Levee "F" Toe Drain Installation

Wichita–Valley Center Local Flood Protection Project (WVLFPP)

August 13, 2012

Prepared for

CITY OF WICHITA

The City of Wichita, Kansas

Project No. 468–84758 Ph 1

O.C.A. NO. 26623470

Joe Hickle P.E. City Stormwater Engineer

Prepared by

AMEC Earth & Environmental, Inc

MARK	DESCRIPTION	DATE	APPR.

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CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

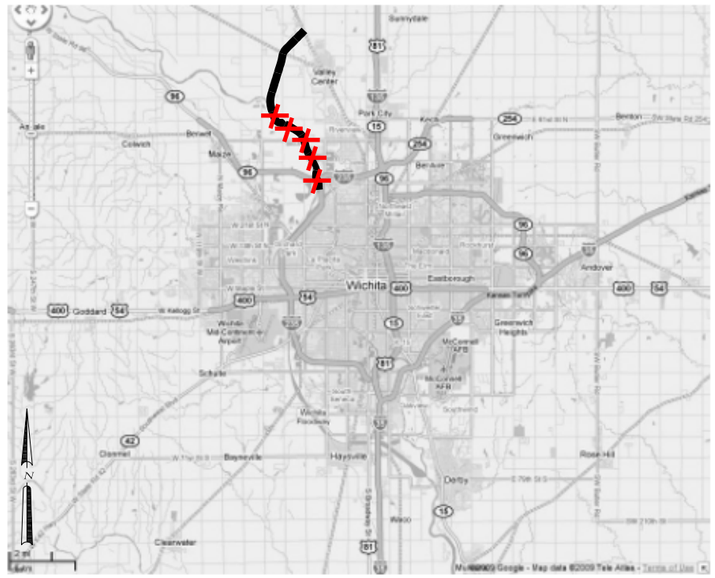
LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY:		DATE:
Larry Sample, PE		08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 01_COVER SHEET.dgn		
AMEC PROJ. NO. 5-6150-0001		

COVER SHEET

G-0.00

SHEET 1 OF 21



VICINITY MAP
NOT TO SCALE

TABLE OF QUANTITIES (BASE BID ITEMS)

Lump Sum Basis

Item		Quantity	Unit
Site Clearing (NOTE 1)		1	Lump Sum
Top Soil Excavation and Stockpiling (NOTE 2)	1953	~~3,633~~	Cubic Yards
Trench Excavation and Disposal of Existing Filter Media and Existing Toe Drain Pipe (NOTE 3)	17577	~~32,697~~	Cubic Yards
Replacement Toe-Drain Pipe with Filter Sock (6" diameter perforated HDPE) (NOTE 4)	17577	~~32,697~~	Linear Feet
Replacment Risers (6" diameter non-perforated HDPE)	510	~~920~~	Linear Feet
Replacement Riser Cap and Outlet Appurtenances (NOTE 5)	51	~~92~~	Each
Precast Concrete Manhole (48" dia.)	29	~~54~~	Each
Replacement Filter Media (Stone meeting ASTM C33 specification for concrete aggregate)	6836	~~12,716~~	Cubic Yards
Earthfill (backfill with existing material)	12695	~~23,615~~	Cubic Yards
Site Restoration (NOTE 6)		1	Lump Sum
Traffic Control		1	Lump Sum

Measured Quantity Basis

Item		Quantity	Unit
Erosion Control BMP (Ditch Check Protection)		5	EA.
Erosion Control BMP (Stabilized Entrance)	6	~~10~~	EA.
Erosion Control Blanket (SC150 or equivalent)	48825	~~43,596~~	Square Yard

1. Includes cost for mobilization, tree removal and trimming, debris and tree disposal, sod stripping, and grading.
2. Includes excavation of top 1.0 foot of soil, stockpiling, and any necessary temporary erosion control such as silt fence.
3. Includes all work associated with the trench excavation and disposal of the existing toe drain pipe, risers and filter media. Trench shoring is required for this project and it shall be assumed that a minimum of 200 feet of shoring will be on site at all times and shall be subsidiary to this bid item. Includes approx. 5900 cu. yds. of existing pipe and filter media to be disposed of off site.
4. All appurtenant fittings such as tees, caps, and couplers shall be subsidiary to this bid item.
5. Includes Fabricated riser cap, 2 metal barrier posts, weed barrier around riser outlet, and crushed rock.
6. Shall include all equipment, materials and labor to restore the site and shall include such items as grading, seeding mulch, fertilizer and any additional items necessary to establish vegetation as described in the General Notes. Esitmated seeding area is 7 acres.

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12 ~~17~~	C-3.01	EROSION CONTROL DETAILS
13 ~~18~~	C-4.01	TRAFFIC CONTROL DETAILS AND NOTES
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15 ~~20~~	C-4.03	TRAFFIC CONTROL DETAILS AND NOTES
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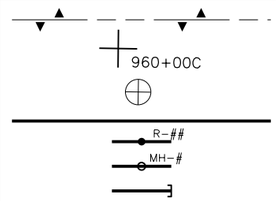
LEGEND



EXISTING LEVEE CENTERLINE

CORPS OF ENGINEERS LEVEE STATIONS (SHOWN FOR INFORMATION ONLY)

EXISTING TOE DRAIN RISERS (FIELD LOCATED IN 2010 BY GPS)

PROPOSED TOE DRAIN

PROPOSED TOE DRAIN RISER

PROPOSED TOE DRAIN MANHOLE

PROPOSED TOE DRAIN CAP

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VICINITY MAP, SHEET INDEX

G-0.01

SHEET 2 OF 21

GENERAL NOTES

Provide all materials and perform construction in accordance with City of Wichita Standard Specifications, unless shown or stated otherwise on these Drawings or in the Special Provisions.
Horizontal Project Datum: NAD83 State Plane, south zone
Vertical Project Datum: NAVD88, USGS mean sea level

EXCAVATION SAFETY:

Provide a minimum advance notice of seventy-two (72) hours to utility companies prior to starting any excavation, as follows:

Kansas one-call or local Wichita	1-800-344-7233 687-2470

The contractor must notify the following in case of an emergency:

AT&T (telephone)	1-800-870-8390
Cox communications (cable)	262-0661
Westar (electric)	383-8600
Kansas gas service (gas)	1-888-482-4950
City of Wichita, Water & Sewer Maintenance.	262-6000
Black Hills (gas)	946-0096

Preserve all existing property irons. Reestablish any property irons damaged or destroyed by construction operations. Reestablishment of damaged irons shall be at the contractor's expense by a licensed land surveyor in accordance with Kansas state laws.

City of Wichita Public Works Department (PWD) shall provide all construction staking at no cost to the contractor. Coordinate survey staking with the PWD and give the surveyor 24 hours notice when stakes are required.

Project surveys used the NAD83 state plane coordinate system, south zone. No coordinates were modified to ground. Elevations are in USGS mean sea level datum (NAVD 88).

No utility relocations are expected for this project. If an unforeseen utility conflict arises, the contractor shall consult with the City of Wichita and the design engineer to determine if the toe drains alignment will be altered or continued through the utility. The Contractor shall work around existing utilities within the right-of-way that do not conflict with the proposed construction. The plans do not show existing utility locations. Utilities in the Flood Control right-of-way are limited, but the contractor is responsible for having utility locates completed prior to construction.

Others will relocate all business signs, posts and landscaping features that conflict with the new construction prior to construction. Contractor shall remove and dispose of all items that remain within the construction limits upon the start of construction, unless otherwise noted.

Contractor shall dispose of and provide disposal sites for all rubble from the removal of miscellaneous structures and excess excavation that is to be wasted. Engineer shall approve the suitability, appearance and site location of disposal sites. Engineer shall not approve locations that will leave an unsightly appearance, in Engineer's opinion. Obtain approval from Kansas Department of Health and Environment for all disposal sites. Obtain Kansas State Board of Agriculture permits for any material stockpiled or disposed of in a flood plain. Obtain approval and permits from U. S. Army Corps of Engineers for any material deposited in waters of the United States or wetlands. Provide additional archeological investigations for any material buried or stockpiled beyond approved construction limits unless buried or stockpiled in a previously approved disposal location.

Items noted for removal may be abandoned in-place if done so in conformance with City of Wichita standard specifications at no additional cost to City of Wichita. Contractor may remove items noted to be abandoned in-place or if in conflict with the proposed improvements at no additional cost to City of Wichita. Cost for removal or abandonment is subsidiary to "removal of existing items" and includes all removal items noted and not-noted on the plan sheets.

Maintain access control along the project corridor throughout construction. Construct temporary fence at no additional cost to the City of Wichita, if necessary, to maintain access control.

Excavation on the levee embankment shall require the excavation area to be re-established in accordance with the Grading Notes section of these General notes.

SITE RESTORATION NOTES:

Repair rutting on levee surfaces due to storm water runoff throughout construction. Replace lost seed, fertilizer and erosion control devices at no additional cost to City of Wichita.

Repair or replace damaged items not part of the project at no additional cost to City of Wichita.

Place topsoil to a minimum depth of 6 inches or as specified on the drawings. The finished grade on Drawings indicates the surface elevation after placement of the prescribed topsoil thickness. Offsite topsoil borrow shall be fertile natural topsoil, typical of the locality, obtained from well-drained areas. Stockpiled topsoil may be used. It shall be without admixture of subsoil or slag and shall be free of stones, lumps, sticks, plants, or their roots, toxic substances or other extraneous matter that may be harmful to plant growth or would interfere with future maintenance. Topsoil pH range shall be 5.5 to 7.0. Engineer shall approve topsoil prior to placement.

Rake all gravel or other similar debris larger than ½inch in diameter and remove during final grade preparation.

Seeding Operations

Substitute the following for City of Wichita Specification Section 902.2 and Table 902-1.

Provide seed in standard containers that is new crop seed complying with and labeled in accordance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect at the time of purchase. Furnish a statement certifying the purity percent, germination percent, and the sproutable seed percent for the seed. Store the seed in a cool, dry place. Seed that is moldy, wet or otherwise damaged will not be accepted.

Water seeded areas with a deep soaking every two (2) weeks during dry periods until a mature stand of grass is obtained.

Permanent seeding shall be completed between September 1 and April 1. Temporary seeding between April 1 and September 1 shall include seeding Annual Rye at a rate of 100 PLS lbs. per acre and shall be either planted and covered by North American Green S150 erosion control mat or hydroseeded with bonded fiber matrix mulch (mulch applied at 3000 lbs per acre).

Seeding shall be accomplished per the following rates and specifications:

COMMON NAME	RATE(PLS lbs/acre)*
Smooth Brome	75
K-31 Fescue	300
Annual Rye	100
Fertilizer (10-20-10)	350

*Pounds of pure live seed per acre

The Seeding process shall include in order:
1. Furnish topsoil
2. Finish grading
3. Prepare seedbed
4. Seed and maintain areas as required.

All embankment side slopes and areas within 15 feet of the levee toe shall be seeded and covered with an Erosion Control Blanket (North American Green SC-150, or approved equal). All other seeded areas shall be covered with a prairie hay mulch, or equivalent. No bare ground shall be visible in the seeded area. Thick clumps of mulch are not permissible. Provide uniform coverage. Mulch shall be applied at a minimum of 4,000 lbs. per acre.

Seeding shall not be performed in windy weather. Seeding shall be done in two (2) directions at right angles to each other. A 3-ft wide strip shall be sodded along sidewalks, roadways, and parking areas to prevent washing and erosion. Following initial soil disturbance or redisturbance, permanent or temporary erosion control measures shall be installed within seven days. The erosion control measures shall be installed on all perimeter slopes and all other disturbed or graded areas on the project site.

Seeding Operations (cont.)

The contractor shall be responsible for establishing a vigorous stand of vegetation in project seeding areas. A vigorous stand of vegetation for this project shall be defined as vegetation having a density equal to at least 70 percent of the vegetation density on undisturbed areas at the site. All work associated with seedbed preparation, seeding, mulching, and vegetation establishment shall be subsidiary to the Site Restoration bid item.

EROSION CONTROL BLANKET will be paid for seperately.

TRAFFIC CONTROL AND CONSTRUCTION SEQUENCING NOTES:

Prepare and submit a construction sequence plan prior to beginning construction.

Erect and maintain traffic control as necessary. Provide all other traffic control necessary due to construction activity on or near local or private streets at no additional cost to City of Wichita.

Maintain adequate drainage within the project limits throughout all construction activities. Provide any temporary grading or storm collection/distribution necessary to provide adequate drainage not outlined on the Drawings at no additional cost to City of Wichita.

Locate acceptable fill material sources; determine haul routes to and from the construction site, and establish staging on or near the construction site.

SPECIAL NOTES REGARDING BREACHES THROUGH THE LEVEE:

Breaching of the levees during this Work is not necessary and will not be permitted.

TREE REMOVAL NOTES:

Removal of all woody vegetation and trees within a clear zone is required to provide access for periodic inspection, regular maintenance, and flood fighting (if required), as well as to protect the levee from damage due to tree root intrusion and from trees blowing over and uprooting the levee.

No tree removal is anticipated for this work. Inspect each proposed work area and report all trees within 10 feet of proposed toe drain alignment.

TREE TRIMMING NOTES:

No tree trimming is anticipated for this work. Inspect each proposed work area and report all trees within 10 feet of proposed toe drain alignment.

EROSION CONTROL NOTES:

The contract documents provide for the construction of all improvements without necessity of entering or disturbing any regulated streams or drainage systems. If the contractor determines that entering a regulated stream or drainage system will be necessary, he will be responsible for obtaining all permits and adhering to all regulatory requirements. The contractor shall prevent all construction material and debris from coming in contact with any regulated stream or drainage system.

GRADING NOTES:

Levee construction usually occurs in narrow strip with limited access for equipment to transport, place, spread, and compact the fill. To assure that the levee is stable and resistant to the forces of water, it is critical that the toe drains be properly prepared, good materials be used, and that satisfactory compaction be accomplished. Because the construction usually takes place in a narrow strip, conventional mass grading techniques and testing frequencies are usually not appropriate.

Excavation near the toe of a slope (especially a trench parallel to the toe of the slope) can result in reducing the stability of the slope and result in slope failure.

Only that portion of the Work that can be opened and backfilled safely within a work shift or continuous shifts may be performed. Leaving a trench open overnight or over a weekend is not permitted. Inspect levee slopes during the work for signs of distress (tension cracks, bulges, depressions, etc).

Preparation

Clear the Work area by complete removal of all objectionable matter and/or obstructions above the ground surface. Objectionable matter includes all trees, fallen timber, brush, vegetation, loose stone, abandoned structures, fencing, and similar debris. Clear the entire area of the proposed toe drains for each work segment prior to construction operations. Dispose of objectionable matter and/or obstructions in approved disposal areas.

Within the Work area, grub all stumps, roots, buried logs, old piling, old paving, drains, and other objectionable matter. Remove roots or other intrusions over 1-1/2 inches diameter within the toe drains work segment. Slope the sides of all holes and depressions caused by grubbing operations no steeper than 1.5:1.0 (H:V) before backfilling. Dispose of grubbed material in approved disposal areas.

Strip topsoil from Work areas to a minimum depth of 4 inches or as designated on Drawings. Stockpile stripped material that is suitable to later reuse as topsoil. Material that does not contain wood, clods, and other objectionable material (i.e. roots, rocks, and debris) and contains adequate moisture and is capable of supporting vegetation growth may be suitable for use as topsoil. Dispose of unsuitable stripped material in approved disposal areas.

Before removing any old or abandoned pipes or any other objects that are in the levee, approval should be obtained from USACE indicating the removal and backfilling process.

Engineered Fill

In general, soil excavated in Work areas that is free of organic matter and other objectionable material (i.e. roots, rocks, and debris) and is of suitable moisture content, is suitable for reuse as engineered fill.

Obtain Record Test results or test proposed engineered fill soil as indicated in "Record Tests" prior to beginning fill placement for the Work. Perform record tests of the engineered fill soil at least once for every 5,000 cubic yards (or fraction thereof) of engineered fill used after placement commences. Retest the engineered fill as indicated in "Record Tests" if the consistency, color, texture, or appearance of the engineered fill changes significantly.

Maintain construction slopes and grades to provide positive drainage during all grading operations; if necessary, install sumps and provide pumps to maintain the Work free of standing water.

Frozen material shall not be used nor shall any fill be placed on frozen surfaces.

No foundation or embankment backfill shall be placed in standing or running water. Should a quick condition develop, dewatering by well points or other methods, shich will nullify the excess gradient, shall be used. Sump pumping will not be permitted.

Record Tests

Test each type engineered fill used for the Work to determine the MDD and optimum moisture content (OMC) per ASTM D-698 (standard Proctor) and the soil classification per ASTM D2487 (USC) of the material. Perform all tests necessary to provide the USC classification (e.g., plasticity characteristics per ASTM D4318 (Atterberg Limits), particle size distribution per ASTM D422, specific gravity ASTM D854) for each type of engineered fill soil. Assure that all engineered fill used for the Work meets the Unified Soil Classification (USC) system type SM, SC, CH, CL, or ML. Soil not meeting those USC types must have hydraulic conductivity (ASTM D5084) and triaxial shear (ASTM D4767) tests at 95% of the soils MDD at OMC submitted for approved by Engineer.

Identify each record test with a unique designation that includes a clear description and photographs of the soil in both moist and dry states so the routine density tests can be readily matched to the appropriate record test. Publish copies of all record tests to City of Wichita, Engineer, Testing Service, Contractor, and/or other entities on the distribution list. Maintain at least one up-to-date set of copies at all Work site(s).

Compaction & Moisture Control

Place approved engineered fill in maximum 12 inch thick, loose lifts and compact to at least 90% of its MDD within the levee embankment slopes and crown. Maintain engineered fill moisture content between -3% to +3% of its OMC prior to and during compaction.

GRADING NOTES(cont.):

Routine Density Tests

Perform routine density tests at a frequency of at least one test per each 2000 square feet, per lift, on all engineered fill placed for the Work with a minimum of at least three tests for each complete lift of engineered fill. Match each routine density test to the record test that most closely matches the soil at the test location.

Identify each routine density test with a unique designation and provide written documentation of each test location, elevation, actual lift thickness measurement, matching record test, actual moist density, actual moisture content, actual dry density, percent of MDD and OMC relative to the matched record test, whether the test passes or fails, and, if a retest of a failed test, the original test's unique designation.

The following table indicates the required precision for test locations:

Location station and offset	to the nearest ten feet
Elevation	to the nearest 1/2 foot
Lift thickness	to the nearest 1/10 foot

A test fails if the compaction is less than the specified criteria for MDD or if the moisture is outside of the specified range for OMC (e.g., a test may have acceptable compaction but fail due to being too dry or too wet). If routine density tests indicate inadequate compaction or excessively dry or moist soil, rework the whole lift represented by the failing test. Retest the failed area after is has been reworked and recompacted.

TOE DRAIN PIPE:

The toe drain pipe shall be 6" diameter, perforated, dual wall, High Density Corrugated Polyethylene (HDPE) such as ADS N-12 pipe as manufactured by Advanced Drainage Systems, Inc. (ADS), or pre-approved equal. All pipe shall conform to AASHTO M252 (4"-10") latest editions. All pipe shall be type SP with a full circular cross section, outer annular corrugated pipe wall, a smooth inner wall. Pipe shall be perforated to comply with the perforation requirements specified in AASHTO M252 with a slot length of 0.875" and slot width of 0.125", and minimum inlet area of 1.0 sq. inch/ft. Pipe diameter will be based on the inside open diameter of the pipe. HDPE Pipe will only be allowed from manufacturers listed as a KDOT Prequalified Polyethylene (PE) pipe manufacturer per KDOT PQL-47 of the KDOT 2007 Pipe Policies.

Unless otherwise specified on the plans or herein, thermoplastic pipe shall conform to the following:

A. High Density Polyethylene (HDPE) Corrugated and Smooth Lined Pipe shall be manufactured to comply with requirements for test methods, dimensions, and markings found in AASHTO M 252 and AASHTO M294, latest editions.
B. High Density Polyethylene (HDPE) Corrugated and Smooth Lined Pipe shall be Manufactured from virgin PE compounds which conform with the requirements of cell Class 335500C as defined and described in ASTM D 3350.
C. Minimum pipe stiffness (PS) at five percent deflection shall be as described in AASHTO M294, Section 7.4 when tested in accordance with ASTM D 2412.
D. Pipe shall be manufactured in a plant which has been 3rd party certified by the Plastic Pipe Institute (PPI) to produce pipe meeting or exceeding the manufacturing and materials requirements of AASHTO M294.
E. Pipe shall have ADS SOCK synthetic wrap (as manufactured by Zodiac Fabrics, Inc.) or approved equivalent factory installed. The filter shall meet the requirements of the following table.

PROPERTY	TEST METHOD	
Material	–	Polyester
Fabric	–	Knitted
Permitivity (min.)	ASTM D4491	5.5 sec-1
Puncture Resistance (min.)	ASTM D6241	1000 N
AOS (max.) AOS (min.)	ASTM D4751	0.60 mm 30 U.S. Sieve 0.42 mm 40 U.S. Sieve
FOS (max.)	CAN/CGSB-148.1, M10-94	450 microns
Mass (relaxed)	ASTM D3887	3.0-3.9 oz/yd2
Mass (applied minimum)		2.7-3.5 oz/yd2
Thickness (min.)	ASTM D4491	24.0 mils
Permeability (K)(min.)	ASTM D4491	0.390 cm/sec
Burst Strength (min.)	ASTM D3887	830 kpa
Air Permeability (min.)	ASTM D737	700 ft3/ft2/min
Water Flow Rate (min.)	ASTM D4491 (2" CONSTANT HEAD)	300 gal/min/ft2
Yarn Denier	–	150
Specific Gravity	–	1.3
Melt Temperature	–	450 deg. F

JOINTS & CONNECTIONS: Joints and connections shall be of like material and produced by the pipe manufacturer for use with the pipe specified. Joints shall be installed such that the connection of pipe sections will form a continuous line free from irregularities in the flow line. Pipe Joints shall be soil tight per definition in accordance with AASHTO section 26.4.2.4, and shall use a non-gasketed integral bell.

Fitting joints – Shall be either integral bell/bell or external coupler covering a minimum of two corrugations at each end.

TOE DRAIN RISERS: The toe drain riser pipe shall be of like material and shall meet all the requirements of the toe drain pipe with the following exceptions:

A. The riser pipe shall not have perforations.
B. The riser pipe shall not be wrapped with a filter sock.

INSTALLATION NOTES:

Excavated trenches on average will be 3 feet wide and 10 feet deep. All existing toe drain pipe, toe drain risers, damaged riser caps, and filter media shall be excavated and properly disposed of. All salvageable riser caps shall be given to the City. Top soil that is excavated during trenching should be stockpiled for later use. Appropriate erosion control measures shall be implemented to prevent sediment movement from any stockpile area established.

HDPE pipe shall be installed in accordance with local regulations or per ASTM D2321 and manufacturer's recommendations. The pipe shall be bedded in the toe drain filter media (C33 Sand). Approximately 12 inches of bedding shall be placed beneath the pipe to establish correct line and grade. The trench width shall be a minimum of 3 feet, or of sufficient width to permit proper compaction. The filter media shall be installed and hand compacted to greater than 85% standard proctor density until the toe drain pipe is covered by a minimum of 1.5 feet of filter media. The remaining trench opening shall be filled with coarse sand or sand/gravel mix free of fine silts and clays (less than 1% passing the #200 sieve). Flooding and jetting shall not be used for compaction without the design engineer's approval. The top foot of the trench shall be filled with stockpiled top soil and compacted to a minimum of 90% of the standard proctor density.

Mandrel deflection testing shall be used to ensure the pipe has not deflected more than 7.5% and shall be completed within 30 days of the pipe installation. Pipe deflections greater than 7.5% will not be allowed and will result in the contractor replacing any sections of pipe that do not meet this standard at the contractor's expense.

FILTER GRADATION:

The toe drain filter shall be a C33 aggregate gradation.

ASTM C33 SAND GRADATION REQUIREMENTS	
SIEVE SIZE	PERCENT PASSING
3/8"	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	less than 1.0

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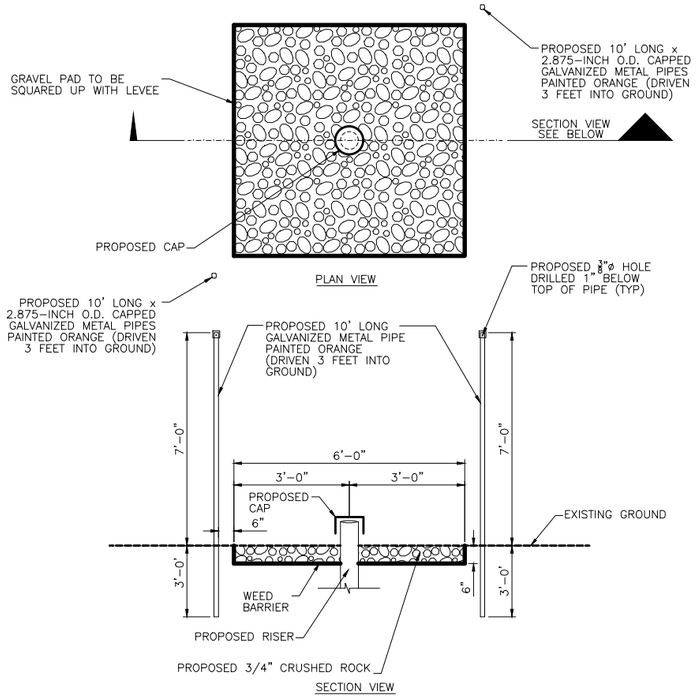


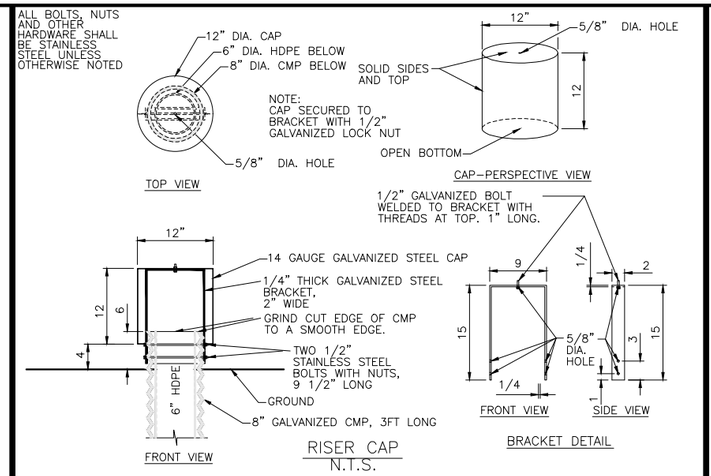
NOTES:

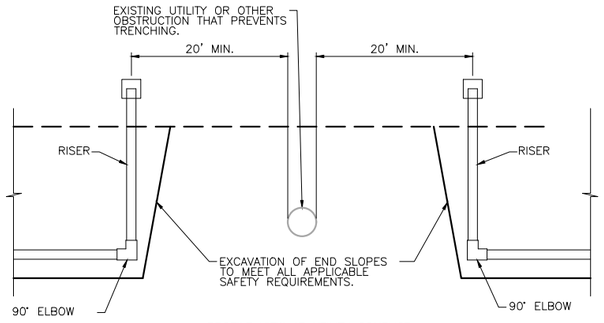
1) GALVANIZED METAL PIPES SHALL BE 2.875" O.D., 0.203–INCH THICK AND 5.97 lbs./lin. ft. WITH A 0.375" (3/8") DIAMETER HOLE DRILLED (1") DOWN FROM THE TOP OF THE GALVANIZED METAL PIPE.

2) PIPES SHALL BE PAINTED IN ACCORDANCE WITH ASTM D 6386. REFER TO THE AMERICAN GALVANIZERS ASSOCIATION'S "GUIDE TO PREPARING HOT–DIP GALVANIZED STEEL FOR PAINT" (http://www.galvanizeit.org/images/uploads/publicationPDFs/Paint_Guide_Galvanized_Steel.pdf

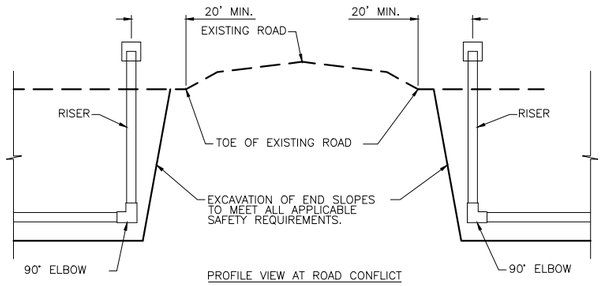
DETAIL "A" – TOE DRAIN MARKERS AND SURFACE TREATMENT
N.T.S.

ALL BOLTS, NUTS AND OTHER HARDWARE SHALL BE STAINLESS STEEL UNLESS OTHERWISE NOTED





PROFILE VIEW AT UTILITY CONFLICT

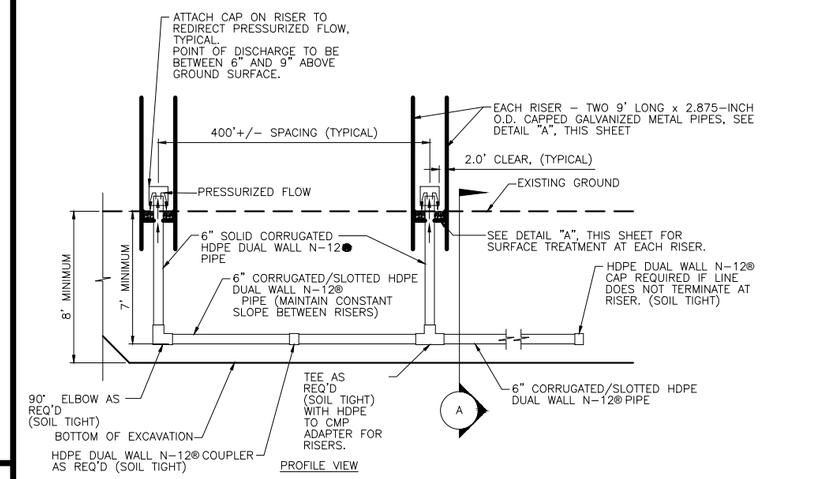


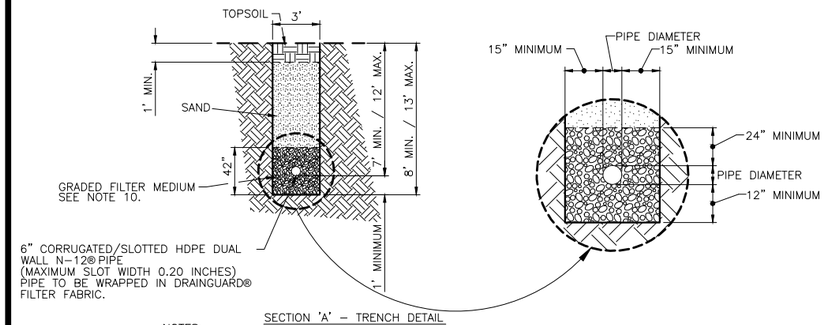
PROFILE VIEW AT ROAD CONFLICT

NOTES:

1. UTILITY LOCATING IS THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL RISERS (NOT SHOWN ON PLAN & PROFILE SHEETS) WILL BE REQUIRED WHEN UTILITIES OR OTHER OBSTRUCTIONS ARE ENCOUNTERED.

LEVEE TOE DRAIN – TERMINATION AT ROADS AND UTILITY CONFLICTS
N.T.S.

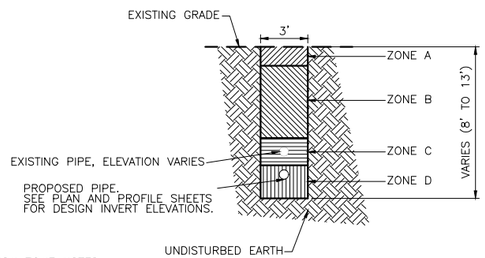




SECTION 'A' – TRENCH DETAIL

NOTES:

1) ALL EXISTING TOE–DRAIN PIPE TO BE REMOVED AND DISPOSED OF.
2) ALL EXISTING FILTER MEDIA TO BE REMOVED AND DISPOSED OF.
3) ALL EXISTING RISER CAPS SHALL BE SALVAGED TO WICHITA FLOOD CONTROL.
4) HORIZONTAL TRENCH DRAINS SHALL BE A MINIMUM OF 7 FEET DEEP TO PIPE INVERT.
5) MAINTAIN CONSTANT SLOPE OF HORIZONTAL PIPE RUNS BETWEEN VERTICAL RISERS. TRENCH DEPTHS GREATER THAN 7 FEET MAY BE NECESSARY.
6) EXCAVATION SLOPES FOR TOE DRAIN INSTALLATION SHALL MEET ALL APPLICABLE SAFETY REQUIREMENTS.
7) ALL CONNECTORS SHALL BE SOIL TIGHT.
8) ALL TOE DRAIN PIPE SHALL BE PERFORATED HDPE DUAL WALL N–12® PIPE OR EQUIVALENT WITH 0.20 INCH MAXIMUM SLOT WIDTH AND A MINIMUM PIPE STIFFNESS OF 46 PSI.
9) CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR CAP ON RISER PIPE DISCHARGE.
10) FILTER MEDIA SHALL CONSIST OF HARD DURABLE STONE MEETING ASTM C33 SPECIFICATION FOR CONCRETE AGGREGATE. REFER TO GENERAL NOTES SHEET FOR GRADATION REQUIREMENTS.



EXCAVATION ZONE NOTES:

ZONE A – EXCAVATE AND STOCKPILE 1' DEPTH OF TOPSOIL MATERIAL.
ZONE B – EXCAVATE AND STOCKPILE MATERIAL THAT IS SUITABLE FOR BACKFILL AFTER NEW TRENCH DRAIN INSTALLATION. DISPOSE OF ANY OBJECTIONABLE MATERIAL ENCOUNTERED. LOWER LIMIT OF ZONE B IS EQUAL TO THE UPPER LIMIT OF EXISTING FILTER MEDIA.
ZONE C – EXCAVATE AND DISPOSE OF EXISTING TRENCH DRAIN PIPE AND FILTER MEDIA.
ZONE D – IF NECESSARY, CONTINUE EXCAVATION UNTIL AN ELEVATION OF 1–FOOT BELOW THE PROPOSED PIPE INVERT IS REACHED. ALL NOTES FOR ZONE B ABOVE ALSO APPLY TO ZONE D.

(ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NOTES ON SHEET G–0.02)

EXCAVATION ZONES – SECTION VIEW

LEVEE TOE DRAIN DETAIL
N.T.S.

MARK	DESCRIPTION	DATE	APPR

amec
AMEC Earth & Environmental, Inc.
1129 SW Wanamaker
Topeka, Kansas 66604
Phone: (785) 272-6830
Fax: (785) 272-6878

CITY OF WICHITA

UPPER LEVEE "C" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

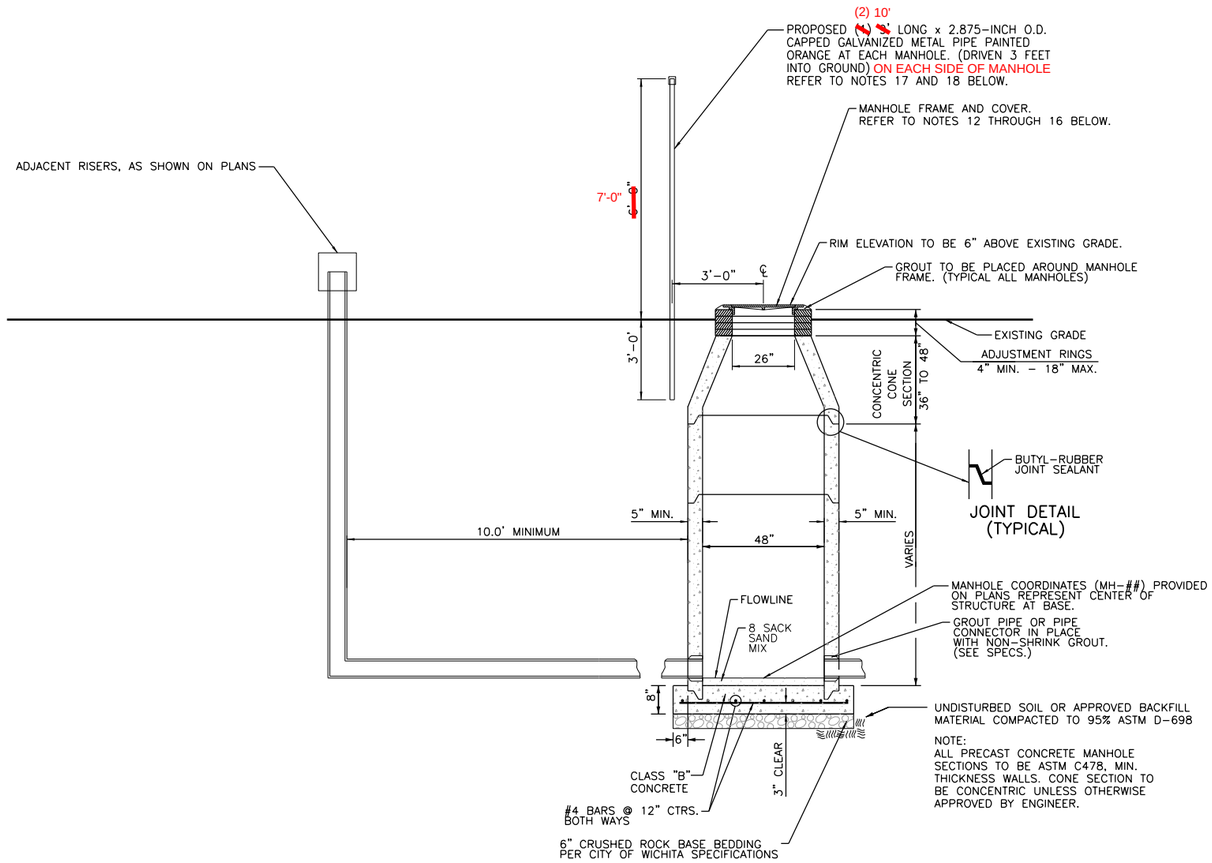
..\sample seal\Seal.jpg

DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: $FILES$		
AMEC PROJ. NO. 5-6150-0001		

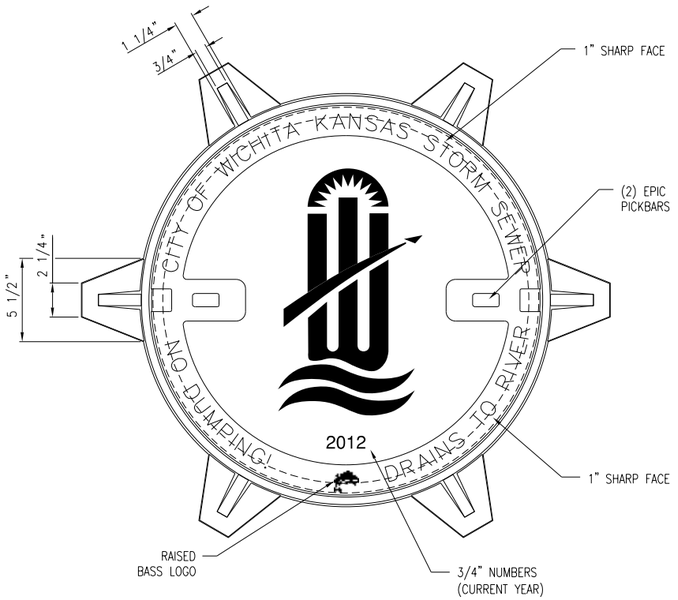
TOE DRAIN DETAILS

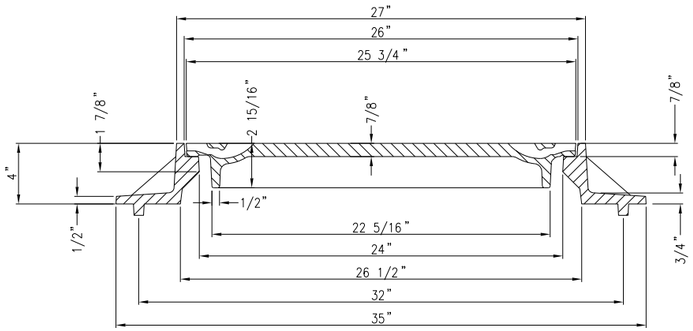
G-0.03
SHEET 4 OF 24

NOTE:
RIM ELEVATIONS PROVIDED ARE APPROXIMATE AND MAY REQUIRE FIELD ADJUSTMENT.



MANHOLE DATA		
I.D.	FLOW LINE ELEV. (FT.)	RIM ELEV. (FT.)
MH-1	1346.00	1355.5
MH-2	1346.00	1356.1
MH-3	1346.00	1355.7
MH-4	1346.00	1355.7
MH-5	1346.00	1355.0
MH-6	1346.00	1354.9
MH-7	1346.00	1355.6
MH-8	1343.00	1353.2
MH-9	1343.00	1353.3
MH-10	1343.00	1354.0
MH-11	1349.00	1358.5
MH-12	1349.00	1356.2
MH-13	1345.00	1356.2
MH-14	1345.00	1354.1
MH-15	1344.00	1353.3
MH-16	1344.00	1353.3
MH-17	1344.00	1352.4
MH-18	1344.00	1351.6
MH-19	1343.00	1351.5
MH-20	1343.00	1351.3
MH-21	1343.00	1352.3
MH-22	1340.00	1352.6
MH-23	1340.00	1351.2
MH-24	1340.00	1349.3
MH-25	1340.00	1350.6
MH-26	1341.00	1351.6
MH-27	1341.00	1350.1
MH-28	1341.00	1350.7
MH-29	1337.00	1347.6
MH-30	1337.00	1346.1
MH-31	1334.00	1344.3
MH-32	1334.00	1341.9
MH-33	1334.00	1341.3
MH-34	1333.00	1342.1
MH-35	1333.00	1341.4
MH-36	1330.00	1340.0
MH-37	1330.00	1339.3
MH-38	1330.00	1338.7
MH-39	1330.00	1339.4
MH-40	1330.00	1339.2
MH-41	1327.00	1335.8
MH-42	1327.00	1336.7
MH-43	1324.00	1337.0
MH-44	1324.00	1333.6
MH-45	1324.00	1332.7
MH-46	1324.00	1332.2
MH-47	1319.00	1329.5
MH-48	1319.00	1327.4
MH-49	1319.00	1327.4
MH-50	1319.00	1327.1
MH-51	1317.00	1325.4
MH-52	1317.00	1325.2
MH-53	1317.00	1324.7
MH-54	1317.00	1324.9





MANHOLE FRAME
DEETER #1261 OR EJIW #1936-Z4

NOTE:
1. FURNISHED WITH MACHINED HORIZONTAL BEARING SURFACE.
2. NOT TO BE USED UNDER PAVEMENT.
3. COVER TO BE DEETER #1261 OR EJIW #1936A1

MANHOLE FRAME/COVER
N.T.S.

GENERAL NOTES

1. IF, IN THE OPINION OF THE ENGINEER, THE MANHOLE SUBGRADE APPEARS UNSTABLE, THE CONTRACTOR WILL HAVE THE OPTION TO COMPACT SUBGRADE AS SHOWN OR INCREASE THE THICKNESS OF THE MANHOLE BASE AS DIRECTED BY THE ENGINEER.
2. STEEL REINFORCING WILL BE REQUIRED IN ALL MANHOLE BASES.
3. ALL MANHOLE CONSTRUCTION SHALL BE WATER TIGHT.
4. TOP OF MANHOLE FLOOR SLAB SHALL BE AT LEAST 3 INCHES BELOW THE FLOW LINE OF THE OUTLET PIPE TO INSURE SUFFICIENT MINIMUM THICKNESS OF SHAPED INVERT.
5. ALL PRECAST CONCRETE MANHOLE SECTIONS SHALL CONFORM TO THE LATEST REVISION OF ASTM C-478 AS MODIFIED BY THE SPECIFICATIONS.
6. CONCRETE USED FOR MANHOLE CONSTRUCTION SHALL CONFORM TO CITY OF WICHITA SPECIFICATIONS FOR CONCRETE PAVEMENT MIX.
7. PRECAST MANHOLES SHALL BE SET AT LEAST 4 INCHES INTO MANHOLE BASE.
8. MANHOLES WITH PRECAST BASES MAY BE USED AT THE CONTRACTORS OPTION. THESE MANHOLES SHALL HAVE AN 8 INCH MINIMUM BASE THICKNESS AND SHALL BE PLACED ON AN 8 INCH MIN. CRUSHED ROCK BASE. PIPES SHALL BE ENCASED WITH CRUSHED ROCK TO AT LEAST 3 FEET FROM THE MANHOLE WALL.
9. CONTRACTOR SHALL REMOVE LIFTING HOOKS AFTER INSTALLATION. RECESSES IN MANHOLE WALL SHALL BE GROUTED FLUSH TO THE MANHOLE WALL WITH HYDRAULIC CEMENT AFTER THE MANHOLE IS IN PLACE. LIFTING HOLES THRU THE MANHOLE WALL WILL NOT BE ACCEPTED.
10. THE ENDS OF ALL PIPES IN MANHOLES SHALL BE CUT OFF FLUSH WITH THE INSIDE FACE OF THE MANHOLE WALL.
11. MANHOLE INVERT SHALL BE SHAPED WITH 8 SACK SAND MIX CONCRETE TO CREATE FLOW CHANNELS AND TO INCREASE HYDRAULIC EFFICIENCY SUCH THAT THE MANHOLE WILL BE SELF CLEANING BETWEEN ALL INLET AND/OR OUTLET PIPES.
12. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF PRECAST MANHOLE, FRAME AND COVER FOR APPROVAL.
13. MANHOLE CASTINGS SHALL BE MANUFACTURED USING GOOD QUALITY GRAY IRON CONFORMING TO CLASS 30 OF A.S.T.M. DESIGNATION A-48. THE FINISHED CASTINGS SHALL BE OF UNIFORM QUALITY, FREE FROM BLOWHOLES, POROSITY, HARDSPOTS, SHRINKAGE DISTORTIONS OR OTHER DEFECTS.
14. THE OUTSIDE CIRCUMFERENCE OF THE VERTICAL FACE OF THE COVER AND THE INSIDE CIRCUMFERENCE OF THE VERTICAL FACE IN THE FRAME RECESS SHALL BE MANUFACTURED TO TOLERANCES SUCH THAT THE CLEARANCE BETWEEN THE COVER AND FRAME WILL NOT EXCEED 1/8" AT ANY POINT AROUND THE CIRCUMFERENCE OF THE COVER. THE SEATING SURFACES BETWEEN THE COVER AND FRAME SHALL BE MACHINED SUCH THAT THESE SEATING SURFACES SHALL MAKE FULL CONTACT FOR THEIR FULL CIRCUMFERENCE TO PRECLUDE THE COVER FROM ROCKING IN THE FRAME.
15. THE SOLID MANHOLE COVER AND FRAME SHALL BE A DEETER #1261, EJIW #1936A1, OR APPROVED EQUAL.
16. THE MANHOLE FRAME SHALL BE A DEETER #1261, EJIW #1936-Z4, OR APPROVED EQUAL.
17. GALVANIZED METAL PIPES SHALL BE 2.875" O.D., 0.203-INCH THICK AND 5.97 lbs./lin. ft.
18. PIPES SHALL BE PAINTED IN ACCORDANCE WITH ASTM D 6386. REFER TO THE AMERICAN GALVANIZERS ASSOCIATION'S "GUIDE TO PREPARING HOT-DIP GALVANIZED STEEL FOR PAINT" (http://www.galvanizeit.org/images/uploads/publicationPDFs/Paint_Guide_Galvanized_Steel.pdf)

CONCENTRIC MANHOLE DETAIL (MH-##)
N.T.S.

MARK	DESCRIPTION	DATE	APPR.

amec
AMEC Earth & Environmental, Inc.
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Topeka, Kansas 66604
Phone: (785) 272-2600
Fax: (785) 272-2678

CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 05_TOE DRAIN DETAILS.dgn		
AMEC PROJ. NO. 5-6150-0001		

TOE DRAIN DETAILS

G-0.04
SHEET 5 OF 21

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

AMEC Earth & Environmental, Inc.
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CITY OF WICHITA

LAWRENCE J. SAMPLE LICENSED 15855 8/13/12 KANSAS PROFESSIONAL ENGINEER

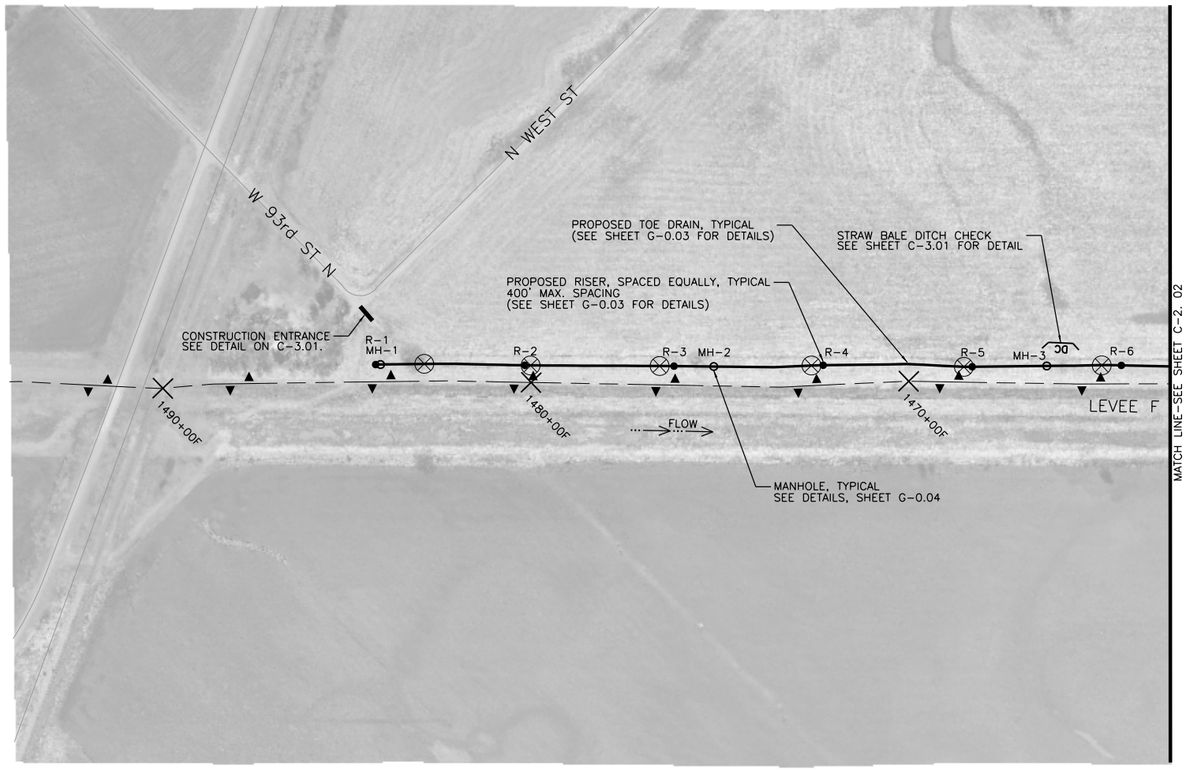
MARK	DESCRIPTION	DATE	APPR.

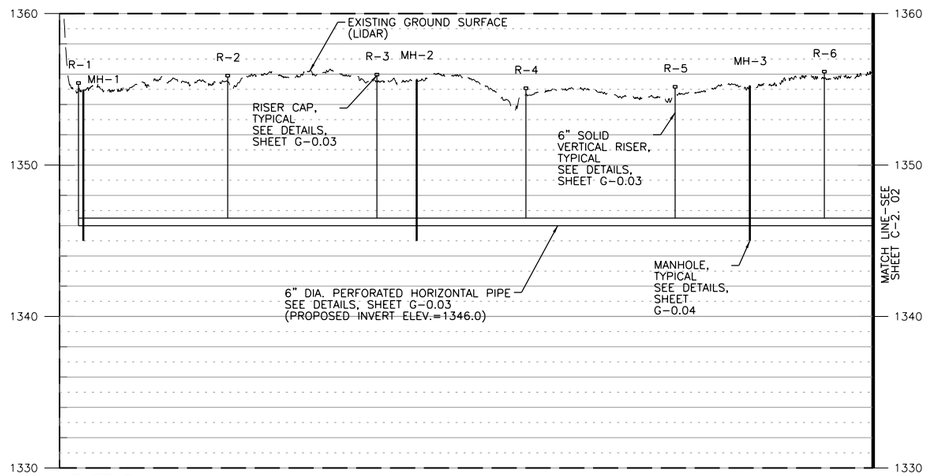
DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 06_KEY PLAN.dgn		
AMEC PROJ. NO. 5-6150-0001		

PARTIAL KEY PLAN

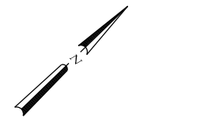
C-1.01

REFER TO SHEET G-0.01 FOR STANDARD DRAWING LEGEND





PROFILE SCALE (40:1 EXAGGERATION):
HORIZONTAL: 1"=200'
VERTICAL: 1"=5'



RISER/MANHOLE COORDINATES		
POINT NAME	NORTHING	EASTING
MH-1	1746662	1632558
MH-2	1746032	1631943
MH-3	1745399	1631333
R-1	1746671	1632567
R-2	1746389	1632292
R-3	1746107	1632017
R-4	1745822	1631745
R-5	1745542	1631468
R-6	1745256	1631197

RISER/MANHOLE COORDINATES AND TOE-DRAIN PIPE INVERT ELEVATIONS ARE BASED LIDAR TOPOGRAPHIC DATA AND MAY REQUIRE MINOR HORIZONTAL AND VERTICAL ADJUSTMENTS TO BE MADE IN THE FIELD. ANY FIELD CHANGES TO THE TOE-DRAIN ALIGNMENT OR PIPE INVERTS SHALL BE APPROVED BY THE CITY OF WICHITA'S STORMWATER ENGINEER.

MARK	DESCRIPTION	DATE	APPR.

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CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL
FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 07_C-2.01.dgn		

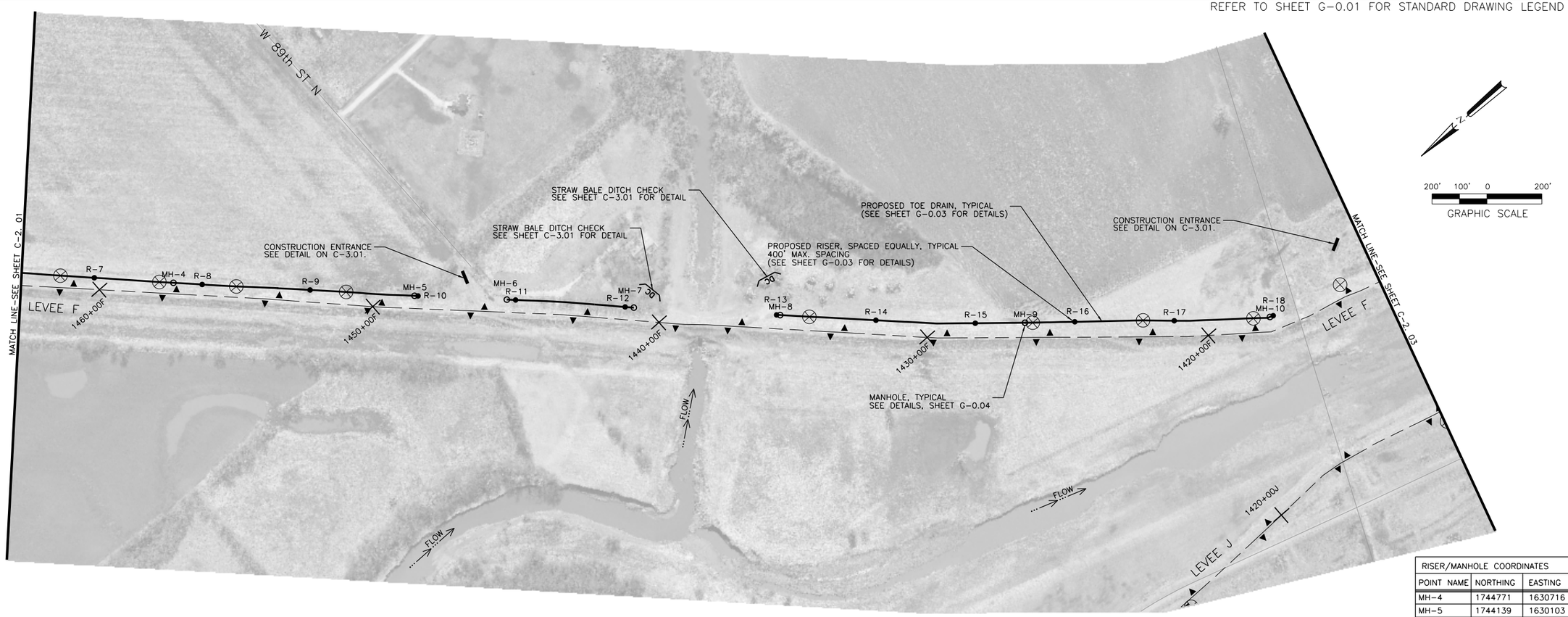
AMEC PROJ. NO. 5-6150-0001

LEVEE TOE DRAIN PLAN AND PROFILE

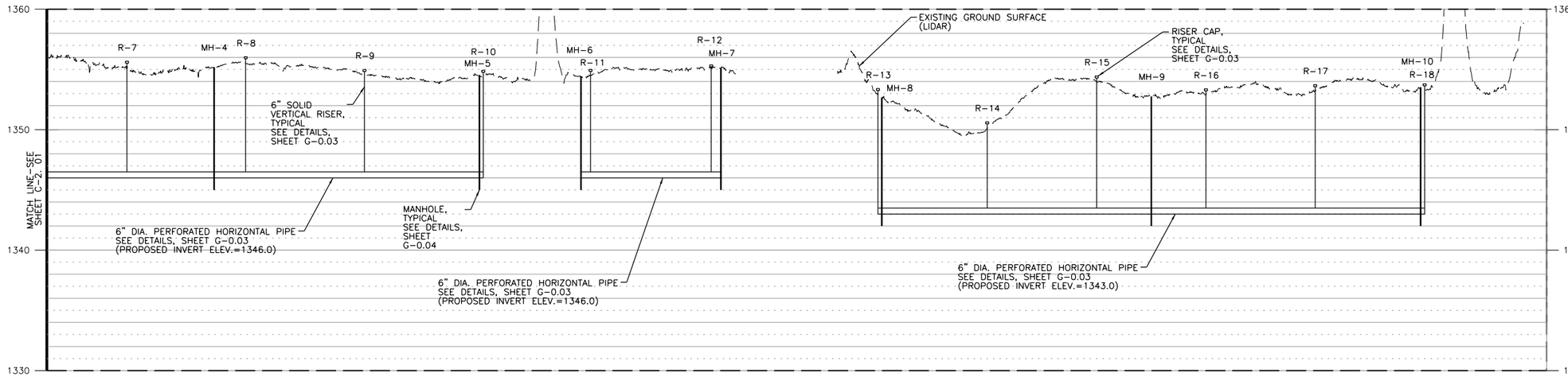
C-2.01

SHEET 7 OF 21

REFER TO SHEET G-0.01 FOR STANDARD DRAWING LEGEND



RISER/MANHOLE COORDINATES		
POINT NAME	NORTHING	EASTING
MH-4	1744771	1630716
MH-5	1744139	1630103
MH-6	1743894	1629872
MH-7	1743564	1629546
MH-8	1743179	1629176
MH-9	1742524	1628569
MH-10	1741836	1627999
R-7	1744977	1630919
R-8	1744696	1630642
R-9	1744412	1630369
R-10	1744130	1630094
R-11	1743871	1629850
R-12	1743586	1629569
R-13	1743189	1629185
R-14	1742928	1628933
R-15	1742662	1628687
R-16	1742385	1628453
R-17	1742109	1628218
R-18	1741824	1627995



RISER/MANHOLE COORDINATES AND TOE-DRAIN PIPE INVERT ELEVATIONS ARE BASED LIDAR TOPOGRAPHIC DATA AND MAY REQUIRE MINOR HORIZONTAL AND VERTICAL ADJUSTMENTS TO BE MADE IN THE FIELD. ANY FIELD CHANGES TO THE TOE-DRAIN ALIGNMENT OR PIPE INVERTS SHALL BE APPROVED BY THE CITY OF WICHITA'S STORMWATER ENGINEER.

PROFILE SCALE (40:1 EXAGGERATION):
HORIZONTAL: 1"=200'
VERTICAL: 1"=5'

MARK	DESCRIPTION	DATE	APPR.

amec
AMEC Earth & Environmental, Inc.
1129 SW Wanamaker
Topeka, Kansas 66604
Phone: (785) 272-2600
Fax: (785) 272-2678

CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

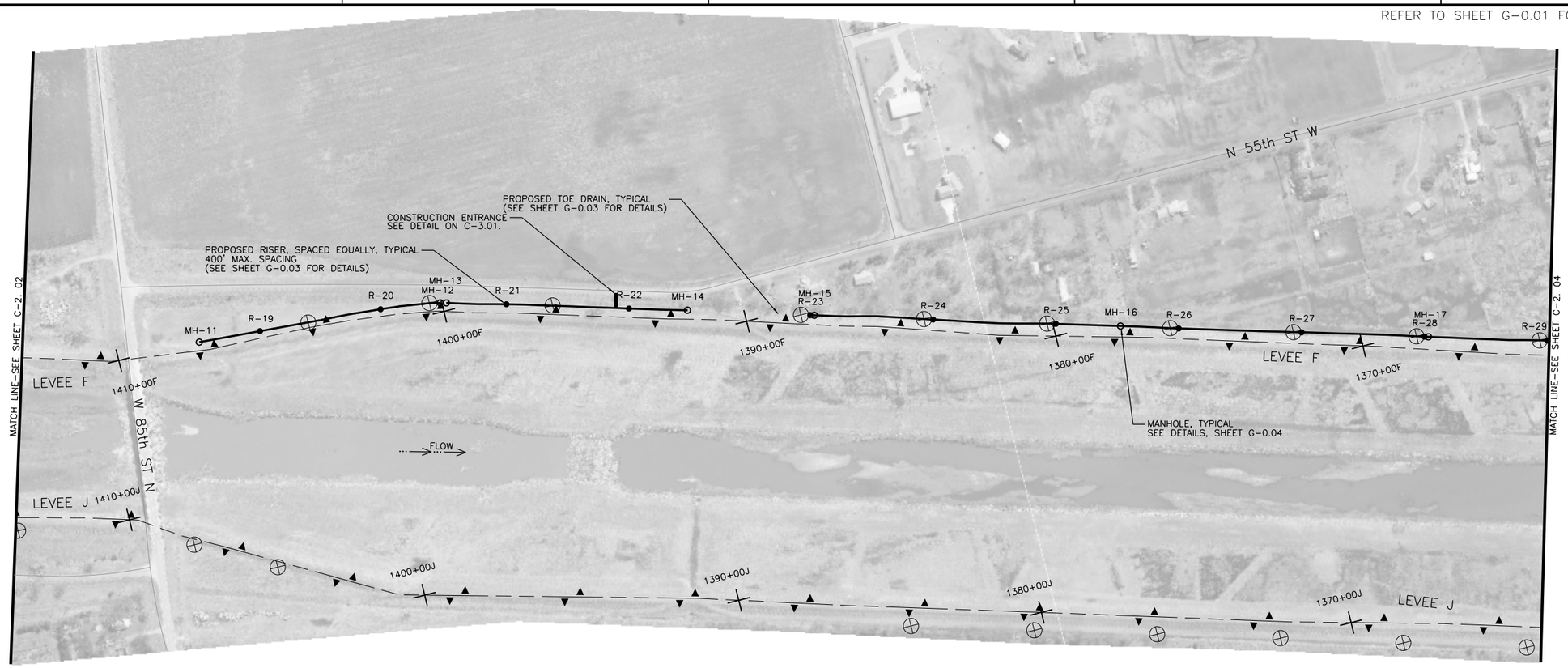
DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 08_G-2.02.dgn		
AMEC PROJ. NO. 5-6150-0001		

LEVEE TOE DRAIN PLAN AND PROFILE

C-2.02

SHEET 8 OF 21

REFER TO SHEET G-0.01 FOR STANDARD DRAWING LEGEND

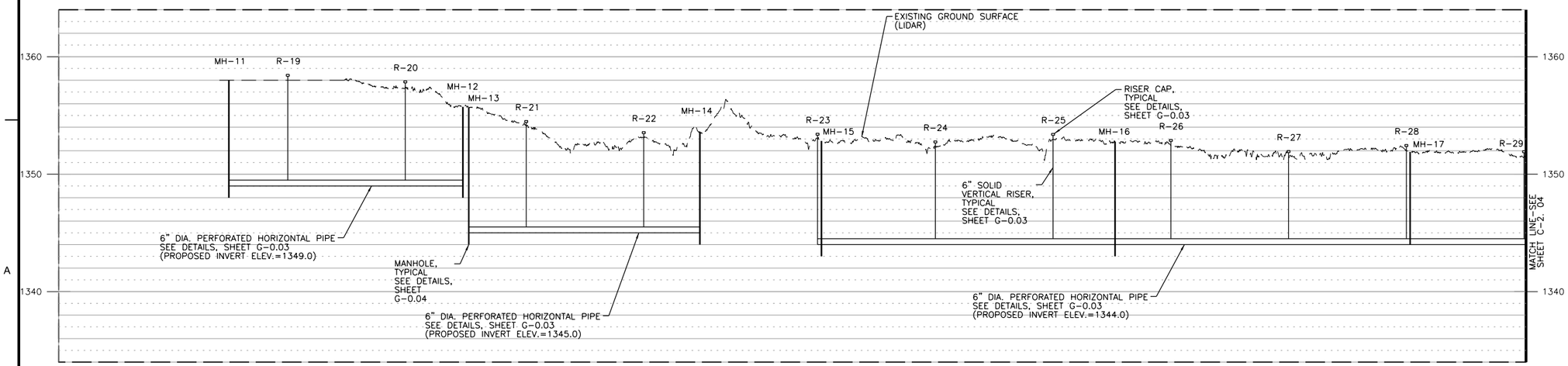


200' 100' 0 200'

GRAPHIC SCALE

RISER/MANHOLE COORDINATES		
POINT NAME	NORTHING	EASTING
MH-11	1740876	1627743
MH-12	1740083	1627677
MH-13	1740063	1627672
MH-14	1739306	1627458
MH-15	1738908	1627342
MH-16	1737947	1627066
MH-17	1736981	1626789
R-19	1740676	1627729
R-20	1740277	1627703
R-21	1739874	1627620
R-22	1739490	1627510
R-23	1738921	1627346
R-24	1738535	1627235
R-25	1738150	1627124
R-26	1737765	1627013
R-27	1737379	1626903
R-28	1736993	1626793
R-29	1736607	1626684

RISER/MANHOLE COORDINATES AND TOE-DRAIN PIPE INVERT ELEVATIONS ARE BASED LIDAR TOPOGRAPHIC DATA AND MAY REQUIRE MINOR HORIZONTAL AND VERTICAL ADJUSTMENTS TO BE MADE IN THE FIELD. ANY FIELD CHANGES TO THE TOE-DRAIN ALIGNMENT OR PIPE INVERTS SHALL BE APPROVED BY THE CITY OF WICHITA'S STORMWATER ENGINEER.



PROFILE SCALE (40:1 EXAGGERATION):
HORIZONTAL: 1"=200'
VERTICAL: 1"=5'

MARK	DESCRIPTION	DATE	APPR.

amec
AMEC Earth & Environmental, Inc.
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Topeka, Kansas 66604
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CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL
FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

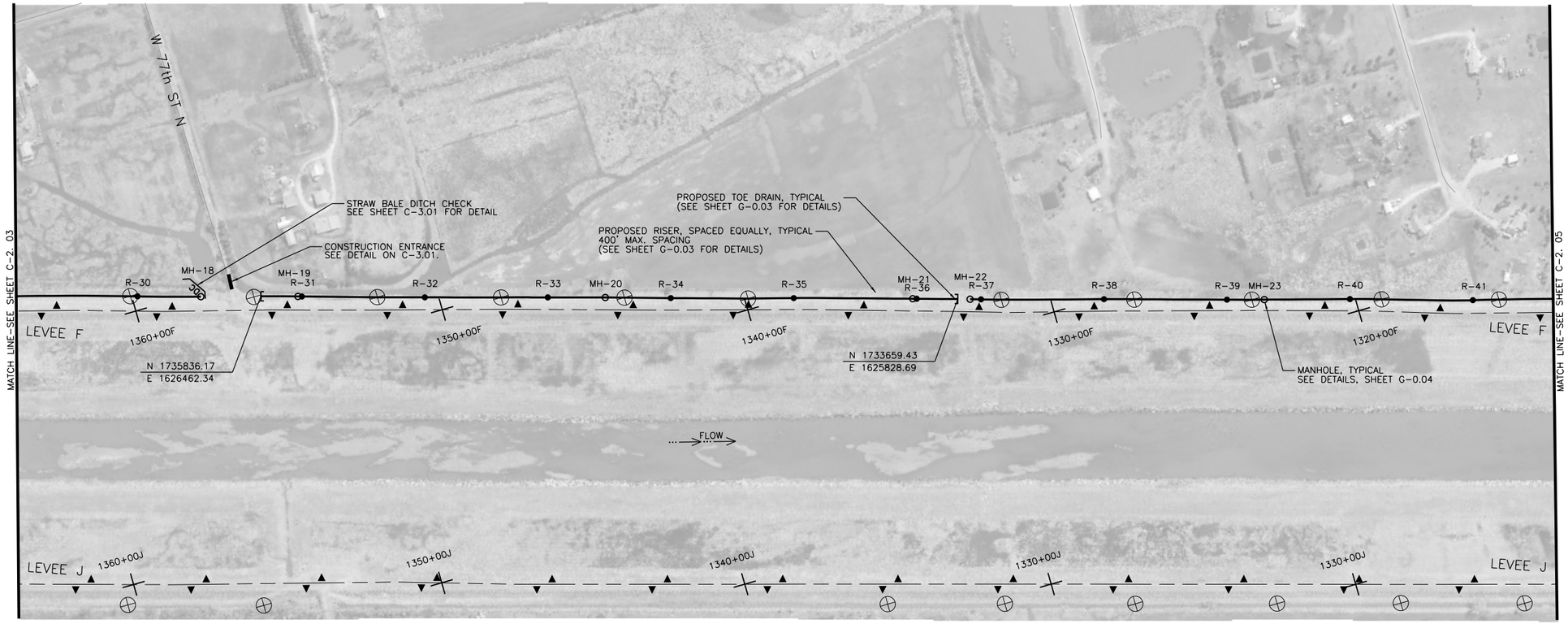
DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 09_C-2.03.dgn		
AMEC PROJ. NO. 5-6150-0001		

LEVEE TOE DRAIN PLAN AND PROFILE

C-2.03

SHEET 9 OF 21

REFER TO SHEET G-0.01 FOR STANDARD DRAWING LEGEND

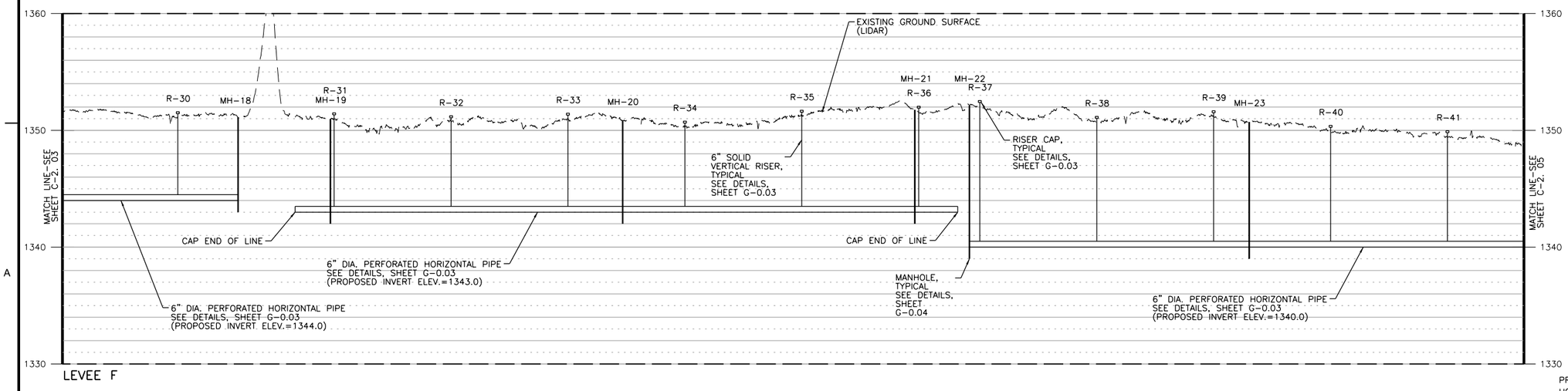


200' 100' 0 200'

GRAPHIC SCALE

RISER/MANHOLE COORDINATES		
POINT NAME	NORTHING	EASTING
MH-18	1736024	1626515
MH-19	1735720	1626428
MH-20	1734760	1626150
MH-21	1733800	1625870
MH-22	1733621	1625817
MH-23	1732702	1625552
R-30	1736222	1626573
R-31	1735708	1626425
R-32	1735324	1626312
R-33	1734940	1626201
R-34	1734556	1626089
R-35	1734171	1625979
R-36	1733788	1625866
R-37	1733587	1625807
R-38	1733202	1625697
R-39	1732818	1625585
R-40	1732433	1625477
R-41	1732050	1625363

RISER/MANHOLE COORDINATES AND TOE-DRAIN PIPE INVERT ELEVATIONS ARE BASED LIDAR TOPOGRAPHIC DATA AND MAY REQUIRE MINOR HORIZONTAL AND VERTICAL ADJUSTMENTS TO BE MADE IN THE FIELD. ANY FIELD CHANGES TO THE TOE-DRAIN ALIGNMENT OR PIPE INVERTS SHALL BE APPROVED BY THE CITY OF WICHITA'S STORMWATER ENGINEER.



PROFILE SCALE (40:1 EXAGGERATION):
HORIZONTAL: 1"=200'
VERTICAL: 1"=5'

MARK	DESCRIPTION	DATE	APPR.

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Fax: (785) 272-4678

CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 10_Cx2.04.dgn		

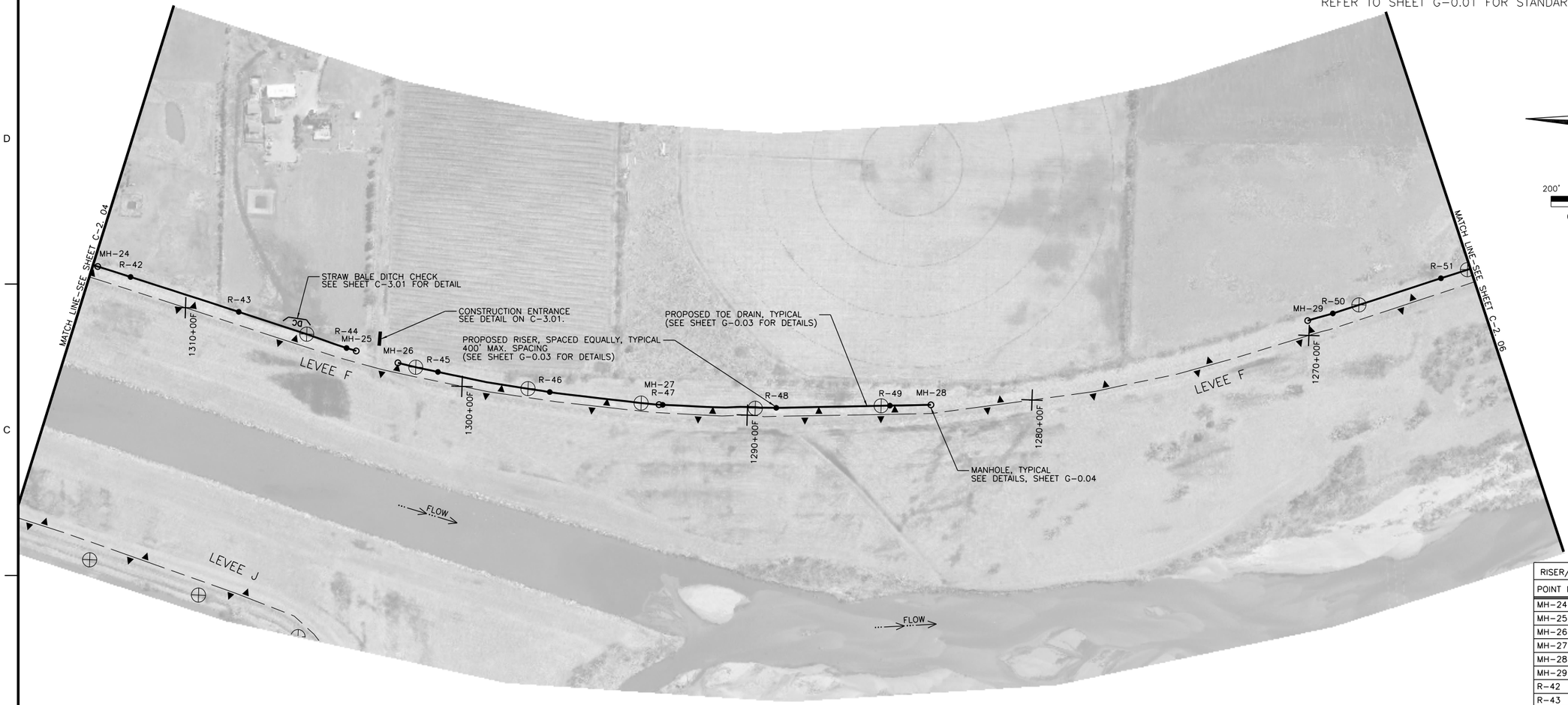
AMEC PROJ. NO. 5-6150-0001

LEVEE TOE DRAIN PLAN AND PROFILE

C-2.04

SHEET 10 OF 21

REFER TO SHEET G-0.01 FOR STANDARD DRAWING LEGEND

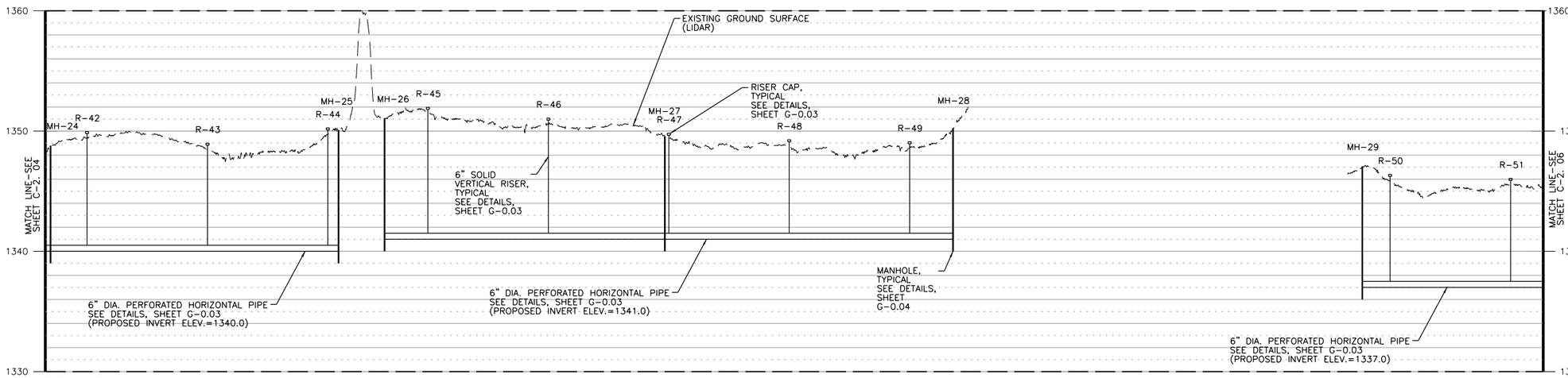


200' 100' 0 200'

GRAPHIC SCALE

RISER/MANHOLE COORDINATES		
POINT NAME	NORTHING	EASTING
MH-24	1731781	1625291
MH-25	1730861	1625026
MH-26	1730713	1624989
MH-27	1729790	1624874
MH-28	1728834	1624907
MH-29	1727519	1625249
R-42	1731664	1625258
R-43	1731279	1625149
R-44	1730896	1625035
R-45	1730571	1624962
R-46	1730176	1624905
R-47	1729777	1624874
R-48	1729377	1624877
R-49	1728978	1624899
R-50	1727431	1625278
R-51	1727055	1625415

RISER/MANHOLE COORDINATES AND TOE-DRAIN PIPE INVERT ELEVATIONS ARE BASED LIDAR TOPOGRAPHIC DATA AND MAY REQUIRE MINOR HORIZONTAL AND VERTICAL ADJUSTMENTS TO BE MADE IN THE FIELD. ANY FIELD CHANGES TO THE TOE-DRAIN ALIGNMENT OR PIPE INVERTS SHALL BE APPROVED BY THE CITY OF WICHITA'S STORMWATER ENGINEER.



LEVEE F

PROFILE SCALE (40:1 EXAGGERATION):
HORIZONTAL: 1"=200'
VERTICAL: 1"=5'

MARK	DESCRIPTION	DATE	APPR.

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15855
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PROFESSIONAL ENGINEER

DESIGNED BY:		DATE:
Larry Sample, PE		08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE

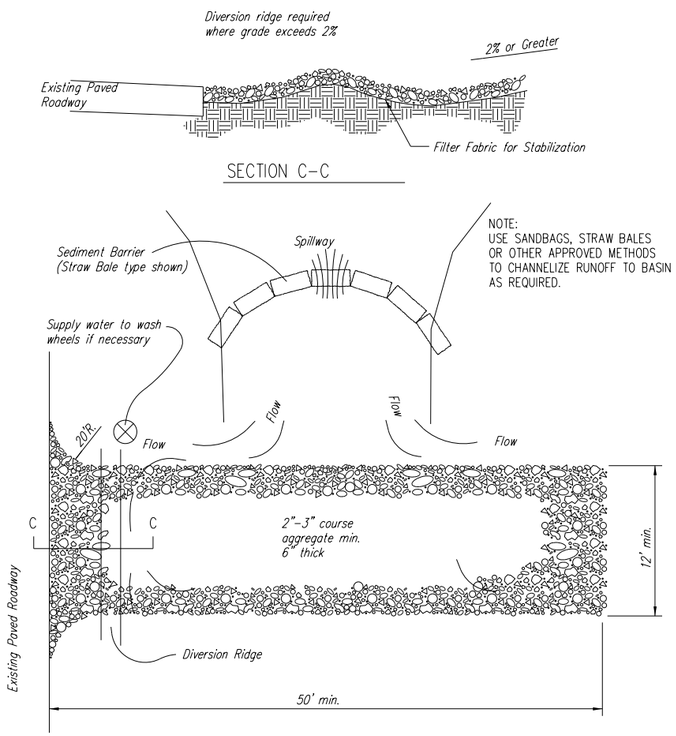
FILE NAME: 11_C-2.05.dgn

AMEC PROJ. NO. 5-6150-0001

LEVEE TOE DRAIN PLAN AND PROFILE

C-2.05

SHEET 11 OF 21



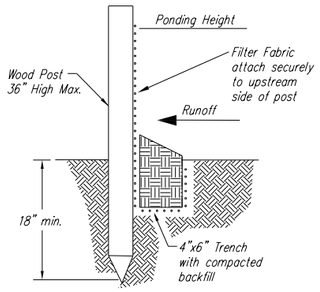
SECTION C-C

STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN, AS SHOWN ABOVE.
4. DRIVE ENTRANCES ONTO RESIDENTIAL LOTS WILL NOT BE REQUIRED TO HAVE THE SEDIMENT BARRIER SHOWN, BUT WHEEL WASHING MAY BE REQUIRED IF STABILIZED ENTRANCE IS NOT SUFFICIENT TO KEEP MUD FROM BEING TRACKED ONTO ADJACENT STREET. ENTRANCE SHALL EXTEND FROM BACK OF CURB TO DWELLING.

STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE
1



SILT FENCE BARRIERS

Material Specification:
Silt fence fabric should conform to the AASHTO M288 96 silt fence specification.
The posts used to support the silt fence fabric should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.
Silt fence fabric should be attached to the wooden posts with staples, wire, zip ties, or nails.

Placement:
A slope barrier should be used at the toe of a slope when a ditch does not exist. The slope barrier should be placed on nearly level ground 5' to 10' away from the toe of a slope. The barrier is placed away from the toe of the slope to provide adequate storage for settling out sediment.
When practicable, silt fence slope barriers should be placed along contours to avoid a concentration of flow.
Silt fence slope barriers can also be placed along right-of-way fence lines to keep sediment from crossing onto adjacent property. When placed in this manner, the slope barrier will not likely follow contours.

Proper installation method:
Excavate a trench the length of the planned slope barrier that is 6" deep by 4" wide. Make sure that the trench is excavated along a single contour. When practicable, slope barriers should be placed along contours to avoid a concentration of flow. Place the soil on the upslope side of the trench for later use.
Roll out a continuous length of silt fence fabric on the downslope side of the trench. Place the edge of the fabric in the trench starting at the top upslope edge. Line all three sides of the trench with the fabric. Backfill over the fabric in the trench with the excavated soil and compact. After filling the trench, approximately 24" to 36" of silt-fence fabric should remain exposed.
Lay the exposed silt fence upslope of the trench to clear an area for driving in the posts. Just downslope of the trench, drive posts into the ground to a depth of at least 18". Place posts no more than 4' apart.
Attach the silt fence to the anchored post with staples, wire, zip ties, or nails.

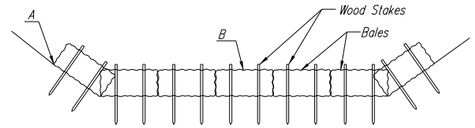
List of common placement/installation mistakes to avoid:
When practicable, do not place silt fence slope barriers across contours. Slope barriers should be placed along contours to avoid a concentration of flow. When the flow concentrates, it overtops the barrier and the silt fence slope barrier quickly deteriorates.
Do not place silt-fence posts on the upslope side of the silt fence fabric. In this configuration, the force of the water is not restricted by the posts, but only by the staples (wire, zip ties, nails, etc.). The silt fence will rip and fail.
Do not place silt fence slope barriers in areas with shallow soils underlain by rock. If the barrier is not sufficiently anchored, it will wash out.
Silt fence slope barriers must be dug into the ground-silt fence at ground level does not work because water will flow underneath.

Inspection and Maintenance:
Silt fence slope barriers should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:

Are there any points along the slope barrier where water is concentrating?
Does water flow under the slope barrier?
Do the silt fences sag excessively?
Has the silt fence torn or become detached from the posts?
Does sediment need to be removed from behind the slope barrier?

SILT FENCE BARRIER
NOT TO SCALE
2

NOTE: Point A must be higher than Point B so that water flows over the bales and not around them.



STRAW BALE DITCH CHECKS

Material Specification:
Bale ditch checks may be constructed of wheat straw, oat straw, prairie hay, or bromegrass hay that is free of weeds declared noxious by the Kansas State Board of Agriculture.
The stakes used to anchor the bales should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.
Optional: The downstream scour apron should be constructed of a double-netted straw erosion-control blanket at least 6' wide.
Optional: The metal landscape staples used to anchor the erosion-control blanket should be at least 8" long.

Placement:
Bale ditch checks should be placed perpendicular to the flowline of the ditch.
The ditch check should extend far enough so that the ground level at the ends of the check is higher than the top of the lowest center bale. This prevents water from flowing around the check.
Straw bale ditch checks should not be placed in ditches where high flows are expected. Rock checks should be used instead.
Bales should be placed in ditches with slopes of 6% or less. For slopes steeper than 6%, rock checks should be used.
The following table provides check spacing for a given ditch grade:

Ditch grade (%)	Check Spacing (feet)
0.5	200
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	30

Proper installation method:
Excavate a trench perpendicular to the ditch flowline that is 4" deep and a bale's width wide. Extend the trench in a straight line along the entire length of the proposed ditch check. Place the soil on the upstream side of the trench-it will be used later.
Optional: On the downstream side of the trench, roll out a length of erosion-control blanket (scour apron) equal to the length of the trench. Place the upstream edge of the erosion-control blanket along the bottom upstream edge of the trench. The erosion control blanket should be anchored in the trench with one row of 8" landscape staples placed on 18" centers. The remainder of the erosion-control blanket (the portion that is not lying in the trench) will serve as the downstream scour apron. This section of the blanket should be anchored to the ground with 8" landscape staples placed around the perimeter of the blanket on 18" centers. The remainder of the blanket should be anchored using two evenly spaced rows of 8" landscape staples on 18" centers placed perpendicular to the flowline of the ditch.
Place the bales in the trench, making sure that they are butted tightly. Two stakes should be driven through each bale along the centerline of the ditch check, approximately 6" to 8" in from the bale ends. Stakes should be driven at least 12" into the ground.
Once all the bales have been installed and anchored, place the excavated soil against the upstream side of the check and compact it. The compacted soil should be no more than 3" to 4" deep and extend upstream no more than 24".

List of common placement/installation mistakes to avoid:
Do not place a bale ditch check directly in front of a culvert outlet. It will not stand up to the concentrated flow.
Do not place bale ditch checks in ditches that will likely experience high flows. They will not stand up to concentrated flow.
Follow prescribed ditch-check spacing guidelines. If spacing guidelines are exceeded, erosion will occur between the ditch checks.
Do not allow water to flow around the ditch check. Make sure that the ditch check is long enough so that the ground level at the ends of the check is higher than the top of the lowest center bale.
Do not place bale ditch checks in channels with shallow soils underlain by rock. If the check is not anchored sufficiently, it will wash out.
Bale ditch checks must be dug into the ground. Bales at ground level do not work because they allow water to flow under the check.

Inspection and Maintenance:
Bale ditch checks should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:

Does water flow around the ditch check?
Does water flow under the ditch check?
Does water flow through spaces between abutting bales?
Are any bales and/or scour aprons (optional) dislodged?
Are bales decomposing due to age and/or water damage?
Does sediment need to be removed from behind the ditch check?

STRAW BALE DITCH CHECK
NOT TO SCALE
3

MARK	DESCRIPTION	DATE	APPR.

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KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 17_EROSION CONTROL DETAILS.dgn		
AMEC PROJ. NO. 5-6150-0001		

EROSION CONTROL DETAILS

C-3.01
SHEET 17 OF 21

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS				

1. MUTCD COMPLIANCE:

ALL TEMPORARY TRAFFIC CONTROL DEVICES AND THEIR INSTALLATION AND MAINTENANCE SHALL COMPLY WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS WHICH HAS BEEN ADOPTED BY THE SECRETARY OF TRANSPORTATION. WHENEVER THE TEMPORARY TRAFFIC CONTROL STANDARDS CONFLICT WITH THE MUTCD, THE STANDARDS SHALL GOVERN.

2. DESIGN SPEED:

THOSE ITEMS DELEGATED TO TEMPORARY TRAFFIC CONTROL SHOULD BE DESIGNED AND INSTALLED USING THE POSTED/LEGAL SPEED OF THE ROADWAY PRIOR TO WORK STARTING.

3. CLEAR ZONE:

ALL CONSTRUCTION EQUIPMENT (INCLUDING VEHICLES), MATERIALS, AND DEBRIS SHALL BE STORED OUT OF THE CLEAR ZONE. WHERE THIS CANNOT BE ACHIEVED, THE CONTRACTOR SHALL PLACE APPROPRIATE SIGNS, OBJECT IDENTIFIERS, AND/OR BARRICADES AS DESIGNATED BY THE ENGINEER. TEMPORARY TRAFFIC CONTROL DEVICES NEEDED FOR THIS CONDITION SHALL BE CONSIDERED SUBSIDIARY TO OTHER BID ITEMS.

4. MINIMUM LANE WIDTHS:

LANE WIDTHS SHALL BE A MINIMUM OF 11' (MEASURED BETWEEN CENTERLINES OF PAVEMENT MARKINGS) OR AS SHOWN ON THE PLANS, OR AS DIRECTED BY THE ENGINEER. A LANE WIDTH LESS THAN 11' MAY REQUIRE RESTRICTED ROADWAY WIDTH SIGNING.

5. FLAGGER:

A MINIMUM OF ONE FLAGGER SHALL BE STATIONED WITHIN EACH MULTI-LANE ROADWAY ACTIVITY AREA WHERE WORK IS IN A CLOSED LANE ADJACENT TO TRAFFIC AND NOT SEPARATED BY A CONCRETE SAFETY BARRIER SYSTEM.

6. PAVEMENT MARKING:

WHEN THE WORK WILL OCCUPY A LOCATION MORE THAN THREE DAYS, ALL CONFLICTING PAVEMENT MARKINGS SHALL BE REMOVED OR MASKED AND ALL TRANSITION TAPERS, CROSSOVERS, AND EDGE LINES ALONG CHANNELIZING DEVICES SHALL BE MARKED WITH SOLID 4" WIDE PAVEMENT MARKING.

7. FIRST MODULE OF IBS:

THE FIRST MODULE OF EACH INERTIAL BARRIER SYSTEM (IBS) SHALL HAVE A MINIMUM OF 2 SQ. FT. OF FLUORESCENT ORANGE PRISMATIC GRADE RETROREFLECTIVE SHEETING FACING TRAFFIC. EITHER A VERTICAL RECTANGLE OR DIAMOND SHAPE MAY BE USED.

8. PEDESTRIAN / BICYCLE SAFETY:

WORK ZONE SIGNS SHALL NOT INHIBIT PEDESTRIAN AND BICYCLE TRAFFIC ON SIDEWALKS OR OTHER AREAS DESIGNATED FOR PEDESTRIAN OR BICYCLE USE.

CONSIDERATION SHOULD BE MADE TO SEPARATE PEDESTRIAN AND BICYCLE MOVEMENTS FROM BOTH WORK SITE ACTIVITY AND VEHICULAR TRAFFIC. UNLESS A REASONABLE SAFE ROUTE THAT DOES NOT INVOLVE CROSSING THE ROADWAY CAN BE PROVIDED, PEDESTRIANS AND BICYCLISTS SHOULD BE APPROPRIATELY DIRECTED WITH ADVANCE SIGNING THAT ENCOURAGES THEM TO CROSS TO THE OPPOSITE SIDE OF THE ROADWAY. IN URBAN AND SUBURBAN AREAS WITH HIGH VEHICULAR TRAFFIC VOLUMES, THESE SIGNS SHOULD BE PLACED AT INTERSECTIONS (RATHER THAN MIDBLOCK LOCATIONS) SO THAT PEDESTRIANS AND BICYCLISTS ARE NOT CONFRONTED WITH MIDBLOCK WORK SITES THAT WILL INDUCE THEM TO ATTEMPT SKIRTING THE WORK SITE OR MAKING A MIDBLOCK CROSSING.

WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED, THE TEMPORARY FACILITIES SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.

9. CHANGED STOP CONDITIONS:

ATTACH TWO FLAGS AND A RED TYPE "B" HIGH INTENSITY WARNING LIGHT TO ANY STOP SIGN THAT CREATES A NEW STOP CONDITION OR MOVES THE STOP CONDITION TO A NEW LOCATION. LEAVE FLAGS AND LIGHTS IN PLACE FOR AT LEAST THE FIRST 30 DAYS. INSTALL W3-1 (SYMBOLIC STOP AHEAD) SIGN IN ADVANCE OF STOP SIGN IF STOP SIGN IS NOT VISIBLE FOR A MINIMUM OF DISTANCE 'A' (SEE CHART ON TE710) OR IF STOP CONDITION IS MOVED TO LESS THAN DISTANCE 'A' FROM AN EXISTING STOP AHEAD SIGN.

10. LUMP SUM BIDDING:

WHEN TRAFFIC CONTROL IS BID LUMP SUM, ADDITIONAL DEVICES WILL BE PAID FOR AS EXTRA WORK.

11. NIGHTTIME LIGHTING:

WHEN NIGHTTIME WORK IS REQUIRED, FLOODLIGHTS SHOULD BE USED TO ILLUMINATE FLAGGER STATIONS, EQUIPMENT CROSSINGS, AND OTHER AREAS WHERE EXISTING LIGHTING IS NOT ADEQUATE FOR THE WORK TO BE PERFORMED SAFELY.

IN NO CASE SHALL FLOODLIGHTS BE PERMITTED TO CREATE A DISABLING GLARE FOR THE DRIVER. THE ADEQUACY OF THE FLOODLIGHT PLACEMENT AND ELIMINATION OF POTENTIAL GLARE SHOULD BE CHECKED BY DRIVING THROUGH THE PROJECT.

12. NCHRP REPORT 350 CRASHWORTHY REQUIREMENTS:

TRAFFIC CONTROL DEVICES SHALL MEET THE EVALUATION CRITERIA IN NCHRP REPORT 350 AS SUPPLEMENTED BY FHWA MEMORANDUM "IDENTIFYING ACCEPTABLE HIGHWAY SAFETY FEATURES," DATED JULY 25, 1997. AVAILABLE ON THE INTERNET AT http://safety.fhwa.dot.gov/roadway_dept/road_hardware/nchrp_350.htm

ANY DEVICE NOT ADDRESSED BY THE TE STANDARDS MAY BE APPROVED ON A CASE BY CASE BASIS BY THE ENGINEER. THE DEVICE SHALL BE ACCOMPANIED BY AND INSTALLED ACCORDING TO NCHRP REPORT 350.

THE CONTRACTOR SHALL:

1) PROVIDE TO THE ENGINEER A COPY OF THE MANUFACTURER'S SELF-CERTIFICATION THAT ANY CATEGORY 1 (i.e. - PLASTIC CONICAL DELINEATORS, TUBULAR MARKERS, DRUMS WITHOUT ATTACHMENTS) AND CATEGORY 2 (i.e. - PORTABLE SIGN STANDS (WITH SIGNS), TYPE II AND III BARRICADES, AND VERTICAL PANELS) DEVICES USED ON THE PROJECT ARE NCHRP REPORT 350 COMPLIANT.

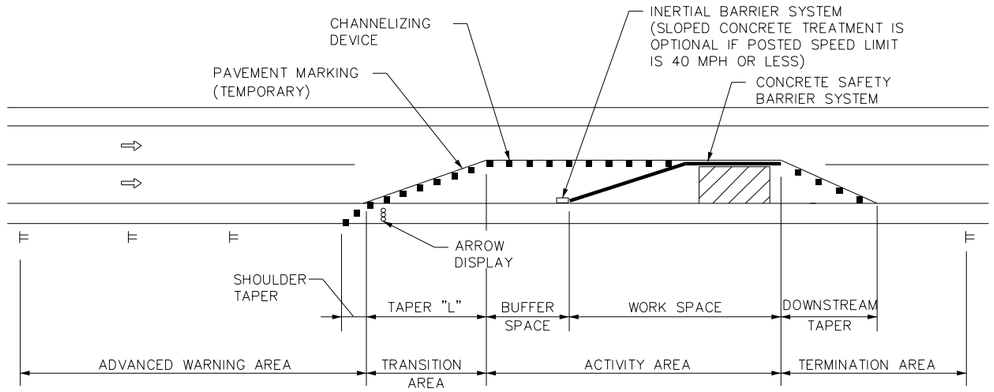
2) PROVIDE TO THE ENGINEER A COPY OF THE ENTIRE FHWA NCHRP REPORT 350 ACCEPTANCE LETTER (WZ-xxx) FOR ANY CATEGORY 2 DEVICE (i.e. - PORTABLE SIGN STANDS (WITH SIGNS), TYPE II AND III BARRICADES, AND VERTICAL PANELS) USED ON THE PROJECT. WORK ZONE FHWA NCHRP REPORT 350 ACCEPTANCE LETTERS (WZ-xxx) ARE AVAILABLE ON THE INTERNET AT: http://safety.fhwa.dot.gov/roadway_dept/road_hardware/listing.cfm?code=work_zone

3) CERTIFY THAT THE TRUCK MOUNTED ATTENUATORS (TMA'S) (WHICH ARE DEFINED AS CATEGORY 3 DEVICES BY THE FHWA MEMORANDUM) WERE PURCHASED PRIOR TO OCTOBER 1, 1998, AND INCLUDE A COPY OF THE ENTIRE FHWA ACCEPTANCE LETTER STATING THAT THE TMA'S ARE NCHRP REPORT 230 COMPLIANT; OR IF THE DEVICES WERE PURCHASED AFTER OCTOBER 1, 1998, INCLUDE A COPY OF THE ENTIRE FHWA'S ACCEPTANCE LETTER STATING THAT THE TMA'S ARE NCHRP REPORT 350 COMPLIANT.

ALL CATEGORY 1 & 2 DEVICES SHALL BE NCHRP REPORT 350 COMPLIANT. TMA'S, PURCHASED PRIOR TO OCTOBER 1, 1998, MAY BE USED UNTIL THE END OF THEIR SERVICEABLE LIVES.

13. TYPE "A" LOW INTENSITY WARNING LIGHTS:

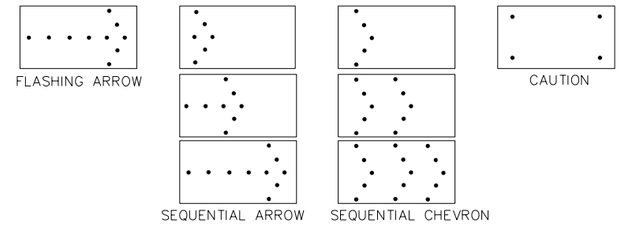
A TYPE "A" LOW INTENSITY WARNING LIGHT IS AN L.E.D. BI-DIRECTIONAL FLASHING WORK ZONE WARNING LIGHT.



TYPICAL WORK ZONE COMPONENTS

NOTE:
REFER TO STD. TE702 FOR TAPER "L" FORMULA.

ARROW DISPLAYS



ARROW DISPLAY ELEMENTS SHALL BE CAPABLE OF A MINIMUM 50 PERCENT DIMMING FROM THEIR FULL-RATED LAMP VOLTAGE. FULL LAMP VOLTAGE SHOULD BE USED DURING THE DAY AND DIMMED MODE SHALL BE USED AT NIGHT. FOR SHOULDER WORK, ROADSIDE WORK NEAR THE SHOULDER, BLOCKING THE SHOULDER, OR FOR TEMPORARY CLOSING ONE LANE ON A TWO-LANE, TWO-WAY ROADWAY, AN ARROW PANEL SHALL BE USED ONLY IN THE CAUTION MODE.

BUFFER SPACE

SPEED (MPH)*	20	25	30	35	40	45	50	55	60	65	70
LENGTH (ft)	115	155	200	250	305	360	425	495	570	645	730

NEITHER WORK ACTIVITY NOR STORAGE OF EQUIPMENT, VEHICLES, OR MATERIAL SHOULD OCCUR IN THE BUFFER SPACE. WHEN A PROTECTION VEHICLE IS PLACED IN ADVANCE OF THE WORK SPACE, ONLY THE SPACE UPSTREAM OF THE VEHICLE CONSTITUTES THE BUFFER SPACE.

* POSTED SPEED PRIOR TO WORK STARTING

IF TEMPORARY CONCRETE SAFETY BARRIER SYSTEM IS USED TO SEPARATE APPROACHING TRAFFIC FROM THE WORK SPACE, THE BARRIER SYSTEM SHALL BE CONSIDERED PART OF THE ACTIVITY AREA. A FULL LANE WIDTH SHOULD BE AVAILABLE THROUGHOUT THE LENGTH OF THE BUFFER SPACE. SEE TYPICAL WORK ZONE COMPONENTS.

NO.	DATE	REVISIONS	BY	APP'D
3	8-8-07	ADD NOTE 13, REVISE NOTE 8 & WZ COMPONENTS	M.B.	A.A.A.
2	12-29-05	MODIFIED BUFFER SPACE TABLE	M.B.	A.A.A.
1	2-1-05	MODIFIED NOTES #2, 8, 10	B.H.	A.A.A.

KANSAS DEPARTMENT OF TRANSPORTATION

GENERAL TRAFFIC CONTROL

TE700 9/1/00

FHWA APPROVAL 8-8-07		APP'D Anthony A. Alrobaire	
DESIGNED B.A.H.	DETAILED B.A.H.	QUANTITIES	TRACED
DESIGN OK.	DETAIL OK.	QUAN. OK.	TRACE OK.

APPR. | DATE | DESCRIPTION | MARK

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CITY OF WICHITA

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PROFESSIONAL ENGINEER

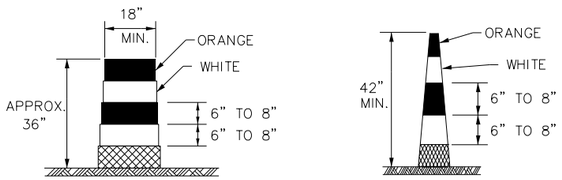
DESIGNED BY: Larry Sample, PE
DATE: 08-13-2012
DWN BY: RES
CKD BY: LBK
APP BY: L. SAMPLE
FILE NAME: 18_TRAFFIC CONTROL DETAILS AND NOTES.dgn
AMEC PROJ. NO. 5-6150-0001

TRAFFIC CONTROL DETAILS AND NOTES

C-4.01

SHEET 18 OF 21

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS				

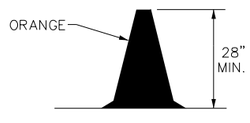


DRUM

CONICAL DELINEATOR

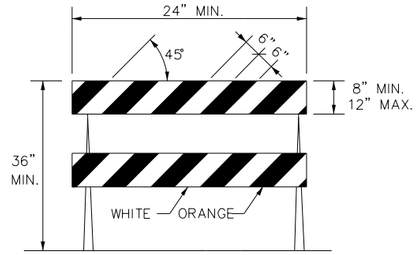
DRUMS AND CONICAL DELINEATORS SHALL HAVE AT LEAST TWO ORANGE AND TWO WHITE 6" TO 8" WIDE RETROREFLECTIVE STRIPES. ADDITIONAL STRIPES MAY BE NON-RETROREFLECTIVE. IF THERE ARE NON-RETROREFLECTIVE SPACES BETWEEN ADJACENT STRIPES, THEY SHALL BE NO MORE THAN 3" WIDE.

ALL RETROREFLECTIVE STRIPES ON DRUMS SHALL BE ASTM TYPE III SHEETING. THE WHITE STRIPES ON CONICAL DELINEATORS SHALL BE ASTM TYPE III SHEETING. ORANGE STRIPES ON ALL CONICAL DELINEATORS SHALL BE FLUORESCENT ORANGE ASTM TYPE IV SHEETING.



TRAFFIC CONE

TRAFFIC CONES MAY BE USED AS CHANNELIZING DEVICES FOR DAYTIME OPERATIONS AND LOW SPEED ROADWAYS ONLY. THEY WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE SUBSIDIARY TO OTHER TRAFFIC CONTROL BID ITEMS. THE ENGINEER MAY REQUIRE THAT TRAFFIC CONES BE SUPPLEMENTED BY OTHER TRAFFIC CONTROL DEVICES IN CERTAIN SITUATIONS.

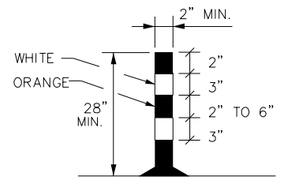


TYPE II BARRICADE

FOR RAILS LESS THAN 36" LONG, 4" WIDE STRIPES MAY BE USED.

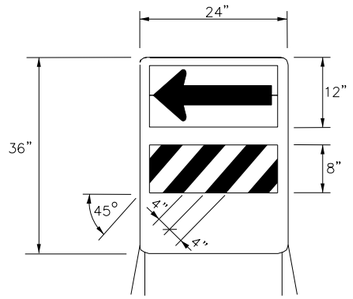
THE ENTIRE AREA OF BARRICADE RAILS, BOTH FRONT AND BACK, SHALL BE ASTM TYPE III SHEETING.

THE STRIPES SHALL SLOPE DOWNWARD TO THE TRAFFIC SIDE FOR CHANNELIZATION.



TUBULAR MARKER

THE TWO WHITE RETROREFLECTIVE STRIPES SHALL BE ASTM TYPE III SHEETING.



DIRECTION INDICATOR BARRICADE

THE ARROW PANEL SHALL BE BLACK ON FLUORESCENT ORANGE ASTM TYPE IV SHEETING. THE STRIPES SHALL BE ORANGE AND WHITE ASTM TYPE III SHEETING SLOPING DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.

THE DIRECTION INDICATOR BARRICADE SHALL BE USED IN SERIES TO DIRECT THE MOTORIST INTO THE INTENDED LANE OF TRAVEL.

THE ARROW PANEL SHOULD NOT BE VISIBLE TO OPPOSING TRAFFIC.

VERTICAL PANEL

THE ENTIRE AREA OF VERTICAL PANELS, BOTH FRONT AND BACK, SHALL HAVE ASTM TYPE III SHEETING. THE STRIPES SHALL SLOPE DOWNWARD TO THE TRAFFIC SIDE FOR CHANNELIZATION.

ITEM	LOCATION	CROSS-OVERS	SHOOFLY DIVERSIONS	TANGENTS	TAPERS	RAMPS	HEAD TO HEAD	OBJECT IDENTIFIER	
PORTABLE									
	DRUMS	YES	YES	YES	YES	YES	(1)	YES	
	CONICAL DELINEATORS	YES	YES	YES	YES	YES	(1)	YES	
	VERTICAL PANELS	(2)	(2)	(2)	(2)	(2)	(1,2)	YES	
	DIRECTION INDICATOR BARRICADE	NO	NO	NO	YES	NO	NO	NO	
	TYPE II BARRICADE	(2)	(2)	(2)	(2)	NO	NO	YES	
FIXED									
	TUBULAR MARKERS	(3)	(3)	(3)	NO	(3)	YES	NO	
	VERTICAL PANELS	(3)	(3)	(3)	(3)	(3)	(3)	YES	

(1) Not allowed on centerline delineation along freeways or expressways.

(2) The stripes shall slope downward to the traffic side for channelization.

(3) May be used upon the approval of the Engineer.

TAPER FORMULAS:

L = WS FOR SPEEDS OF 45 MPH OR MORE

$L = WS^2/60$ FOR SPEEDS OF 40 MPH OR LESS

WHERE: L = MINIMUM LENGTH OF TAPER IN FEET
S = NUMERICAL VALUE OF POSTED SPEED PRIOR TO WORK STARTING IN MPH
W = WIDTH OF OFFSET IN FEET

CHANNELIZER PLACEMENT:

(A) THE SPACING BETWEEN DEVICES IN THE ADVANCE WARNING AREA AND THE TRANSITION AREA (TAPER) SHOULD NOT EXCEED A DISTANCE IN FEET EQUAL TO THE POSTED SPEED LIMIT IN MPH PRIOR TO WORK STARTING.

(B) THE SPACING BETWEEN DEVICES IN THE ACTIVITY AREA SHOULD NOT EXCEED A DISTANCE IN FEET EQUAL TO TWO TIMES THE POSTED SPEED LIMIT IN MPH PRIOR TO WORK STARTING.

(C) CHANNELIZING DEVICES SHALL BE PLACED FOR OPTIMUM VISABILITY, NORMALLY AT RIGHT ANGLES TO THE TRAFFIC FLOW.

(D) CHANNELIZING DEVICES PLACED ALONG SHOULDER EDGES OR IN DROPOFFS SHALL HAVE A MINIMUM OF 24" FROM THE TOP OF THE CHANNELIZING DEVICE TO THE TOP OF THE PAVEMENT.

NO.	DATE	REVISIONS	BY	APP'D
3	8-8-07	TRIMLINE CHANGED TO CONICAL DELINEATOR	M.B.	A.A.A.
2	11-19-03	CHANGED BORDER	B.H.	S.A.B.
1	9-26-02	MODIFIED NOTES	M.H.	S.A.B.

KANSAS DEPARTMENT OF TRANSPORTATION

CHANNELIZING DEVICES

TE702 9/1/00

FHWA APPROVAL 8-8-07		APP'D Anthony A. Alrobaire	
DESIGNED L.E.R.	DETAILED B.A.H.	QUANTITIES	TRACED
DESIGN CK.	DETAIL CK.	QUAN. CK.	TRACE CK.

APPR.	DATE	DESCRIPTION	MARK

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CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY:		DATE:
Larry Sample, PE		08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE

FILE NAME: 19_TRAFFIC CONTROL DETAILS AND NOTES.dgn

AMEC PROJ. NO. 5-6150-0001

TRAFFIC CONTROL DETAILS AND NOTES

C-4.02

SHEET 19 OF 21

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS				

GENERAL NOTES

1. MAINTENANCE:

THE CONTRACTOR SHALL MAINTAIN ALL SIGNS AND DEVICES IN AN UPRIGHT POSITION. THE CONTRACTOR SHALL CLEAN OR REPLACE ANY DAMAGED OR ILLEGIBLE SIGN OR DEVICE AS DIRECTED BY THE ENGINEER.

2. EXISTING SIGNS:

IF EXISTING SIGNS THAT ARE TO REMAIN (WHETHER DENOTED ON THE PLANS OR NOT) INTERFERE WITH CONSTRUCTION WORK, THE CONTRACTOR SHALL REMOVE, STORE, AND RESET THE SIGNS. THIS SHALL BE SUBSIDIARY TO OTHER TRAFFIC CONTROL BID ITEMS. SIGNING DAMAGED BY THE CONTRACTOR SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

3. CONFLICTING SIGNS, SIGNS NOT IN USE, AND TRAFFIC SIGNALS:

SIGNS AND TRAFFIC SIGNALS THAT ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN OR DO NOT APPLY TO THE TRAFFIC OPERATIONS SHALL BE IMMEDIATELY REMOVED, TURNED SO NOT VISIBLE TO TRAFFIC FROM ANY DIRECTION, OR COMPLETELY COVERED WITH ADEQUATE OPAQUE WATERPROOF MATERIAL. TAPE SHALL NOT BE APPLIED TO THE FACE OF THE SIGN.

4. PORTABLE AND POST MOUNTED SIGNS:

TEMPORARY TRAFFIC CONTROL SIGNS THAT ARE ANTICIPATED TO REMAIN IN PLACE FOR 3 DAYS OR LESS ARE CONSIDERED "PORTABLE." PORTABLE SIGNS SHALL BE MOUNTED ON AN APPROVED SUPPORT AT A MINIMUM HEIGHT OF 12" ABOVE THE TRAVELED WAY. TRAFFIC CONTROL SIGNS IN PLACE FOR OVER 3 DAYS ARE REQUIRED TO BE MOUNTED ON APPROVED POSTS. A MINIMUM OF 42" OF THE APPROVED POST MUST BE BELOW THE GROUND SURFACE WITH ADEQUATE BACKFILL AND COMPACTION. ALL POSTS AT MINIMUM SHALL EXTEND TO THE TOP EDGE OF THE SIGN AND NO GREATER THAN 6" ABOVE THE SIGN.

WHEN THE SIGN WIDTH IS EQUAL TO OR GREATER THAN 9', THREE OR MORE WOOD POSTS MAY BE USED WITH A MINIMUM OF 4' BETWEEN THE CENTERLINE OF EACH POST. ALL SIGNS LESS THAN 9' IN WIDTH SHALL USE A MAXIMUM OF TWO WOOD POSTS.

"ROLL-UP" SIGNS MAY BE USED FOR PORTABLE WARNING SIGNS. THEY MUST BE FLUORESCENT ORANGE ASTM TYPE IV SIGNS OF OPAQUE MATERIAL. MESH SIGNS ARE NOT ALLOWED.

5. SHEETING:

ALL ORANGE SIGNS SHALL HAVE FLUORESCENT ORANGE ASTM TYPE IV SHEETING. ALL OTHER SIGNS SHALL HAVE ASTM TYPE III SHEETING OF STANDARD COLORS.

6. SIGNS INVOLVING SPEEDS:

THE W3-5 (SPEED REDUCTION) SHOULD BE USED ONLY IF THE ENGINEER DETERMINES THAT A REDUCED SPEED IS REQUIRED ON THE PROJECT.

THE KM4-20 (WORK ZONE) PLAQUE SHALL BE PLACED ABOVE ALL SPEED LIMIT SIGNS, (R2-1), EXISTING AND TEMPORARY. MOUNT THE WORK ZONE PLAQUES TO THE POST. DO NOT OVERLAP THE R2-1 AND KM4-20 SIGNS.

FOR SPEEDS OF 30 MPH OR LESS, THE W1-1(TURN) OR W1-3(REVERSE TURN) SHOULD BE USED. FOR SPEEDS OF 35 MPH OR MORE, THE W1-2(CURVE) OR W1-4(REVERSE CURVE) SHOULD BE USED. THE W13-1(MPH) IS TO BE ELIMINATED IF THE ADVISORY SPEED IS WITHIN 5 MPH OF THE SPEED LIMIT.

7. SIGNS CONTROLLING WORK ZONE:

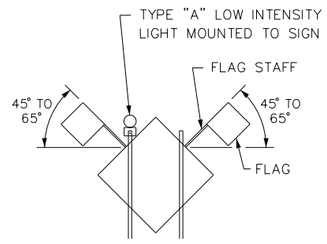
THE KG20-2(END ROAD WORK) SHOULD BE PLACED 500' FROM THE END OF THE ACTUAL WORK SPACE, NOT NECESSARILY AT THE EXTREME LIMITS OF THE PROJECT. THE KG20-2 SHOULD BE MOUNTED ON TWO POSTS. THE KG20-2 MAY BE MOUNTED ON ONE POST IF IN URBAN AREAS WHERE UTILITIES ARE A PROBLEM AND WIND LOADS ARE NOT AN ISSUE.

WHERE TWO WORK ZONES ARE LESS THAN 1 MILE APART IN RURAL AREAS OR ¼ MILE APART IN URBAN AREAS, THE KG20-2(END ROAD WORK) FOR THE FIRST WORK ZONE AND THE W20-1(ROAD WORK) FOR THE SECOND WORK ZONE SHOULD BE ELIMINATED.

8. WARNING LIGHTS ON SIGNS:

TYPE "A" LOW INTENSITY WARNING LIGHTS SHOULD BE USED WITH ALL CONSTRUCTION ACTION WARNING SIGNS AND SHALL NOT BE USED ON SIGNS MOUNTED LESS THAN 5' HIGH ON TEMPORARY SUPPORTS. ON ALL OTHER CONSTRUCTION WARNING SIGNS, TYPE "A" LOW INTENSITY WARNING LIGHTS ARE TO BE USED AS DIRECTED BY THE ENGINEER.

TYPE "A" LOW INTENSITY WARNING LIGHTS SHALL BE MAINTAINED SO AS TO BE CAPABLE OF BEING VISIBLE ON A CLEAR NIGHT FROM A DISTANCE OF 3000 FT. IF A TYPE "A" LOW INTENSITY WARNING LIGHT HAS A SEPARATE BATTERY CASE, THE BATTERY CASE SHALL BE MOUNTED NO HIGHER THAN 12" ABOVE THE GROUND AND MOUNTED BEHIND THE SIGN POST. A TYPE "A" LOW INTENSITY WARNING LIGHT WHERE THE LENS AND BATTERY ARE ONE UNIT SHALL BE MOUNTED ON THE TEMPORARY SIGN POST NEAREST TO THE TRAVELED WAY. FLAGS SHALL NOT INTERFERE WITH THE VISABILITY OF THE TYPE "A" LOW INTENSITY WARNING LIGHT.



TWO (2) 18" x 18" FLUORESCENT RED-ORANGE FLAGS SHALL BE ATTACHED (IN THE POSITION SHOWN) ON THE W20-2(DETOUR), W1-1(TURN), W1-2(CURVE), W1-3(REVERSE TURN), W1-4(REVERSE CURVE), W3-3(SIGNAL AHEAD), W4-2(LANE REDUCTION), W20-4(ONE LANE ROAD), W20-5(LANE CLOSED), W20-7A(FLAGGER), AND W3-4 (BE PREPARED TO STOP) SIGNS AND ANY OTHER ACTION SIGNS AS SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER. THE FLAGS AND STAFFS ARE TO BE ATTACHED IN SUCH A MANNER THAT THE SIGN WILL NOT BE OBSCURED. THE FLAGS MAY BE EITHER A CLOTH OR VINYL MATERIAL. THE FLAGS SHALL BE SUBSIDIARY TO THE CONSTRUCTION SIGN BID ITEMS.

SIGN LAYOUT INFORMATION

END ROAD WORK
KG20-2
(BLACK ON ORANGE)

STD. SIZE EXPWY/FREEWAY
6" C
48"x 24"

LETTER SIZES FOR BLACK ON ORANGE "DESTINATION" SIGNS

STD. SIZE	EXPWY/FREEWAY
6" C	10" D

WORK ZONE
KM4-20
(BLACK ON ORANGE)

STD. SIZE	EXPWY/FREEWAY
3" C	6" C
24"x 6"	48"x 12"

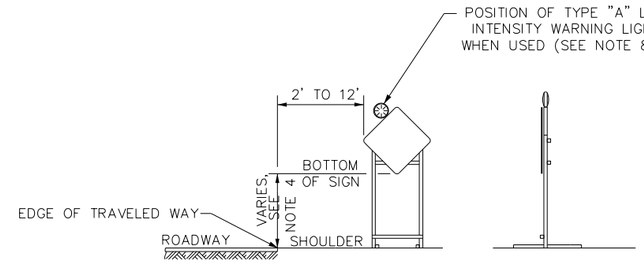
NOTE:
TEXT DIMENSIONS ARE IN INCHES.
BORDER IS BLACK NON-REFLECTIVE.
SEE STD. TE730 OR TE731 FOR KG20-5 SIGN LAYOUT.

ADVANCE WARNING SIGN SPACING (IN FEET):

	A	B	C
URBAN (40 MPH OR LOWER)	100	100	100
URBAN (45 MPH OR HIGHER)	350	350	350
RURAL (55 MPH OR LOWER)	500	500	500
RURAL (60 MPH OR HIGHER)	750	750	750
EXPRESSWAY/FREEWAY	1000	1500	2640

THE SPACING BETWEEN ANY SIGNS MAY BE ADJUSTED AS APPROVED BY THE ENGINEER IN ORDER TO MAXIMIZE VISIBILITY.

THE SPACING BETWEEN SIGNS SHALL BE NO LESS THAN 100', UNLESS DIRECTED BY THE ENGINEER.



(SEE NOTE 4 FOR "ROLL-UP" SIGNS OPTION)

HEIGHT AND LATERAL DIMENSIONS FOR SIGNS MOUNTED ON SKIDS OR OTHER SUPPORTS ON PAVEMENT

NO.	DATE	REVISIONS	BY	APP'D
3	8-8-07	MODIFIED NOTES 4, 5, 6, 7 & 8, KG20-2 LAYOUT	M.B.	A.A.A.
2	12-29-05	MODIFIED FLAGS, M4-20 & SIGN LAYOUT INFO	M.B.	A.A.A.
1	2-1-05	MODIFIED NOTE #9	B.H.	A.A.A.

KANSAS DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SIGNS

TE710 9/1/00

FHWA APPROVAL 8-8-07		APP'D Anthony A. Alrobaire	
DESIGNED B.A.H.	DETAILED B.A.H.	QUANTITIES	TRACED
DESIGN OK.	DETAIL OK.	QUAN. OK.	TRACE OK.

DESCRIPTION | DATE | APPR.

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CITY OF WICHITA

LEVEE "F" TOE DRAIN INSTALLATION
WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
Wichita, KS 67202

LAWRENCE J. SAMPLE
LICENSED
15855
8/13/12
KANSAS
PROFESSIONAL ENGINEER

DESIGNED BY: Larry Sample, PE	DATE: 08-13-2012
DWN BY: RES / CKD BY: LBK	APP BY: L. SAMPLE
FILE NAME: 20_TRAFFIC CONTROL DETAILS AND NOTES.dgn	
AMEC PROJ. NO. 5-6150-0001	

TRAFFIC CONTROL DETAILS AND NOTES

C-4.03
SHEET 20 OF 21

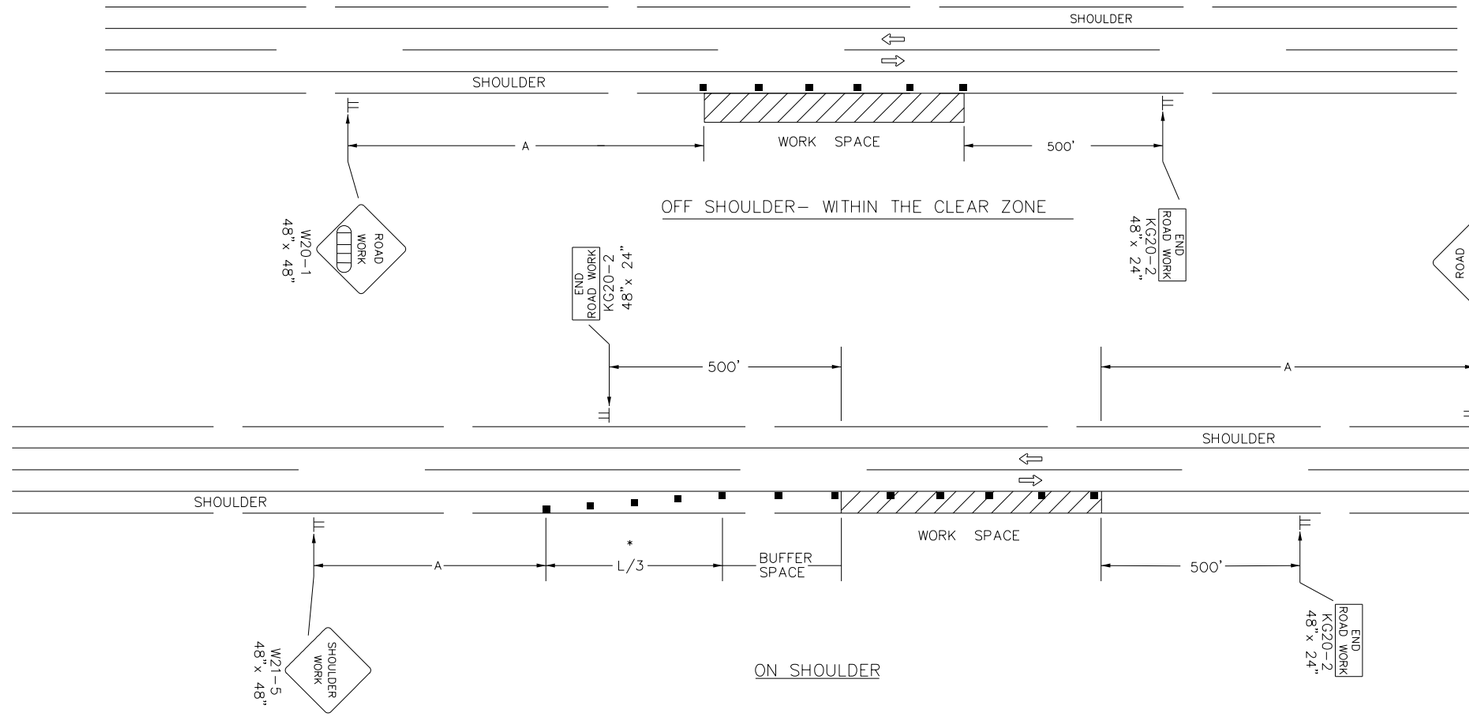
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS				

REFER TO STD. TE710 FOR ADDITIONAL INFORMATION ON TEMPORARY TRAFFIC CONTROL SIGNS AND SIGN SPACING.
REFER TO STD. TE702 FOR INFORMATION ON TAPERS AND CHANNELIZING DEVICES.
REFER TO STD. TE700 FOR LENGTH OF BUFFER SPACE.

NOTE:

NO TRAFFIC CONTROL IS REQUIRED IF THE WORK SPACE IS LOCATED OUTSIDE OF THE CLEAR ZONE.

FOR OPERATIONS OF 60 MINUTES OR LESS, ALL SIGNS AND CHANNELIZING DEVICES MAY BE ELIMINATED IF A VEHICLE WITH HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS IS USED.



WHEN CONCRETE BARRIER SYSTEM IS USED, PORTABLE CHANNELIZING DEVICES ARE NOT NEEDED ALONG THE TANGENT BARRIER SECTION. DELINEATION ON THE BARRIER SYSTEM IS STILL REQUIRED. SEE RD622.

* OMIT TAPER IF PAVED SHOULDER IS LESS THAN 8' WIDE.

■ Channelizing Device
AHEAD, 1500 FT, OR 1 MILE

NO.	DATE	REVISIONS	BY	APP'D
3	8-8-07	G20-2 CHANGED TO KG20-2	M.B.	A.A.A.
2	12-29-05	UPDATED END ROAD WORK SIGN DESIGNATION	M.B.	A.A.A.
1	11-19-03	CHANGED BORDER	B.H.	S.A.B.

KANSAS DEPARTMENT OF TRANSPORTATION

TYPICAL TRAFFIC CONTROL
WORK ON OR NEAR THE SHOULDER
UNDIVIDED HIGHWAY (2 OR 4 LANE)

TE720 9/1/00

FHWA APPROVAL 8-8-07		APP'D Anthony A. Alrobaire	
DESIGNED L.E.R.	DETAILED B.A.H.	QUANTITIES	TRACED
DESIGN CK.	DETAIL CK.	QUAN. CK.	TRACE CK.

APPR. | DATE | DESCRIPTION | MARK

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CITY OF WICHITA

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WICHITA-VALLEY CENTER LOCAL FLOOD PROTECTION PROJECT
WICHITA, KANSAS

PREPARED FOR
THE CITY OF WICHITA, KANSAS
455 N. Main
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LAWRENCE J. SAMPLE LICENSED 15855 KANSAS PROFESSIONAL ENGINEER
8/13/12

DESIGNED BY: Larry Sample, PE		DATE: 08-13-2012
DWN BY: RES	CKD BY: LBK	APP BY: L. SAMPLE

FILE NAME: 21_TRAFFIC CONTROL DETAILS AND NOTES.dgn

AMEC PROJ. NO. 5-6150-0001

TRAFFIC CONTROL DETAILS AND NOTES

C-4.04

SHEET 21 OF 21