH POSITIVE GRAVITY FLOW TO OUTLET AS SHOWN ON THE PLANS.
   4. PLACE AND COMPACT LEVELING PAD MATERIALS FOR MSE AND GRAVITY WALL UNITS.

STEP 2 - INSTALLING FIRST COURSE OF BLOCK UNITS

A. SETTING FIRST COURSE OF BLOCK UNITS
   1. CHECK LEVELING PAD ELEVATIONS AND SMOOTH LEVELING PAD SURFACE.
   2. STAKE AND STRING LINE THE WALL LOCATION PAYING CLOSE ATTENTION TO EXACT LOCATION OF CURVES, CORNERS, AND VERTICAL AND HORIZONTAL STEPS. STRING LINE MUST BE ALONG THE MOLDED FACE (BACK) OF THE BLOCK UNIT, AND NOT ALONG THE BROKEN BLOCK FINISH SURFACE.
   3. INSTALL FIRST COURSE OF BLOCKS, CHECKING LEVEL AS PLACED.

B. BACKFILLING FIRST COURSE OF BLOCK UNITS
   1. RECHECK WALL LOCATION.
   2. USE NO. 57 STONE TO FILL ANY OPENINGS IN AND BETWEEN BLOCK UNITS AS REQUIRED.
   3. CAREFULLY PLACE CRUSHED STONE MATERIAL BEHIND AND UP TO THE HEIGHT OF THE BLOCK UNIT TO CREATE WALL FACE DRAIN. FOR TYPE B GEOGRID CONNECTIONS SEE STEP 5 FOR ATTACHING GEOGRID TO FIRST BLOCK COURSE.
   4. PLACE GEOTEXTILE AS SHOWN.
   5. PLACE AND COMPACT THE REINFORCED FILL SOIL.
   6. PLACE AND COMPACT FILL SOILS IN FRONT OF BLOCK UNIT.
   7. PLACE AND COMPACT RETAINED FILL SOILS.

STEP 3 - PLACEMENT AND BACKFILLING OF BLOCK UNITS WITHOUT GEOGRID REINFORCEMENT (GRAVITY WALL)

A. INSTALLING SUCCESSIVE COURSE OF BLOCK UNITS
   1. ENSURE THAT DRAINAGE AGGREGATE IS LEVEL WITH, OR SLIGHTLY BELOW TOP OF BLOCK UNIT BELOW.
   2. THOROUGHLY CLEAN DEBRIS AND AGGREGATE OFF OF TOP OF BLOCK UNITS.
   3. PLACE NEXT COURSE OF BLOCK AND PUSH UNITS FORWARD AS FAR AS POSSIBLE TO ESTABLISH PROPER SETBACK CONSISTENT WITH SETBACK SHOWN ON THE DETAILS AND IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

B. FILL PLACEMENT AND COMPACTION
   1. RECHECK WALL LOCATION.
   2. USE NO. 57 STONE TO FILL OPENINGS IN AND BETWEEN BLOCK UNITS AS REQUIRED.
   3. CAREFULLY PLACE AGGREGATE DRAIN MATERIAL BEHIND AND UP TO THE HEIGHT OF THE BLOCK UNIT TO CREATE WALL FACE DRAIN.
   4. PLACE GEOTEXTILE AS SHOWN.
   5. PLACE AND COMPACT THE REINFORCED FILL SOIL.
   6. PLACE AND COMPACT FILL SOILS IN FRONT OF BLOCK UNIT TO ELEVATIONS SHOWN ON THE DRAWINGS.
   7. PLACE AND COMPACT RETAINED FILL SOILS.

STEP 4 - PLACEMENT AND BACKFILLING OF BLOCK UNITS WITH TYPE A GEOGRID REINFORCEMENT CONNECTION

A. INSTALLING SUCCESSIVE COURSE OF BLOCK UNITS
   1. ENSURE THAT NO. 57 STONE IS LEVEL WITH OR SLIGHTLY BELOW TOP OF BLOCK UNIT BELOW.
   2. THOROUGHLY CLEAN DEBRIS AND NO. 57 STONE OFF TOP OF BLOCK UNITS.
   3. CUT GEOGRID TO DESIGN LENGTH SHOWN ON PLANS AND INSTALL WITH MACHINE STRENGTH DIRECTION PERPENDICULAR TO THE WALL FACE. PLACE GEOGRID TO FRONT FACE OF BLOCKS AS SHOWN ON DETAILS.
   4. PLACE NEXT COURSE OF BLOCK ON GEOGRID AND PUSH UNITS FORWARD AS FAR AS POSSIBLE TO ESTABLISH PROPER SETBACK, CONSISTENT WITH SETBACK SHOWN ON DETAILS AND IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

B. FILL PLACEMENT AND COMPACTION
   1. PULL GEOGRID TIGHT USING UNIFORM TENSION SO THAT THERE ARE NO WRINKLES IN THE GEOGRID. HOLD OR STAKE IN PLACE TO MAINTAIN TENSION THROUGHOUT FILL PLACEMENT PROCESS.
   2. PLACE NO. 57 STONE IN AND BETWEEN BLOCK UNITS AS REQUIRED.
   3. CAREFULLY PLACE AGGREGATE DRAIN MATERIAL BEHIND AND UP TO THE HEIGHT OF THE BLOCK UNIT TO CREATE WALL FACE DRAIN.
   4. PLACE GEOTEXTILE AS SHOWN.
   5. PLACE AND COMPACT REINFORCED FILL STONE BEHIND WALL WORKING FROM THE WALL BACK TOWARDS THE FREE END OF THE GEOGRID.
   6. PLACE AND COMPACT RETAINED FILL SOILS.

STEP 5 - PLACEMENT AND BACKFILLING OF BLOCK UNITS WITH TYPE B GEOGRID REINFORCEMENT CONNECTION

A. INSTALLING SUCCESSIVE COURSE OF BLOCK UNITS
   1. ENSURE THAT NO. 57 STONE IS LEVEL WITH OR SLIGHTLY BELOW TOP OF BLOCK UNIT BELOW.
   2. THOROUGHLY CLEAN DEBRIS AND NO. 57 STONE OFF TOP OF BLOCK UNITS.
   3. PLACE NEXT COURSE OF BLOCK. PUSH UNITS FORWARD AS FAR AS POSSIBLE TO ESTABLISH PROPER SETBACK, CONSISTENT WITH SETBACK SHOWN ON DETAILS AND IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
   4. PLACE AND COMPACT FILL TO THE LEVEL OF THE STRUCTURAL CONNECTION.
   5. PLACE STEEL DOWEL THROUGH STRUCTURAL CONNECTION.
   6. CUT GEOGRID TO DESIGN LENGTH SHOWN ON PLANS AND INSTALL WITH MACHINE STRENGTH DIRECTION PERPENDICULAR TO THE WALL FACE. WRAP GEOGRID AROUND STEEL DOWEL AND PROVIDE MINIMUM OVERLAP SHOWN ON THESE DRAWINGS.
   7. CONNECT OVERLAPPING SECTIONS OF GEOGRID WITH A BODKIN OR BULLNOSE TO MAINTAIN OVERLAP LENGTH DURING FILL PLACEMENT.

B. FILL PLACEMENT AND COMPACTION
   1. PULL GEOGRID TIGHT USING UNIFORM TENSION SO THAT THERE ARE NO WRINKLES IN THE GEOGRID. HOLD OR STAKE IN PLACE TO MAINTAIN TENSION THROUGHOUT FILL PLACEMENT PROCESS.
   2. PLACE NO. 57 STONE IN AND BETWEEN BLOCK UNITS AS REQUIRED.
   3. CAREFULLY PLACE AGGREGATE DRAIN MATERIAL BEHIND AND UP TO THE HEIGHT OF THE BLOCK UNIT TO CREATE WALL FACE DRAIN.
   4. PLACE GEOTEXTILE AS SHOWN.
   5. PLACE AND COMPACT REINFORCED FILL STONE BEHIND WALL WORKING FROM THE WALL BACK TOWARDS THE FREE END OF THE GEOGRID.
   6. PLACE AND COMPACT CHIMNEY DRAIN, INCLUDING GEOTEXTILE FABRIC AND AGGREGATE DRAIN MATERIAL, AT END OF REINFORCED SOIL ZONE AS SHOWN ON THE DRAWINGS.
   7. PLACE AND COMPACT RETAINED FILL SOILS.

NOTE: CONTINUE CONSTRUCTION OF THE WALL TO FULL HEIGHT USING STEPS 3, 4 AND 5

STEP 6 - CAPPING AND GRADING
   1. INSTALL CAP/CAPING UNIT AND SECURE IN PLACE PER MANUFACTURER'S RECOMMENDATIONS.
   2. PLACE AND COMPACT FINAL BACKFILL.
   3. ROUGH GRADE FOR POSITIVE DRAINAGE AWAY FROM THE WALL FACE.
   4. FINAL GRADING AND RESTORATION BY OTHERS.

6.0 QUALITY ASSURANCE/INSPECTION

1. ENSURE THE WALLS ARE ALONG THE PROPER ALIGNMENT, AND WITHIN APPROPRIATE PROPERTY BOUNDARIES, AND CONSTRUCTION EASEMENTS.

2. THE FOLLOWING TOLERANCES SHALL BE STRICTLY ADHERED TO:
   2.1 TOP OF MSE AND GRAVITY WALLS: +/- 0.25 FOOT
   2.2. BOTTOM OF SOIL NAIL WALL: +/- 0.25 FOOT.
   2.3. NAIL LOCATION +/- 6 INCHES OF VERTICAL AND HORIZONTAL.
   2.4. NAIL INCLINATION: +/- 3 DEGREES OF SPECIFIED ANGLE.
   2.5. NAIL SPLAY: +/- 3 DEGREES PERPENDICULAR TO WALL FACE.

3. IF VERTICAL OR HORIZONTAL NAIL POSITIONS CAN NOT BE MAINTAINED DUE TO OBSTRUCTIONS, OFFSET NAIL LOCATIONS WILL BE ACCEPTED PROVIDED THE MAXIMUM RELATIVE SPACING OF 4 FEET IS NOT EXCEEDED.

4. THE CONTRACTOR SHALL MAINTAIN RECORDS OF INSTALLED NAIL LENGTHS AND GROUT VOLUMES DURING INSTALLATION OF SOIL NAILS TO VERIFY THAT DRILL HOLES ARE ADEQUATELY GROUTED. THE RECORDS SHALL BE PROVIDED TO THE ENGINEER WITHIN 48 HOURS OF INSTALLATION.

5. THE INSTALLER SHALL PREPARE AND APPLY SHOTCRETE TO A MINIMUM OF ONE TEST PANEL PER NOZZLEMAN PRIOR TO SHOTCRETE PLACEMENT AND APPROXIMATELY HALF WAY THROUGH THE PROJECT. THE TEST PANELS SHALL INCLUDE ONE LAYER OF WELDED WIRE FABRIC REINFORCEMENT.

6. CONTRACTOR IS SOLELY RESPONSIBLE FOR QUALITY OF THE WORK. INSPECTION, MONITORING, AND WALL TESTING BY THE OWNER, THEIR DESIGNATED REPRESENTATIVE, OR ECS ARE SOLELY AT THE DISCRETION OF THE OWNER, AND IN NO WAY RELIEVE THE CONTRACTOR OF SOLE RESPONSIBILITY FOR MAINTAINING A QUALITY CONTROL PLAN.

7.0 GROUTED NAIL VERIFICATION AND PROOF TESTING

1. VERIFICATION TESTS SHALL BE PERFORMED ON NINE NON-PRODUCTION, SACRIFICIAL NAILS A MINIMUM OF TWO (2) DAYS FOLLOWING INSTALLATION (OR WHEN TESTS INDICATE GROUT STRENGTH EXCEEDS 2500 PSI). TEST NAILS SHALL BE INSTALLED WITH SIMILAR MEANS AND METHODS AS THE PRODUCTION ANCHORS.

2. VERIFICATION TESTS SHALL BE INSTALLED WITH A 10 FOOT UNBOND LENGTH, A 10 FOOT BOND LENGTH AND TESTED TO A DESIGN TEST LOAD (DTL) OF 12 KIPS. CONTRACTOR SHALL USE A PVC BOND BREAKER TO ENSURE UNBONDED LENGTH.

3. TEST NAIL TENDONS SHALL BE SIZED TO SAFELY SUPPORT THE MAXIMUM TEST LOAD.

4. TESTING SHALL BE PERFORMED IN THE PRESENCE OF ENGINEER.

5. VERIFICATION TESTS SHALL BE PERFORMED AT NINE LOCATIONS, AS SPECIFIED ON THE PLANS. THE TESTS SHALL BE PERFORMED PRIOR TO INSTALLATION OF PRODUCTION SOIL NAILS.

6. VERIFICATION TESTS SHALL BE PERFORMED BY TENSIONING TEST NAILS TO 200% OF DESIGN TEST LOAD (DTL EQUALS TO ALLOWABLE NAIL DESIGN CAPACITY MULTIPLIED BY BONDED LENGTH OF TEST NAIL) USING A CALIBRATED HYDRAULIC JACKING SYSTEM WITH LOAD INCREMENTS OF 0.05, 0.25, 0.5, 0.75, 1.0, 1.25, 1.75, AND 2.0 TIMES DTL OF GROUTED NAILS. EACH LOAD SHALL BE HELD WITHIN 2% OF THE TEST LOAD FOR TEN (10) MINUTES, OR UNTIL THREE SUCCESSIVE READINGS ARE WITHIN 0.004 INCH RANGE IN DISPLACEMENT (READING A MINIMUM OF 2 MINUTES) EXCEPT AT 1.5 X DTL AT WHICH A 60 MINUTE CREEP TEST WILL BE PERFORMED. NAIL ELONGATION SHALL BE MEASURED WITH A DIAL GAGE CAPABLE OF MEASURING 0.001 INCH INCREMENTS AND RECORDED AT PERIODS OF 0.5, 1, 2, 4, 6 AND 10 MINUTES AFTER APPLICATION OF THE TEST LOAD AND ALSO AT 20, 30, 40, AND 60 MINUTES DURING CREEP TESTS.

7. PROOF TESTS SHALL BE PERFORMED ON 5% OF PRODUCTION NAILS IN EACH ROW. PROOF TESTS SHALL BE PERFORMED ON PRODUCTION NAILS WITH A DTL OF 18 KIPS. TEST SHALL BE PERFORMED WITH A MINIMUM OF TWO (2) DAYS FOLLOWING INSTALLATION (OR WHEN TESTS INDICATE GROUT STRENGTH EXCEEDS 2500 PSI).

8. PROOF TESTS SHALL BE PERFORMED BY TENSIONING THE TEST NAILS USING A CALIBRATED HYDRAULIC JACKING SYSTEM WITH LOAD INCREMENTS OF 0.05, 0.25, 0.5, 0.75, 1.0, 1.25 AND 1.5 TIMES DTL OF GROUTED NAIL. EACH LOAD SHALL BE HELD WITHIN 5% OF THE TEST FOR TEN (10) MINUTES, OR UNTIL THREE SUCCESSIVE READINGS ARE WITHIN 0.04 INCH RANGE OF DISPLACEMENT (READING A MINIMUM OF 2 MINUTES.) EXCEPT AT 1.5 X DTL AT WHICH A 10 MIN. CREEP TEST WILL BE PERFORMED. NAIL ELONGATION SHALL BE MEASURED WITH A DIAL GAGE CAPABLE OF MEASURING 0.01 INCH INCREMENTS AND RECORDED AT PERIODS OF 0.5, 1, 2, 4, 6 AND 10 MINUTES AFTER APPLICATION OF THE TEST LOAD.

9. TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER IN WRITING AT THE END OF THE DAY IN WHICH ANY TEST IS PERFORMED.

10. THE TEST OF THE NAIL SHALL BE CONSIDERED ACCEPTABLE IF MOVEMENT OF THE NAIL AT 1.5 X DTL IS LESS THAN 0.04 INCHES BETWEEN THE 1 AND 10 MINUTES READINGS (OR LESS THAT 0.08 INCHES BETWEEN 6 AND 60 MINUTES READINGS, IF DESIRED), AND THE CREEP RATE IS CONSTANT OR DECREASING. UNACCEPTABLE TEST RESULTS SHALL RESULT IN MODIFICATIONS TO THE DESIGN AND/OR CONSTRUCTION PROCEDURES.

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL SEAL 039550 3-31-14 ENGINEER MARCK PLOTKIN

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CRAVEN STREET IMPROVEMENTS
NOTES AND SPECIFICATIONS

Vertical Scale:

Horizontal Scale:

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KEYSTONE RETAINING HEADWALL DESIGN PARAMETERS

WALL GEOMETRY

Back Batter of Face:	2°
Minimum Block Embedment:	See Wall Profile

WALL SURCHARGE LOADS

Dead Load (psf)	--
Live Load (psf)	250

MINIMUM FACTORS OF SAFETY

F.S. against Sliding:	1.5
F.S. against Overturning:	2.0
F.S. against Bearing Capacity Failure	2.0
F.S. against Global Instability:	1.3
F.S. against Uncertainties:	1.5
F.S. against Geogrid Pullout:	1.5

SOIL WITHIN REINFORCED FILL ZONE

Density of Backfill (pcf):	120
Phi (deg):	30°
Cohesion (psf):	0

SOIL WITHIN RETAINED ZONE

Density (pcf):	117
Phi (deg):	28°
Cohesion (psf):	0

FOUNDATION SOIL

Density (pcf):	115
Phi (deg):	26°
Cohesion (psf):	0
Allowable Bearing Pressure (psf):	3,000 psf
Leveling Pad:	Graded Aggregate (#57 Stone) tamped.

GEOGRID DATA

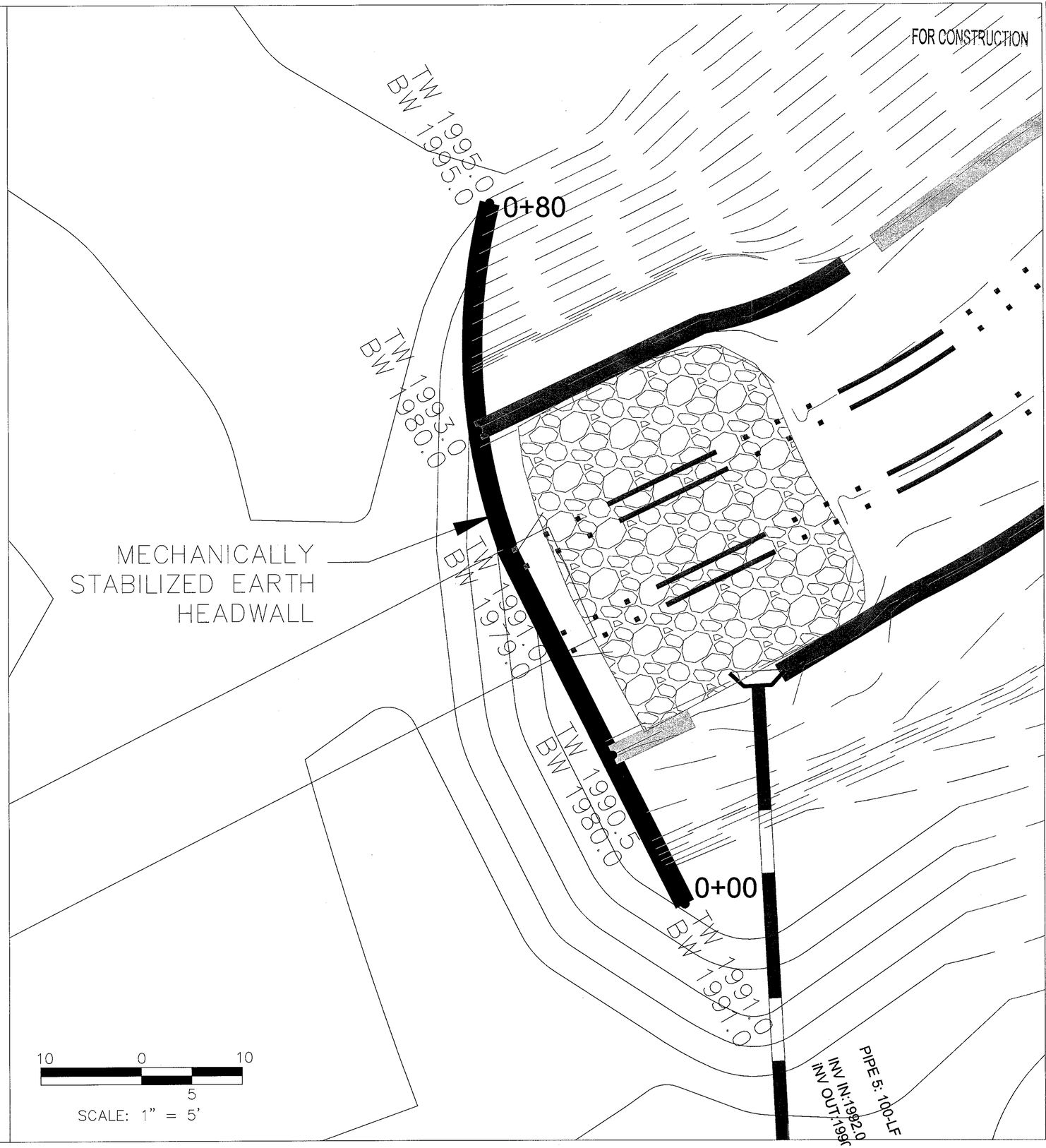
Geogrid Type:	Stratagrid SG 200
Coverage of Geogrids (%):	100
Creep Reduction Factor	1.55
Durability Reduction Factor	1.10
Installation Damage Reduction Factor:	
Sand, Silt, or Clay	1.1
Geotextile Type:	Mirafi 140N or approved equivalent

MODULAR BLOCK DATA

Modular Block System:	Keystone Retaining Wall System
Block Type:	8" Century Units and corresponding Cap Units
Block Face:	Straight Face
Cap Face Type:	Straight Face
Unit Fill:	Graded Aggregate (#57 Stone)

NOTES

1. THE DESIGN IS BASED ON SOILS HAVING A UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION OF SM OR COARSER AND A FRICTION ANGLE OF 30 DEG. OR HIGHER FOR THE REINFORCED BACKFILL SOILS. IF THE MATERIALS USED IN CONSTRUCTION DIFFER FROM THIS CRITERIA, ECS SHALL BE CONTACTED SO THAT THESE DOCUMENTS CAN BE REVISED AS NECESSARY TO MEET THE SOIL AND/OR AGGREGATE CONDITIONS. SHEAR STRENGTH TESTING SHALL BE PERFORMED ON REPRESENTATIVE REINFORCED AND RETAINED ZONE SOILS PRIOR TO CONSTRUCTION.
2. CONSTRUCTION OF THE HEADWALL SHOWN ON THIS PLAN SHALL BE PERFORMED UNDER THE FULL-TIME OBSERVATIONS OF ECS.
3. IF THE ELEVATION, LOCATION, SURCHARGE LOADING, OR GRADING SURROUNDING THE RETAINING WALL CHANGES FROM THAT DEPICTED ON THESE PLANS, ECS SHALL BE NOTIFIED SO THAT MODIFICATIONS TO THE GEOTECHNICAL DESIGN CAN BE MADE, IF NECESSARY. NO MATERIAL SUBSTITUTIONS ARE PERMITTED.
4. BASEMAP PROVIDED BY COLE JENEST & STONE.
5. EXISTING FILL IS ANTICIPATED BENEATH THE WALL AND REINFORCED SOIL ZONE. THE EXISTING FILL IS NOT SUITABLE FOR WALL SUPPORT AND SHALL BE REMOVED AND REPLACED WITH NEW STRUCTURAL FILL PRIOR TO WALL CONSTRUCTION.
6. THE DESIGN IS BASED ON SOIL BACKFILL. THE CONTRACTOR MAY ELECT TO BACKFILL THE RETAINED SOIL ZONE WITH CRUSHED NO 57 STONE FOR CONSTRUCTABILITY. THE CONTRACTOR SHALL PLACE A NONWOVEN FILTER FABRIC AT ALL INTERFACES BETWEEN CRUSHED STONE AND SOIL.
7. EXISTING FILL IS ANTICIPATED BENEATH THE WALL AND REINFORCED SOIL ZONE. ALLUVIAL SOILS MAY BE ENCOUNTERED BENEATH EXISTING FILL. THE EXISTING FILL AND ALLUVIAL SOILS ARE NOT CONSIDERED SUITABLE FOR WALL SUPPORT AND SHALL BE COMPLETELY REMOVED AND REPLACED WITH NEW STRUCTURAL FILL PRIOR TO WALL CONSTRUCTION.



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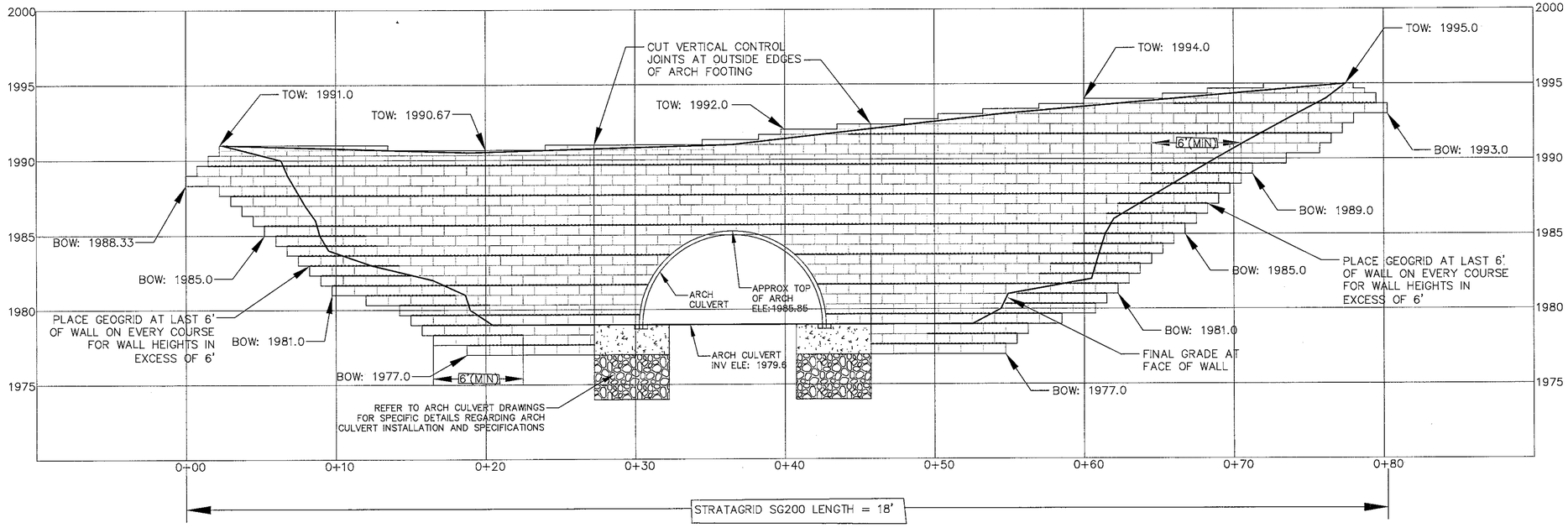
Mattern & Craig CONSULTING ENGINEERS • SURVEYORS ECS

CRAVEN STREET IMPROVEMENTS
ARCH CULVERT HEADWALL
SITE PLAN

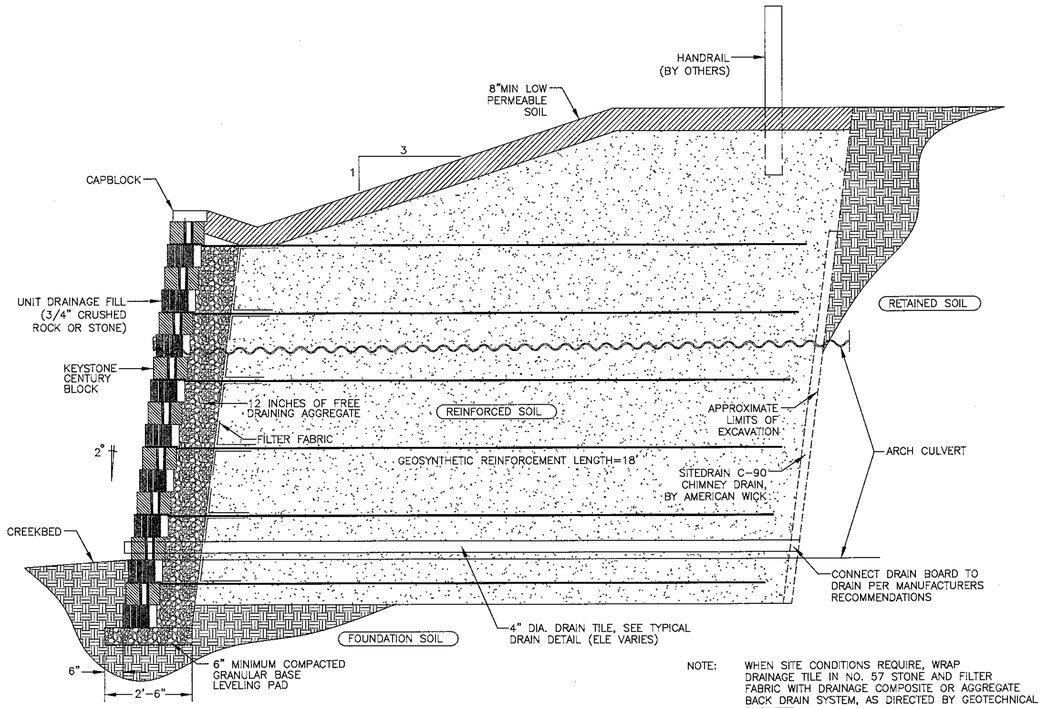
Vertical Scale: AS SHOWN
Horizontal Scale: AS SHOWN
Commission Number:
Sheet No.: C13K

FOR CONSTRUCTION



KEYSTONE CENTURY MSE WALL PROFILE

SCALE 1": 4'



NOTE: WHEN SITE CONDITIONS REQUIRE, WRAP DRAINAGE TILE IN NO. 57 STONE AND FILTER FABRIC WITH DRAINAGE COMPOSITE OR AGGREGATE BACK DRAIN SYSTEM, AS DIRECTED BY GEOTECHNICAL ENGINEER.

1/C13L TYPICAL REINFORCED HEADWALL SECTION
KEYSTONE CENTURY UNIT – NEAR VERTICAL SETBACK
NTS

NORTH CAROLINA PROFESSIONAL SEAL 039550 ENGINEER 5/23/14

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Mattern & Craig
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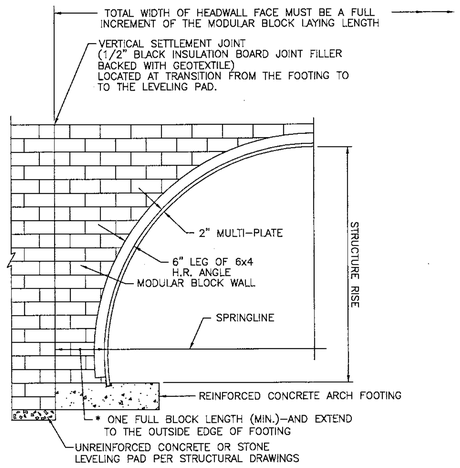
EGS

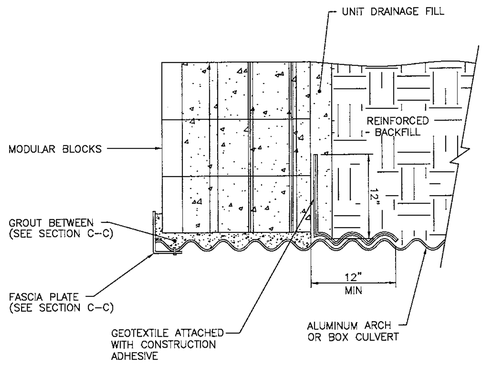
CRAVEN STREET IMPROVEMENTS
ARCH CULVERT HEADWALL
PROFILE AND CROSS SECTION

Vertical Scale: AS SHOWN
Horizontal Scale: AS SHOWN
Commission Number:
Sheet No.: C13L

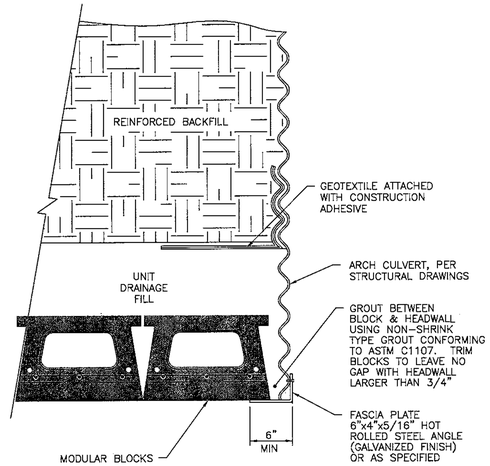


NOTE: OUT TO OUT OF FOOTING IS A CRITICAL DIMENSION. SEE PLAN VIEW.

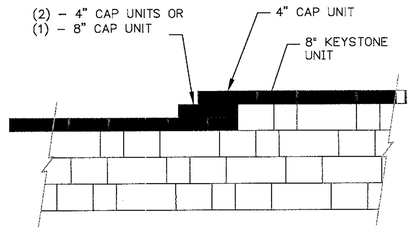
1 C13M STRUCTURAL PLATE MODULAR BLOCK HEADWALL DETAIL
NTS



2 C13M MODULAR BLOCK/ARCH CULVERT HORIZONTAL CONNECTION JOINT DETAIL
NTS

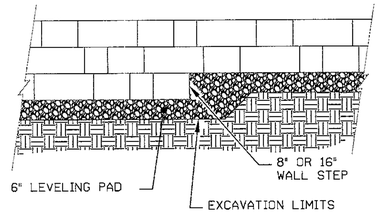


3 C13M MODULAR BLOCK/ARCH CULVERT VERTICAL CONNECTION JOINT DETAIL
NTS

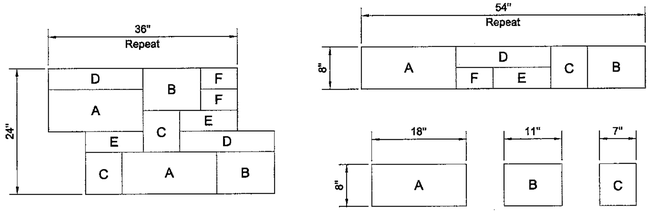


Note:
1. SECURE ALL CAP UNITS WITH KEYSTONE KAPSEAL OR EQUAL.

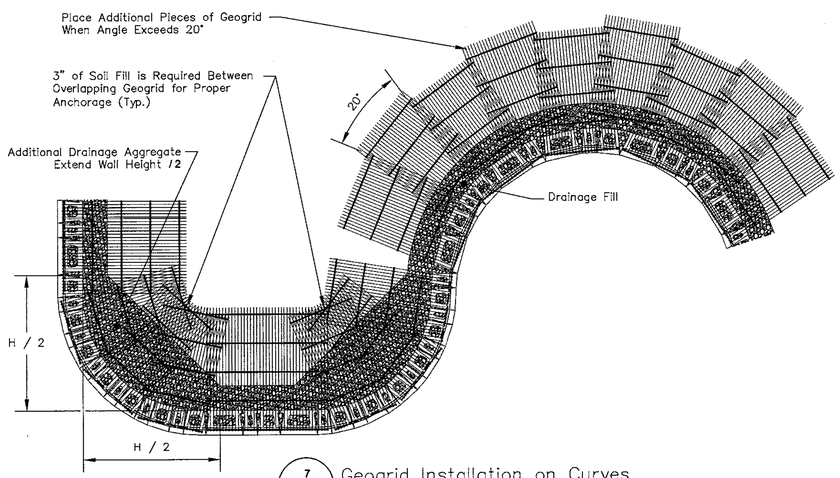
4 C13M Top of Wall Steps
NTS



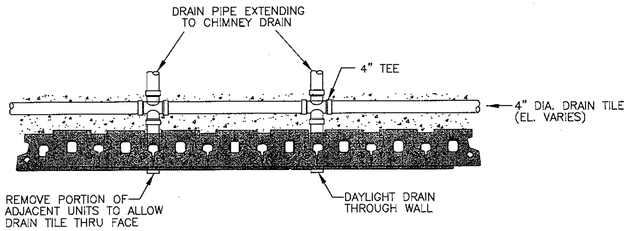
5 C13M Elevation
NTS



10 C13M KEYSTONE CENTURY WALL COURSE PATTERN DESIGNS
NTS

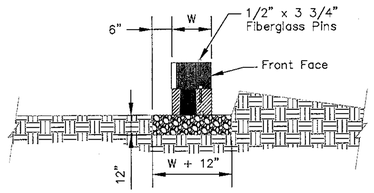


7 C13M Geogrid Installation on Curves
NTS



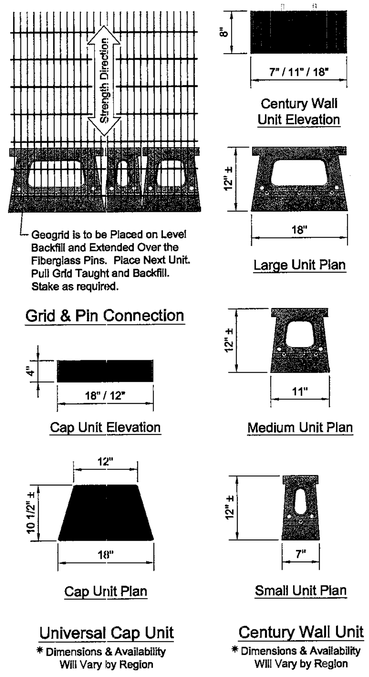
9 C13M TYPICAL DRAIN DETAIL
NTS

Note:
1. The leveling pad is to be constructed of crushed stone or 2000 psi ± unreinforced concrete, or compacted crushed No 57 stone



Section

6 C13M Leveling Pad Detail
NTS



8 C13M BLOCK DIMENSIONS AND GRID PLACEMENT
NTS

FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL SEAL 039550 5/23/14 ENGINEER

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CRAVEN STREET IMPROVEMENTS
ARCH CULVERT HEADWALL DETAILS

Vertical Scale: AS SHOWN
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FOR CONSTRUCTION

RETAINING WALL CONSTRUCTION SPECIFICATIONS
FOR
KEYSTONE CENTURY SEGMENTAL BLOCK RETAINING
HEADWALL REINFORCED WITH STRATAGRID GEOGRIDS

NARRATIVE

ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PRDVISIONS ON THIS SHEET. THE CONSTRUCTION OF THE RETAINING WALL SHOWN ON THESE PLANS SHALL BE MONITORED AND TESTED BY ECS ON A FULL-TIME BASIS TO DETERMINE THAT THE RETAINING WALLS ARE CONSTRUCTED IN ACCORDANCE WITH THE INTENT OF THE DESIGN.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE QUALITY OF THE WORK. INSPECTION, TESTING AND MONITORING BY THE OWNER, THEIR DESIGNATED REPRESENTATIVE OR ECS ARE SOLEY AT THE DISCRETION OF THE OWNER, AND IN NO WAY RELIEVE THE CONTRACTOR OF SOLE RESPONSIBILITY FOR MAINTAINING A QUALITY CONTROL PLAN.

CLEARING AND SUBGRADE PREPARATION

1. CLEARING AND STRIPPING LIMITS SHALL BE EXTENDED A MINIMUM OF 1 FOOT IN FRONT OF THE RETAINING WALLS AND 2 FOOT BEHIND THE REINFORCED ZONE.
2. ALL EXISTING TOPSOIL, ROOTMAT, AND ANY OTHER SOFT OR UNSUITABLE MATERIALS SHALL BE REMOVED FROM THE CLEARING AND STRIPPING LIMITS.
3. PRIOR TO INITIATION OF FILL PLACEMENT, THE STRIPPED AREA SHALL BE OBSERVED BY AN ECS GEOTECHNICAL ENGINEER TO DETERMINE THE EXTENT OF ANY REQUIRED REMEDIAL WORK.
4. EXISTING FILL IS ANTICIPATED BENEATH THE WALL AND REINFORCED SOIL ZONE. ALLUVIAL SOILS MAY BE ENCOUNTERED BENEATH EXISTING FILL. THE EXISTING FILL AND ALLUVIAL SOILS ARE NOT CONSIDERED SUITABLE FOR WALL SUPPORT AND SHALL BE COMPLETELY REMOVED AND REPLACED WITH NEW STRUCTURAL FILL PRIOR TO WALL CONSTRUCTION.

EXCAVATION SUPPORT AND SLOPES

1. TEMPORARY SLOPES SHALL BE NO STEEPER THAN 1H:1V.
2. EXCAVATIONS SHALL BE CONSTRUCTED AND BRACED IN ACCORDANCE WITH CURRENT OSHA REQUIREMENTS.
3. THE CONTRACTOR SHALL NOT STOCKPILE EXCAVATED MATERIALS OR EQUIPMENT IMMEDIATELY ADJACENT TO THE EXCAVATION WALLS OR SLOPES. ALL SUCH MATERIALS SHALL BE KEPT BACK FROM THE TOP OF THE EXCAVATION OF A MINIMUM DISTANCE EQUAL TD THE EXCAVATION DEPTH. WHERE EQUIPMENT OR MATERIALS MUST BE PLACED IMMEDIATELY ADJACENT TO THE EXCAVATION WALLS, THE EXCAVATION WALLS SHALL BE DESIGNED FOR THE ANTICIPATED SURCHARGE LOADING, OR ADDITIONAL BRACING MUST BE PROVIDED TO SUPPORT THE ANTICIPATED SURCHARGE LOADING.

MATERIALS

1. RETAINING WALL UNITS SHALL CONSIST OF KEYSTONE CENTURY MASONRY UNITS. ALL LMASDNRY RETAINING WALL UNITS SHALL BE IN STRICT ACCORDANCE WITH THE LATEST SPECIFICATIONS FURNISHED BY KESTONE RETAINING WALL SYSTEMS, MINNEAPOLIS, MINNESOTA.
2. THE COLOR AND FACE OPTIONS OF BLOCK UNIT TO BE SELECTED BY THE OWNER.
3. FIBERGLASS PINS SHALL BE NYLON RESIN RODS WITH FIBERGLASS AS SUPPLIED BY KYSTONE RETAINING WALL SYSTEMS, INC., AND SHALL BE IN ACCORDANCE WITH THE LATEST KEYSTONE SPECIFICATIONS.
4. GEOTEXTILES SHALL CONSIST OF MIRAFI 140N, OR OTHER EQUIVALENT AS APPROVED BY ECS.
5. MATERIAL HANDLING AND STORAGE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
6. DRAINAGE AGGREGATE SHALL CONSIST OF NCDOT NO. 57 STONE.
7. LEVELING PAD SHALL CONSIST OF DRAINAGE AGGREGATE OR UNREINFORCED CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
8. FILL MATERIALS FOR THE REINFORCED FILL AND RETAINED FILL ZONES SHALL CONSIST OF SOILS HAVING A UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION OF SM, SC, SP, SW, GM, GC, GP, OR GW, BE FREE OF ORGANIC MATTER, COBBLES GREATER THAN 3 INCHES IN MAXIMUM DIMENSION, OR DEBRIS, AND HAVE MAXIMUM LIQUID LIMIT AND PLASTICITY INDEX OF 30 AND 10, RESPECTIVELY. FURTHERMORE, THE REINFORCED AND RETAINED FILL ZONES SHALL CONSIST OF MATERIALS THAT MEET OR EXCEED THE REQUIREMENTS OF THE DESIGN PARAMETERS.
9. THE DESIGN SOIL PARAMETERS SHALL BE CONFIRMED WITH LABORATORY TESTING INCLUDING GRAIN SIZE DISTRIBUTION, ATTERBERG LIMITS, PROCTOR ANALYSIS, AND SIMPLE DIRECT SHEAR.
10. UNACCEPTABLE FILL MATERIALS INCLUDE TOPSOIL, ORGANIC MATERIALS (OH,OL), PLASTIC SILTS AND CLAYS (CH,MH), AND SOILS NOT MEETING THE CRITERIA OF THE PREVIOUS PARAGRAPH (CL,ML).
11. CHIMNEY DRAIN SHALL SONSIST OF A GEOCOMPOSITE DRAINAGE BOARD SUCH AS SITE DRAIN C-90 BY AMERICAN WICK DRAIN, OR EQUIVALANT. THE CHIMNEY DRAIN SHALL BE PLACED IN ONE CONTINUOUS VERTICAL PLACE FROM THE BASE OF THE REINFORCED ZONE TO AN ELEVATION EQUIVALENT TO THE UPPERMOST LAYER OF GEOGRID.
12. GEOGRID REINFORCEMENT SHALL CONSIST OF STRATAGRID SG200 BY STRATA SYSTEMS INC.. ALL GEOGRIDS SHALL BE IN STRICT ACCORDANCE WITH THE LATEST SPECIFICATIONS FURNISHED BY STRATA SYSTEMS, INC.. NO GEOGRID REINFORCEMENT SUBSTITUTIONS SHALL BE PERMITTED.

FOUNDATIONS

1. THE FOUNDATION SUBGRADES SHALL BE PREPARED IN ACCORDANCE WITH THE SECTION CLEARING AND SUBGRADE PREPARATION.
2. THE BEARING CAPACITY OF THE SUBGRADE SUPPORTING ALL RETAINING WALL ELEMENTS, INCLUDING MASONRY BLOCKS AND REINFORCED FILL ZONE, SHALL BE VERIFIED BY AN ECS SOIL TECHNICIAN OR GEOTECHNICAL ENGINEER AT A MINIMUM FREQUENCY OF 25 FEET DN CENTER. THE REQUIRED BEARING CAPACITY FOR EACH WALL, OR SECTION OF WALL, IS SPECIFIED ON THE DESIGN NOTES.
3. THE REQUIRED EMBEDMENT DEPTH FOR EACH WALL, OR SECTION OF WALL, IS SPECIFIED ON THE DETAILS AND WALL PROFILES.
4. EXISTING FILL IS ANTICIPATED BENEATH THE WALL AND REINFORCED SOIL ZONE. ALLUVIAL SOILS MAY BE ENCOUNTERED BENEATH EXISTING FILL. THE EXISTING FILL AND ALLUVIAL SOILS ARE NOT CONSIDERED SUITABLE FOR WALL SUPPORT AND SHALL BE COMPLETELY REMOVED AND REPLACED WITH NEW STRUCTURAL FILL PRIOR TO WALL CONSTRUCTION.

COMPACTIVE EFFORT AND FILL PLACEMENT

1. LEVELING PAD - WHERE CRUSHED STONE IS USED, TAMP IN PLACE WITH A WALK BEHIND VIBRATORY PLATE COMPACTOR OR A FLAT PLATE TAMP.
2. NO. 57 STONE - TAMP AND COMPACT WITH A SMOOTH PLATE WALK-BEHIND VIBRATORY PLATE COMPACTOR.
3. REINFORCED SOIL FILL ZONE - THIS ZONE SHALL BE COMPACTED TO A MINIMUM 95 PERCENT OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D - 698 STANDARD PROCTOR METHOD, TO NOT LESS THAN 5 FEET BEYOND THE ENDS OF THE GEOGRID. WHERE REINFORCED FILL CONSIST OF CRUSHED STONE, THE CRUSHED STONE SHALL BE COMPACTED WITH A SMOOTH PLATE WALK-BEHIND VIBRATORY PLATE COMPACTOR OR SMOOTH DRUM VIBRATORY ROLLER.
4. RETAINED FILL ZONE - THIS ZONE SHALL BE COMPACTED TO A MINIMUM 95 PERCENT OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D - 698 STANDARD PROCTOR METHOD.
5. FILL MATERIALS SHALL NOT BE PLACED ON WET, FROZEN OR FROST HEAVED SOILS. ALL SUCH SOILS SHALL BE REMOVED PRIOR TO CONTINUATION OF FILL OPERATIONS.
6. FILL MATERIALS SHALL NOT CONTAIN FROZEN MATERIALS AT THE TIME OF FILL PLACEMENT. ALL SUCH SOILS SHALL BE REMOVED PRIOR TO CONTINUATION OF FILL OPERATIONS.
7. FILL SOILS SHALL BE PLACED IN LIFTS NOT EXCEEDING 6 INCHES IN LOOSE THICKNESS.
8. AT THE TIME OF COMPACTION FILL SOILS SHALL BE WITHIN 3% OF THE OPTIMUM MOISTURE CONTENT, AS DETERMINED IN ACCORDANCE WITH THE APPROPRIATE PROCTOR METHOD.
9. ALL FILL AND BACKFILL OPERATIONS SHALL BE OBSERVED ON A FULL-TIME BASIS BY ECS TO DETERMINE IF MINIMUM COMPACTION REQUIREMENTS ARE BEING MET AND THAT MATERIALS MEETING OR EXCEEDING THE SPECIFICATIONS REQUIREMENTS ARE USED.
10. IN-PLACE DENSITY TEST SHALL BE PREFORMED WITHIN A MINIMUM OF 1 TEST PER 500 SQUARE FEET OF SOIL FILL AREA FOR EACH LIFT OF FILL PLACED. THE ELEVATION AND LOCATION OF THE TEST SHOULD BE CLEARLY IDENTIFIED AT THE TIME OF FILL PLACEMENT.
11. GRANULAR SOILS (UNIFIED SOIL CLASSIFICATION SM OR BETTER) SHALL BE COMPACTED WITH VIBRATORY COMPACTION EQUIPMENT.
12. CARE SHOULD BE EXERCISED REGARDING THE USE OF RELATIVELY HEAVY MACHINERY CLOSE TO THE WALL. LIGHTER HAND OPERATED COMPACTION WITHIN 5 FEET OF THE WALL.
13. THE FILL AREA SHALL BE GRADED AT THE END OF EACH DAY TO FACILITATE THE POSITIVE DRAINAGE OF SURFACE WATER ASSOCIATED WITH PRECIPITATION AWAY FROM IT.

DEWATERING AND SITE DRAINAGE

1. THE CONTRACTOR SHALL PROVIDE SUMP PIT AND PUMPING OPERATIONS AS REQUIRED FOR DEWATERING THE RETAINING WALL EXCAVATIONS.
2. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE SITE DRAINAGE DURING EARTHWORK OPERATIONS, INCLUDING PROVIDING FOR DRAINAGE FOR SURFACE WATER AWAY FROM THE CONSTRUCTION AREAS, AND ENHANCEMENT OF NATURAL DRAINAGE PATHS WITHOUT INTERRUPTING ITS PATTERN.
3. ALL EROSION AND SEDIMENTATION CONTROL SHALL BE CONTROLLED IN ACCORDANCE WITH SOUND ENGINEERING PRACTICE AND CURRENT STATE AND COUNTY REQUIREMENTS.
4. PROVIDE POSITIVE DRAINAGE FROM BACK WALL AT ALL TIMES DURING CONSTRUCTION.

GENERAL CONSTRUCTION SEQUENCE
FOR
KEYSTONE CENTURY SEGMENTAL BLOCK RETAINING
HEADWALL REINFORCED WITH STRATAGRID GEOGRIDS

STEP 1 - EXCAVATION AND LEVELING PAD

A. WALL LAYOUT AND GENERAL EXCAVATION

1. SURVEY STAKE WALL LOCATION AND GENERAL EXCAVATION LIMITS FOR WALL CONSTRUCTION.
2. ENSURE THE WALL IN ALONG PROPER ALIGNMENT, AND WITHIN APPROPRIATE PROPERTY BOUNDARIES, AND CONSTRUCTION EASEMENTS,
3. PERFORM GENERAL EXCAVATION FOR WALL.
4. THE ARCH CULVERT AND ARCH CULVERT FOUNDATION SHALL BE INSTALLED PRIOR TO WALL EXCAVATION.

B. LEVELING PAD CONSTRUCTION

1. STAKE WALL LOCATION FOR LEVELING PAD EXCAVATION.
2. EXCAVATE TRENCH TO CREATE THE MINIMUM LEVELING PAD THICKNESS AND TO THE MINIMUM WIDTH SHOWN.
3. INSTALL DRAIN PIPE WITH POSITIVE GRAVITY FLOW TO OUTLET, IF REQUIRED, AND AS SHOWN ON THE PLANS.
4. PLACE, LEVEL AND COMPACT LEVELING PAD MATERIAL FOR RETAINING WALL UNITS.
5. PLACE AND COMPACT AGGREGATE BLANKET DRAIN. INSTALL GEOTEXTILE AS SHOWN.

STEP 2 - INSTALLING FIRST COURSE OF BLOCK UNITS

A. SETTING FIRST COURSE OF BLOCK UNITS

1. CHECK LEVELING PAD ELEVATIONS AND SMOOTH LEVELING PAD SURFACE.
2. STAKE AND STRING LINE THE WALL LOCATION PAYING CLOSE ATTENTION TO EXACT LOCATION OF CURVES, CORNERS, AND VERTICAL AND HORIZONTAL STEPS. STRING LINE MUST BE ALONG THE MOLDED FACE (BACK) OF THE BLOCK UNIT, AND NOT ALONG THE BROKEN BLOCK FINISH SURFACE.
3. INSTALL FIRST COURSE OF BLOCKS, CHECKING LEVEL AS PLACED

B. BACKFILLING FIRST COURSE OF BLOCK UNITS

1. RECHECK WALL LOCATION.
2. USE DRAINAGE AGGREGATE TO FILL ANY OPENINGS IN AND BETWEEN BLOCK UNITS AS REQUIRED.
3. CAREFULLY PLACE DRAINAGE AGGREGATE BEHIND AND UP TO THE HEIGHT OF THE BLOCK UNIT TO CREATE WALL FACE DRAIN.
4. PLACE GEOTEXTILE AS SHOWN.
5. PLACE AND COMPACT REINFORCED SOIL BEHIND WALL DRAIN.
6. PLACE AND COMPACT FILL SOILS IN FRONT OF BLOCK DRAIN.
7. PLACE CHIMNEY DRAIN.
8. PLACE AND COMPACT RETAINED FILL SOILS.
9. COMPACT DRAINAGE AGGREGATE.

STEP 3 - PLACEMENT AND BACKFILLING OF BLOCK UNITS

A. INSTALLING SUCCESSIVE COURSE OF BLOCK UNITS

1. ENSURE THAT DRAINAGE AGGREGATE IS LEVEL WITH, OR SLIGHTLY BELOW TOP OF BLOCK UNIT BELOW.
2. THOUROUGHLY CLEAN DEBRIS AND AGGREGATE OFF OF TOP OF BLOCK UNITS.
3. INSTALL CONNECTING SHEAR PINS.
4. PLACE NEXT COURSE OF BLOCK AND PUSH UNITS FORWARDS TO ENGAGE SHEAR PINS AND ESTABLISH PROPER SETBACK, CONSISTENT WITH SETBACK SHOWN ON THE DETAILS AND IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

B. FILL PLACEMENT AND COMPACTION

1. USE DRAINAGE AGGREGATE TO FILL OPENINGS IN AND BETWEEN BLOCK UNITS AS REQUIRED.
2. CAREFULLY PLACE DRAINAGE AGGREGATE BEHIND AND UP TD THE HEIGHT OF THE BLOCK UNIT TO CREATE WALL FACE DRAIN.
3. WHERE SHOWN ON PLANS, INSTALL PERFORATED PVC DRAIN PIPE (4' O.D.) ON TOP OF FIRST COURSE OF DRAINAGE AGGREGATE. THE PVC DRAIN PIPE SHOULD BE ENCASED IN A MINIMUM OF 4 INCHES OF NO. 57 STONE AND SLOPE SUFFICIENTLY DOWNGRADIENT (MINIMUM 1% FALL) TO PROMOTE POSITIVE DRAINAGE. THE PVC DRAIN PIPE SHOULD TERMINATE AT LEAST 5 FEET BEYOND THE END OF THE WALL.
4. PLACE GEOTEXTILE AS SHOWN.
5. PLACE AND COMPACT REINFORCED SOIL BEHIND WALL DRAIN.
6. EXTEND CHIMNEY DRAIN UPWARDS.
7. PLACE AND COMPACT RETAINED FILL SOILS.
8. COMPACT DRAINAGE AGGREGATE.

STEP 4 - GEOGRID REINFORCEMENT INSTALLATION

A. PLACEMENT OF GEOGRID REINFORCEMENT

1. ENSURE THAT DRAINAGE AGGREGATE IS LEVEL WITH, OR SLIGHTLY BELOW TOP OF BLOCK UNIT BELOW.
2. THOROUGHLY CLEAN DEBRIS AND AGGREGATE OFF OF TOP OF BLOCK UNITS.
3. CUT GEOGRID TO DESIGN LENGTH SHOWN ON PLANS (GGL) AND INSTALL WITH STRENGTH DIRECTION PERPENDICULAR TO THE WALL FACE. HOOK GEOGRID OVER PROTRUDING PINS AS SHOWN ON DETAILS PROVIDED.
4. PLACE NEXT COURSE OF BLOCK ON GEOGRID AND PUSH UNITS FORWARD TO ENGAGE SHEAR PINS AND ESTABLISH PROPER SETBACK, CONSISTENT WITH SETBACK SHOWN ON DETAILS AND IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

B. SETTING FIRST COURSE OF BLOCK UNITS

1. PULL GEOGRID TIGHT USING UNIFORM TENSION SO THAT THERE ARE NO WRINKLES IN THE GEOGRID. HOLD OR STAKE IN PLACE TO MAINTAIN TENSION THROUGHOUT FILL PLACEMENT PROCESS.
2. PLACE DRAINAGE AGGREGATE FOR WALL FACE DRAIN IN AND BETWEEN BLOCK UNITS AS REQUIRED.
3. PLACE GEOTEXTILE AS SHOWN.
4. PLACE AND COMPACT REINFORCED FILL SDIL BEHIND WALL DRAIN, WORKING FROM THE WALL BACK TOWARDS THE FREE END OF THE GEOGRID.
5. EXTEND CHIMNEY DRAIN UPWARDS.
6. PLACE AND COMPACT RETAINED FILL SOILS.
7. COMPACT DRAINAGE AGGREGATE.

NOTE: CONTINUE CONSTRUCTION OF THE WALL TO FULL HEIGHT USING STEPS 3 AND 4.

STEP 5 - CAPPING AND GRADING

1. INSTALL CAP/CAPING UNIT (OPTIONAL) AND SECURE IN PLACE PER MANUFACTURER'S RECOMMENDATIONS.
2. PLACE AND COMPACT FINAL BACKFILL.
3. FINISH GRADE FOR POSITIVE DRAINAGE AWAY FROM THE WALL FACE.
4. PLACE TOPSOIL AND VEGETATE SLOPES ABOVE, BELOW, AND AROUND WALL TERMINATIONS.

GENERAL NOTES:

1. ALIGNMENT SHOULD BE CHECKED EVERY OTHER COURSE, ESPECIALLY FOR STRAIGHT WALLS.
2. BLOCKS, DRAINAGE AGGREGATE, REINFORCED FILL, CHIMNEY DRAIN, AND RETAINED FILL SHALL BE BROUGHT UP SIMULTANEOUSLY. NONE OF THESE ITEMS SHOULD LEAD ANOTHER BY MORE THAN ONE COURSE HEIGHT.
3. IF THE RETAINING WALLS PRODUCTS CHANGES FROM KEYSTONE AND STRATAGRID GEOGRID TO ANY OTHER MATERIAL, ECS SHALL BE NOTIFIED SO THAT AN EVALUATION OF THE RETAINING WALL USING THE NEW MATERIALS CAN BE PERFORMED AND MODIFICATIONS CAN BE MADE, IF NECESSARY. IN ADDITION, DETAILS AND NOTES SPECIFIC TO THE SELECTED PRODUCT SHOULD BE UPDATED.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039550 MARC F. PLOTKIN 5/23/14

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