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JOINT VENTURE TEAM

DETROIT ARSENAL, MICHIGAN MANNED/UNMANNED TACTICAL VEHICLE LAB FY 2025 P2# 506474



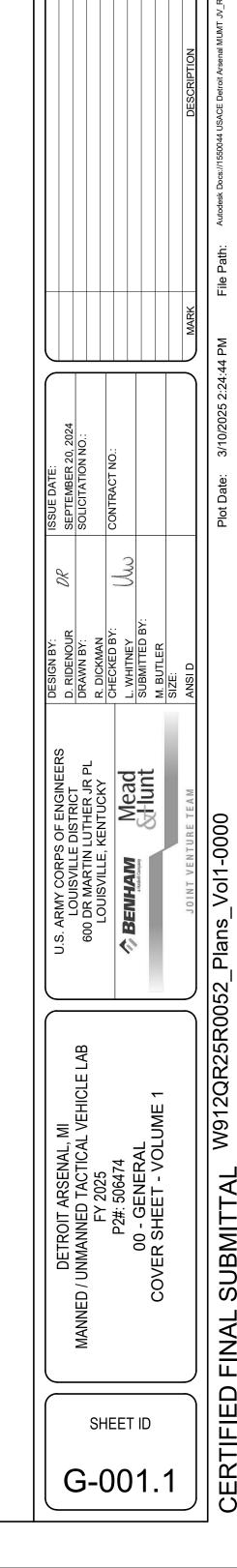
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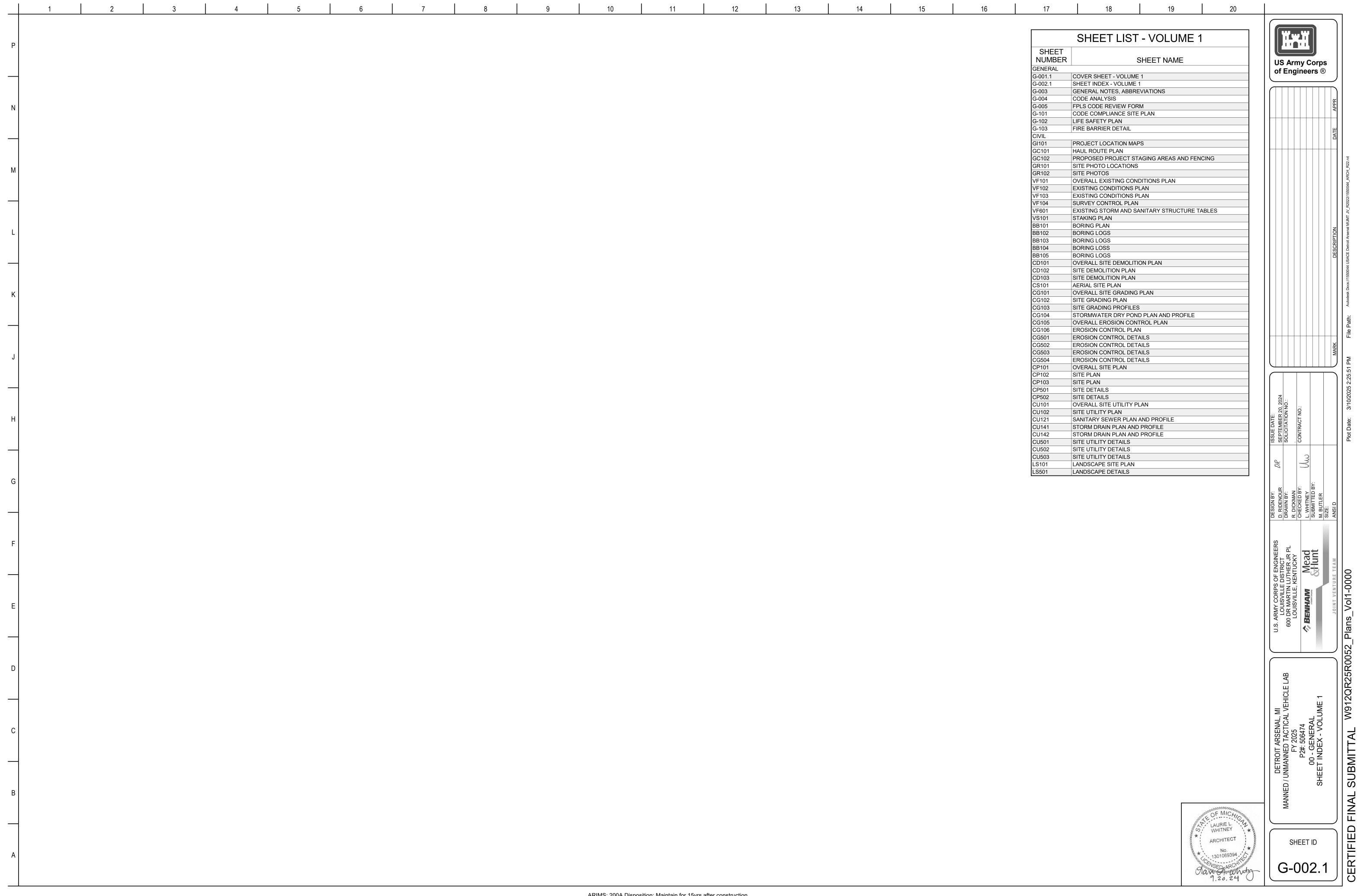
ISSUE DATE: SEPTEMBER 20, 2024

VOLUME: VOLUME 1 OF 2

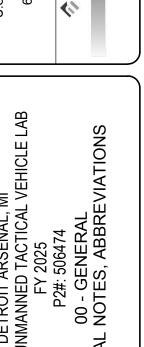


12 May 2025 W912QR25R0052









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THE BUILDING IS A SINGLE-STORY STRUCTURE OF NON-COMBUSTIBLE CONSTRUCTION WITH A CONSTRUCTION CLASSIFICATION OF TYPE IIB (IBC §602.2).

THE FIRE-RESISTANCE REQUIREMENTS FOR BUILDING ELEMENTS OF TYPE IIB CONSTRUCTION (IBC TABLES 601 AND 602 & NFPA 20 §

4.14.1.1.2):	
STRUCTURAL FRAME (INCLUDING COLUMNS, GIRDERS, AND TRUSSES)	0 HOUR
INTERIOR BEARING WALLS	0 HOUR
INTERIOR NONBEARING WALLS	0 HOUR
EXTERIOR WALLS	
WITH FIRE SEPARATION DISTANCE OF AT LEAST 20 FT	0 HOUR
FLOOR CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	0 HOUR
ROOF CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	0 HOUR
,	

THE BUILDING HAS A FIRE SEPARATION DISTANCE (FSD) OF AT LEAST 20 FT ON ALL SIDES OF THE BUILDING (IBC TABLE 602.2).

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BASED ON NONSEPARATED MIXED USE OF GROUP B AND GROUP F-1 IBC §508.3 MAX STORIES GROUP B: 4 ALLOWED / 1 ACTUAL IBC TABLE 504.4 MAX HEIGHT GROUP B: 75 FT ALLOWED/ 34 FT ACTUAL IBC TABLE 504.3 92,000 SQ.FT ALLOWED/ 23,643 SQ.FT ACTUAL MAX AREA GROUP B: IBC TABLE 506.2 3 ALLOWED / 1 ACTUAL IBC TABLE 504.4 MAX STORIES GROUP F-1:

MAX HEIGHT GROUP F-1: 75 FT ALLOWED/ 34 FT ACTUAL MAX AREA GROUP F-1:

IBC TABLE 504.3 46,500 SQ.FT ALLOWED/ 20,516 SQ.FT ACTUAL IBC TABLE 506.2

FIRE/SMOKE RESISTANCE RATED SEPARATIONS

REFERENCE FIRE PUMP ROOM UFC 3-600-01 §9-5.1.1, NFPA 20 §4.14.1.1.2 UFC 3-600-01 \$4-40.4 ELECTRICAL ROOM w/TRANSFORMER 1-HOUR NFPA 70 §450.42 NFPA 101 §8.7.1.1 MECH ROOM SMOKE PARTITION NFPA 101 §38.3.2.1 UFC 3-600-01 §4-48.5.2.2 STORAGE 1-HOUR TRASH / RECYCLE ROOMS 1-HOUR UFC 3-600-01 §4-46.2

TYPE OF ASSEMBLY FIRE DOOR FIRE DAMPER SMOKE DAMPER RATING 1 HR ASSEMBLY RATING RATING 1 HR 1 HR FIRE BARRIER 0.75 HR N/A CLASS II* SMOKE PARTITION 0 HR STORAGE AREA 0.75 HR 1 HR

GENERAL INSTRUCTION BUILDING - CODE ANALYSIS

FIRE BARRIERS: THROUGH PENETRATIONS SHALL BE PROTECTED BY AN APPROVED PENETRATION FIRESTOP SYSTEM, INSTALLED AS TESTED, IN ACCORDANCE WITH ASTM E814 OR UL 1479, WITH A MINIMUM POSITIVE PRESSURE DIFFERENTIAL OF 0.01 INCH OF WATER AND AN F RATING OF

JOINTS INSTALLED IN OR BETWEEN FIRE-RESISTANCE RATED WALL ASSEMBLIES, FLOOR OR FLOOR/CEILING ASSEMBLIES AND ROOFS OR ROOF/CEILING ASSEMBLIES SHALL BE PROTECTED BY AN APPROVED FIRE-RESISTANT JOINT SYSTEM DESIGNED TO RESIST THE PASSAGE OF FIRE FOR A TIME PERIOD NOT LESS THAN THE ASSEMBLY IN WHICH IT IS LOCATED (NFPA 101 §8.3.5.2.1). FIRE RESISTANT JOINT SYSTEMS SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF EITHER ASTM E1966 OR UL 2079. ALL HEAD OF WALL, WALL TO WALL, AND FLOOR TO WALL JOINT SYSTEMS SHALL BE DYNAMIC. BOTTOM OF THE WALL JOINTS SHALL BE STATIC. NONSYMMETRICAL WALL JOINT SYSTEMS SHALL BE TESTED WITH BOTH FACES EXPOSED TO THE FURNACE TEST. AND THE ASSIGNED FIRE-RESISTANCE RATING SHALL BE THE SHORTEST DURATION

SMOKE PARTITIONS: PENETRATIONS FOR CABLES, CABLE TRAYS, CONDUITS, PIPES, TUBES, VENTS, WIRES, AND SIMILAR ITEMS TO ACCOMMODATE ELECTRICAL, MECHANICAL, PLUMBING, AND COMMUNICATIONS SYSTEMS THAT PASS THROUGH A SMOKE PARTITION SHALL BE PROTECTED BY A

JOINTS MADE WITHIN OR AT THE PERIMETER OF SMOKE PARTITIONS SHALL BE PROTECTED WITH A JOINT SYSTEM THAT IS CAPABLE OF LIMITING

NFPA 101 TABLE A.10.2.2 NFPA 101 TABLE A.10.2.2 NFPA 101 TABLE A.10.2.2

GENERAL PURPOSE PORTABLE FIRE EXTINGUISHERS MUST BE PROVIDED WHERE REQUIRED BY NFPA 101 (UFC 3-600-01, 9-17.1, NFPA 10 §5.2 & §5.4)

BUILDING SHALL HAVE AT LEAST ONE MEANS OF ALL-WEATHER GROUND ACCESS TO ALLOW EMERGENCY VEHICLES UNIMPEDED ACCESS TO THE FACILITY. ALL-WEATHER GROUND ACCESS MUST BE PAVED, START FROM THE ROAD, AND TERMINATE NO FARTHER THAN 33 FEET FROM AN EXTERIOR DOOR ACCESSIBLE FOR FIRE DEPARTMENT INGRESS (I.E. AN EXTERIOR DOOR THAT PROVIDES ACCESS TO THE FACILITY INTERIOR).

DIMENSIONS OF FIRE LANES AND TURNAROUNDS MUST COMPLY WITH NFPA 1 (UFC 3-600-01 §9-1.3). FIRE DEPARTMENT ACCESS ROADS SHALL HAVE AN UNOBSTRUCTED WIDTH OF NOT LESS THAN 20 FT AND AN UNOBSTRUCTED VERTICAL CLEARANCE OF NOT LESS THAN 13 FT 6 IN (NFPA 1 § 18.2.3.5.1.1 AND §18.2.3.5.1.2). DEAD END FIRE DEPARTMENT ACCESS ROADS IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH APPROVED PROVISIONS FOR THE FIRE APPARATUS TO TURN AROUND. (NFPA 1 §18.2.3.2.2)

A SUITABLE ALL-WEATHER GROUND ACCESS SURFACE FOR ANY APPARATUS SHALL BE PROVIDED WITHIN 150 FEET OF THE FIRE DEPARTMENT CONNECTION (UFC 3-600-01 §9-1.4).

PRIVATE FIRE SERVICE MAINS SUPPLYING FIRE PROTECTION SYSTEMS WITHIN THE BUILDING SHALL BE PERMITTED TO EXTEND NO MORE THAN 10 FEET, AS MEASURED FROM THE OUTSIDE OF THE BUILDING, UNDER THE BUILDING TO THE RISER LOCATION (NFPA 24 §10.4.3.1).

THE BUILDING HAS A TOTAL FLOOR AREA OF 44,159 SQ. FT. AND IS OF TYPE IIB (000) CONSTRUCTION WHICH RESULTS IN A REQUIRED FIRE FLOW OF 4.500 GPM FOR 4 HOURS IN ACCORDANCE WITH NFPA 1 TABLE 18.4.5.2.1. THE REQUIRED FIRE FLOW IS PERMITTED TO BE REDUCED BY 75% AS THE BUILDING IS FULLY SPRINKLERED THROUGHOUT BUT CANNOT BE LESS THAN 1,000 GPM AND SHALL NOT EXCEED 2,000 GPM FOR 2 HOURS (NFPA 1 §18.4.5.3.2, NFPA 1 §18.4.5.3.4 AND UFC 3-600-01 §9-2.1). THEREFORE, THE REQUIRED FIRE FLOW FOR THE BUILDING IS 1,125 GPM AT 20 PSI

ALL COMPONENTS AND FEATURES RELATED TO MEANS OF EGRESS SHALL COMPLY NFPA 101 AND UFC 3-600-01 (UFC 3-600-01 §10-1.1).THEREFORE EACH SEPARATED PORTION OF THE BUILDING SHALL COMPLY WITH THE REQUIREMENTS FOR THE OCCUPANCY THEREIN (NFPA 101 §6.1.14.4.5)

REFERENCE NFPA 221 TABLE 4.9.2

NFPA 221 TABLE 4.9.2

NFPA 101 §8.4.6.3

MEANS OF EGRESS SHALL HAVE A CEILING HEIGHT OF NOT LESS THAN 7 FT 6 IN. (NFPA 101 §7.1.5.1)

OCCUPANT LOAD

THE OCCUPANCY LOADS ARE DETERMINED BASED ON THE AREA. FUNCTION OF THE SPACE, AND THE OCCUPANT LOAD FACTOR (SQ. FT. /PERSON). THE OCCUPANT LOAD FACTORS ARE PROVIDED IN UFC 3-600-01 TABLE 10-1 AND NFPA 101 TABLE 7.3.1.2. THE OCCUPANT LOAD FACTOR IS BASED ON THE ACTUAL USE OF THE SPACE, NOT ON ITS OCCUPANCY CLASSIFICATION, OCCUPANT LOAD CALCULATIONS ARE PROVIDED BELOW.

	ROOM			OCCUPANT LOAD FACTOR (SQ.FT /	GROSS	OCCUPANT
ROOM / AREA	NUMBER	SQ. FT.	OCCUPANCY CLASSIFICATION	PERSON)	OR NET	LOAD
REMAINDER		18,797.33	BUSINESS	150	GROSS	126
ELEC.	103	346.93	BUILDING EQUIPMENT	500	GROSS	1
FIRE PUMP / MECH.	104/105	632.17	BUILDING EQUIPMENT	500	GROSS	2
COMM	106	227.23	BUILDING EQUIPMENT	300	GROSS	1
ELEC.	115	128.45	BUILDING EQUIPMENT	500	GROSS	1
RECYCLE	116	136.74	BUILDING EQUIPMENT	500	GROSS	1
BREAK RM	133	493.68	ASSEMBLY	15	NET	33
COPY RM	139	173.18	BUSINESS	150	GROSS	2
COMM	140	154.56	BUILDING EQUIPMENT	300	GROSS	1
CONF. ROOM	143	307.36	CONFERENCE	15	NET	21
CONF. ROOM	144	487.02	CONFERENCE	15	NET	33
SERVER	146	255.96	BUILDING EQUIPMENT	500	GROSS	1
STORAGE	147	1,333.37	STORAGE	500	GROSS	3
JAN CLOSET	150	133.20	BUILDING EQUIPMENT	500	GROSS	1
OPEN BAYS	145	20,552.45	INDUSTRIAL	100	GROSS	206
TOTAL		44,159.64				433

MINIMUM NUMBER OF MEANS OF EGRESS REQUIRED:

OCCUPANT LOAD 1-500: NOT LESS THAN 2 EXITS REQUIRED NFPA 101 §7.4.1.1

EXIT CAPACITY

NFPA 101 TABLE 7.3.3.1 **EGRESS CAPACITY FACTORS:** ALL OTHERS - 0.2 INCHES LEVEL COMPONENTS & RAMPS:

EXIT CAPACITY CALCULATION FOR EACH EXIT IS SHOWN ON THE LIFE SAFETY FLOOR PLANS.

MEANS OF EGRESS COMPONENTS AND CLEAR WIDTH

THE REQUIRED CAPACITY OF EACH DOOR OPENING SHALL BE SUFFICIENT FOR THE OCCUPANT LOAD THEREOF AND SHALL PROVIDE A MINIMUM CLEAR WIDTH OF 32 INCHES. CLEAR OPENINGS OF DOORWAYS WITH SWINGING DOORS SHALL BE MEASURED BETWEEN THE FACE OF THE DOOR AND THE STOP, WITH THE DOOR OPEN 90 DEGREES. WHERE A DOOR OPENING INCLUDES TWO DOOR LEAVES WITHOUT A MULLION, ONE LEAF SHALL PROVIDE A CLEAR OPENING WIDTH OF 32 INCHES. THE MAXIMUM WIDTH OF A SWINGING DOOR LEAF SHALL BE 48 INCHES NOMINAL. THE HEIGHT OF DOOR OPENINGS SHALL BE NOT LESS THAN 80 INCHES. (NFPA 101 §7.2.1.2.3.2)

THERE SHALL NOT BE PROJECTIONS INTO THE REQUIRED CLEAR WIDTH OF A DOOR OPENING LOWER THAN 34 INCHES ABOVE THE FLOOR OR GROUND. PROJECTIONS INTO THE CLEAR OPENING WIDTH BETWEEN 34 INCHES AND 80 INCHES ABOVE THE FLOOR OR GROUND SHALL NOT EXCEED 4 INCHES. DOOR CLOSERS AND DOORSTOPS SHALL BE PERMITTED TO BE 78 INCHES MINIMUM ABOVE THE FLOOR. (NFPA 101 §7.2.1.2.1.1)

EGRESS DOORS SHALL BE OF THE PIVOTED OR SIDE-HINGED SWINGING TYPE AND SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING

ALL LOCKS, LATCHES AND ALL OTHER FASTENING DEVICES ON A DOOR LEAF SHALL BE PROVIDED WITH A RELEASING DEVICE THAT HAS AN OBVIOUS METHOD OF OPERATION AND THAT IS READILY OPERATED UNDER ALL LIGHTING CONDITIONS (NFPA 101 §7.2.1.5.3).

A ROOM OR AREA CONTAINING AN OCCUPANT LOAD OF 50 OR MORE PERSONS, OR HIGH-HAZARD CONTENTS AREA (NFPA 101 §7.2.1.4.2).

ACCESSIBLE MEANS OF EGRESS

ACCESSIBLE MEANS OF EGRESS SHALL COMPLY WITH NFPA 101 (UFC 3-600-01 §10-1.2). AN ACCESSIBLE MEANS OF EGRESS IS DEFINED AS A MEANS OF EGRESS THAT PROVIDES AN ACCESSIBLE ROUTE TO AN AREA OF REFUGE, A HORIZONTAL EXIT, OR A PUBLIC WAY (NFPA 101 §3.3.180.1).

ACCESS WITHIN THE ALLOWABLE TRAVEL DISTANCE IS PROVIDED TO AT LEAST ONE ACCESSIBLE EXIT PROVIDING AN ACCESSIBLE ROUTE TO AN EXIT DISCHARGE (NFPA 101 §7.5.4.1.1). EXIT ACCESS TRAVEL ALONG THE ACCESSIBLE MEANS OF EGRESS IS PERMITTED TO BE COMMON FOR THE DISTANCES PERMITTED AS COMMON PATHS OF TRAVEL (NFPA 101 §7.5.4.1.4). ONE MEAN OF EGRESS IS PERMITTED FOR THE BUSINESS AREA WITH A TOTAL OCCUPANT LOAD OF LESS THAT 100 PERSONS (NFPA 101 §38.2.4.3), ONE MEANS OF EGRESS IS PROVIDED FOR THE BUSINESS AREA.

THE ACCESSIBLE MEANS OF EGRESS FOR THE BUILDING CONSISTS OF EXIT DOORS DISCHARGING DIRECTLY TO THE EXTERIOR

TRAVEL DISTANCE, COMMON PATH AND DEAD END LIMITS

TRAVEL DISTANCE LIMIT: NFPA 101 TABLE A.7.6, IDG DIVISION 21 **NEW BUSINESS:** 300 FEET

NEW INDUSTRIAL 250 FEET

NFPA 101 TABLE A.7.6, IDG DIVISION 21 **COMMON PATH LIMIT:**

100 FEET **NEW BUSINESS:** 100 FEET **NEW INDUSTRIAL**

NFPA 101 TABLE A.7.6, IDG DIVISION 21 DEAD-END LIMIT:

NEW BUSINESS 50 FEET NEW INDUSTRIAL 50 FEET

MEANS OF EGRESS ILLUMINATION

ILLUMINATION OF MEANS OF EGRESS SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 101 §7.8 (NFPA 101 §38.2.8 AND 40.2.8). LLUMINATION OF MEANS OF EGRESS SHALL BE CONTINUOUS DURING TIMES OF OCCUPANCY (NFPA 101 §7.8.1.2). ILLUMINATION PROVIDED OUTSIDE THE BUILDING SHOULD BE EITHER A PUBLIC WAY OR A DISTANCE AWAY FROM THE BUILDING THAT IS CONSIDERED SAFE, WHICHEVER IS CLOSEST TO THE BUILDING BEING EVACUATED.

FLOORS AND OTHER WALKING SURFACES WITHIN AN EXIT OR WITHIN PORTIONS OF THE EXIT ACCESS AND EXIT DISCHARGE ARE PROVIDED WITH A MINIMUM ILLUMINATION OF 1 FOOT-CANDLE (FTC; 10.8 LUX) MEASURED AT THE FLOOR (NFPA 101 §7.8.1.3(2)). THE REQUIRED ILLUMINATION IS ARRANGED SO THAT THE FAILURE OF ANY SINGLE LIGHTING UNIT DOES NOT RESULT IN AN ILLUMINATION LEVEL OF LESS THAN 0.2 FTC (2.2 LUX) IN ANY DESIGNATED AREA (NFPA 101 §7.8.1.4).

AUTOMATIC LIGHTING CONTROL DEVICES ARE PERMITTED AND SHALL BE USED TO TEMPORARILY TURN OFF THE ILLUMINATION WITHIN THE MEANS OF

EGRESS, AND EACH LIGHTING CONTROL DEVICE SHALL COMPLY WITH ALL OF THE FOLLOWING (NFPA 101 §7.8.1.2.2): THE LIGHTING CONTROL DEVICE SHALL BE LISTED.

THE LIGHTING CONTROL DEVICE SHALL BE EQUIPPED TO AUTOMATICALLY ENERGIZE THE CONTROLLED LIGHTS UPON LOSS OF NORMAL POWER

AND IS EVALUATED FOR THIS PURPOSE.

ILLUMINATION TIMERS ARE PROVIDED AND ARE SET FOR A MINIMUM 15-MINUTE DURATION

THE LIGHTING CONTROL DEVICE IS ACTIVATED BY ANY OCCUPANT MOVEMENT IN THE AREA SERVED BY THE LIGHTING UNITS. THE LIGHTING CONTROL DEVICE SHALL BE ACTIVATED BY ACTIVATION OF THE BUILDING FIRE ALARM SYSTEM.

THE LIGHTING CONTROL DEVICE SHALL NOT TURN OFF ANY LIGHTS RELIED UPON FOR ACTIVATION OF PHOTOLUMINESCENT EXIT SIGNS OR PATH MARKERS (IF APPLICABLE).

THE LIGHTING CONTROL DEVICE DOES NOT TURN OFF ANY BATTERY-EQUIPPED EMERGENCY LUMINARIES, UNIT EQUIPMENT, OR EXIT SIGNS.

MARKING OF MEANS OF EGRESS

MARKING OF MEANS OF EGRESS SHALL BE IN ACCORDANCE WITH NFPA 101 §7.10 (NFPA 101 §38.2.10 AND §40.2.10). EXIT SIGNS INDICATING THE DIRECTION OF EGRESS WILL BE PROVIDED IN ACCORDANCE WITH NFPA 101. EXIT SIGNS WILL BE PLACED AT ALL EXIT DOORS (NFPA 101 § 7.10.1.2.1). HORIZONTAL COMPONENTS OF THE EGRESS PATH ARE MARKED BY APPROVED EXIT OR DIRECTIONAL EXIT SIGNS WHERE THE CONTINUATION OF THE EGRESS PATH IS NOT OBVIOUS. EXIT SIGNS ARE PLACED SO THAT NO POINT IN AN EXIT ACCESS CORRIDOR EXCEEDS THE RATED VIEWING DISTANCE OR 100 FT, WHICHEVER IS LESS, FROM THE NEAREST SIGN (NFPA 101 §7.10.1.5.2).

EMERGENCY LIGHTING MUST BE PROVIDED FOR MEANS OF EGRESS IN ACCORDANCE WITH NFPA 101 (NFPA 101 §42.2.9). EMERGENCY ILLUMINATION IS PROVIDED FOR A MINIMUM OF 1.5 HOURS IN THE EVENT OF FAILURE OF NORMAL LIGHTING PER NFPA 101 §7.9.2.1. EMERGENCY LIGHTING FACILITIES ARE ARRANGED TO PROVIDE INITIAL ILLUMINATION THAT IS NO LESS THAN AN AVERAGE OF 1 FTC (10.8 LUX) AND, AT ANY POINT, NO LESS THAN 0.1 FTC (1.1 LUX), MEASURED ALONG THE PATH OF EGRESS AT FLOOR LEVEL (NFPA 101 §7.9.2.1.1). ILLUMINATION LÉVELS ARE PERMITTED TO DECLINE TO NO LÈSS THAN AN AVERAGE OF 0.6 FTC (6.5 LUX) AND, AT ANY POINT, NO LESS THAN 0.06 FTC (0.65 LUX) AT THE END OF 1.5 HR. (NFPA 101 §7.9.2.1.2). A MAXIMUM-TO-MINIMUM ILLUMINATION UNIFORMITY RATIO OF 40 TO 1 IS NOT TO BE EXCEEDED (NFPA 101 §7.9.2.1.3). THE EMERGENCY LIGHTING SYSTEM MUST BE ARRANGED TO PROVIDE THE REQUIRED ILLUMINATION AUTOMATICALLY WHEN NORMAL LIGHTING IS INTERRUPTED DUE TO FAILURE OF A PUBLIC UTILITY OR OTHER OUTSIDE ELECTRICAL POWER SUPPLY, THE OPENING OF A CIRCUIT BREAKER OR FUSE, OR MANUAL ACT(S), INCLUDING ACCIDENTAL OPENING OF A SWITCH CONTROLLING NORMAL LIGHTING FACILITIES (NFPA 101 §7.9.2.3).

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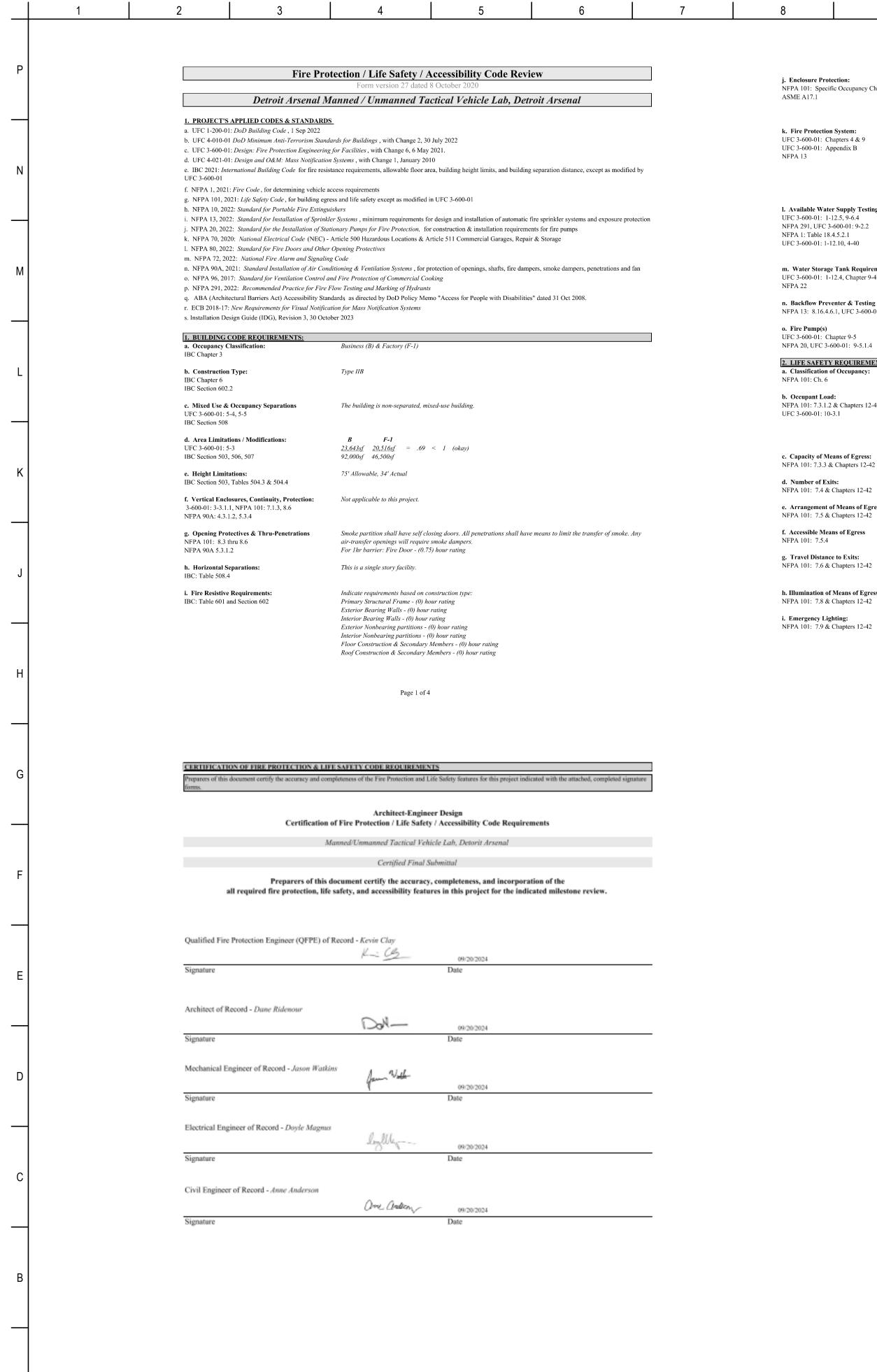
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j. Marking of Means of Egress: NFPA 101: 7.10 & Chapters 12-42 j. Enclosure Protection: NFPA 101: Specific Occupancy Chapters $Me chanical \ Rm \ requires \ sprinkler \ with \ smoke \ partition$ k. Interior Finish Classification Limits: ASME A17.1 Fire Pump Rm requires sprinkler with 1 hr fire barrier. Electrical Rm w/Transformers requires sprinklers with 1 hr fire barrier. NFPA 101: Table A.10.2.2 Recycling Rm requires sprinklers with 1 hr fire barrier. I. Detection, Alarm, & Communications: k. Fire Protection System: Building will be protected throughout with new wet pipe sprinkler system. UFC 3-600-01: Chapters 4 & 9 UFC 3-600-01: Chapter 9-18 UFC 3-600-01: Appendix B NFPA 101: 9.6 & Chapters 12-42 Light Hazard: 0.1 gpm/1,500 sf, K-factor 5.6, 250 gpm hose demand. For ceiling heights up to 30 ft. Ordinary Hazard: 0.2 gpm/2,500 sf, K-factor 8.0, 250 gpm hose demand. For ceiling heights up to 45 ft. m. Portable Fire Extinguishers: Storage: 0.2 gpm/1,500 sf, K-factor 11.2, 250 gpm hose demand. For ceiling heights up to 45 ft. UFC 3-600-01, 9-17, NFPA 10 The storage is intended for use as a material place holder. Fuel load for this space is expected to be low, but no greater than moderate. Rack storage will be used and packing materials will be limited with core materials being noncombustible. n. Corridors: NFPA 101: Chapters 12-42 l. Available Water Supply Testing Static = 47 psi, Residual = 39 psi, Flowing = 876 gpm o. Fire Dampers: UFC 3-600-01: 1-12.5, 9-6.4 Performed 13 October 2022 Location: Detroit, MI Test Conducted by Kevin Clay, FPE NFPA 90A: 5.3.1, 5.4.1 & 5.4.2 NFPA 291, UFC 3-600-01: 9-2.2 NFPA 1: Table 18.4.5.2.1 UFC 3-600-01: 1-12.10, 4-40 p. Smoke Dampers: m. Water Storage Tank Requirements No water storage tank required. q. Duct Smoke Detectors UFC 3-600-01: 1-12.4, Chapter 9-4 NFPA 90A: 6.4.2.1 NFPA 22 n. Backflow Preventer & Testing r. Elevators A backflow preventer will be installed in the fire riser room, on the supply side of the pump. NFPA 13: 8.16.4.6.1, UFC 3-600-01; 9-6.3.5, 9-6.6 ASME A17.1, UFC 3-490-06: 3-3.1 o. Fire Pump(s) Horizontal Split-Case Electric Fire Pump Rated for 1,000 gpm @ 65 psi s. Roof Access: UFC 3-600-01: Chapter 9-5 UFC 3-600-01: 10-4 NFPA 20, UFC 3-600-01: 9-5.1.4 IBC Chapter 1011.12 2. LIFE SAFETY REQUIREMENTS: a. Classification of Occupancy: The building is classified as a business and industrial NFPA 70: NEC Articles 500 & 511 NFPA 101: Ch. 6 u. Fire Dept. Vehicle Access b. Occupant Load: Actual floor area Business: 18,787 GSF / 150 GSF = 127 UFC 3-600-01: 9-1 NFPA 101: 7.3.1.2 & Chapters 12-42 Actual floor area Assembly: 1,288 NSF / 15 NSF = 87 NFPA 1: 18.2.3.4.1 UFC 3-600-01: 10-3.1 Actual floor area Building Equipment: 1,985 GSF / 500 GSF = 7 Actual floor area Industrial: 20,552 GSF / 100 GSF = 206 v. Fire Hydrant Installation Actual floor area Storage: 1,333 GSF / 500 GSF = 3 UFC 3-600-01: 9-3.5 Total Floor Maximum Occupancy: 433 c. Capacity of Means of Egress: Business Occupancy: (442)(0.2"/persons) = 88.4" exit capacity required NFPA 101: 9.2.3, Chapters 12-42 NFPA 101: 7.3.3 & Chapters 12-42 4. MASS NOTIFICATION: d. Number of Exits: Sufficient exits are provided for all spaces within the facility. Access to all exits are not readily available to all UFC 4-021-01 NFPA 101: 7.4 & Chapters 12-42 occupant. However, all occupants have access to a minimum of two exits. ECB 2018-17 e. Arrangement of Means of Egress A single exit is permitted per NFPA 101 where the common path of travel is not exceeded. There is a single exit from NFPA 101: 7.5 & Chapters 12-42 the Electrical, the Mech Room, and the Fire Pump Room. All exits are accesible. f. Accessible Means of Egress NFPA 101: 7.5.4 Common Path Dead End Length Travel Distance g. Travel Distance to Exits: Business 100 ft NFPA 101: 7.6 & Chapters 12-42 50 ft 50 ft 250 ft Industrial 250 ft h. Illumination of Means of Egress: Minimum illumination per NFPR 101 7.8.1.3 is 1 ft-candle.

Emergency lightning is required for Business Occupancies with more than 300 occupants per NFPA 101 38.2.9.

Emergency lightning is not required for the Industrial Occupancies that are only occupied during daylight hours

with skylights or windows arranged to provide the required level of illumination on all portions of the means of

egress during such hours per NFPA 101 40.2.9.

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General purpose fire extinguishers provided when required. 10-lb Type 4A:80BC portable fire extinguishers will be Protected by sprinklers, no ratings required. No ratings will be provided. Approved fire dampers shall be provided in all air transfer openings in partitions that are required to have a fire resistance rating and in which other openings are required to be protected. Fire dampers shall be installed in air transfer openings in fire resistance rated partitions. Air Handling Units will have smoke dampers since it will have a capacity of 2,000 cfm. IBC: Section 716, NFPA 90A: 4.3.10.2, 5.3.5.1 Air Handling Units will have a duct smoke detector since it will have a capacity of grater than 2,000 cfm. No elevators in this project. The facility is a single story. UFC 3-600-01: 4-1, IBC Chapter 30, NFPA 13 No roof access required. Roof access provided. t. Hazardous Locations in Commercial Garages No commercial garages in this project. Building shall have at least one means of all-weather ground access to allow emergency vehicles unimpeded access to the facility. Fire department access roads shall have an unobstructed width of not less than 20 ft and unobstructed vertical clearance of not less than 13 ft 6 in. Existing hydrants are provided where the maximum hose lay length around the Building does not exceed 350 ft. w. Kitchen Cooking Exhaust Equipment Not applicable to this project. A mass notification system will be provided and communicate to the base reporting system. 5. ACCESSIBILITY REQUIREMENTS: Facility shall be completely accessible in accordance with ABA. Fire alarm annunciators shall be in accordance with ABA.

Exit signs will be provided.

Interior Wall and Ceiling Finish in Corridors and Lobbies Class A or B

Interior Floor Finish in Exits and Exit Access Corridors Class I or II

Interior Wall and Ceiling Finish in All Other Areas Class A,B or C

A combination fire alarm and MNS system will be provided with audible/visuals, text signs, and manual pull stations.

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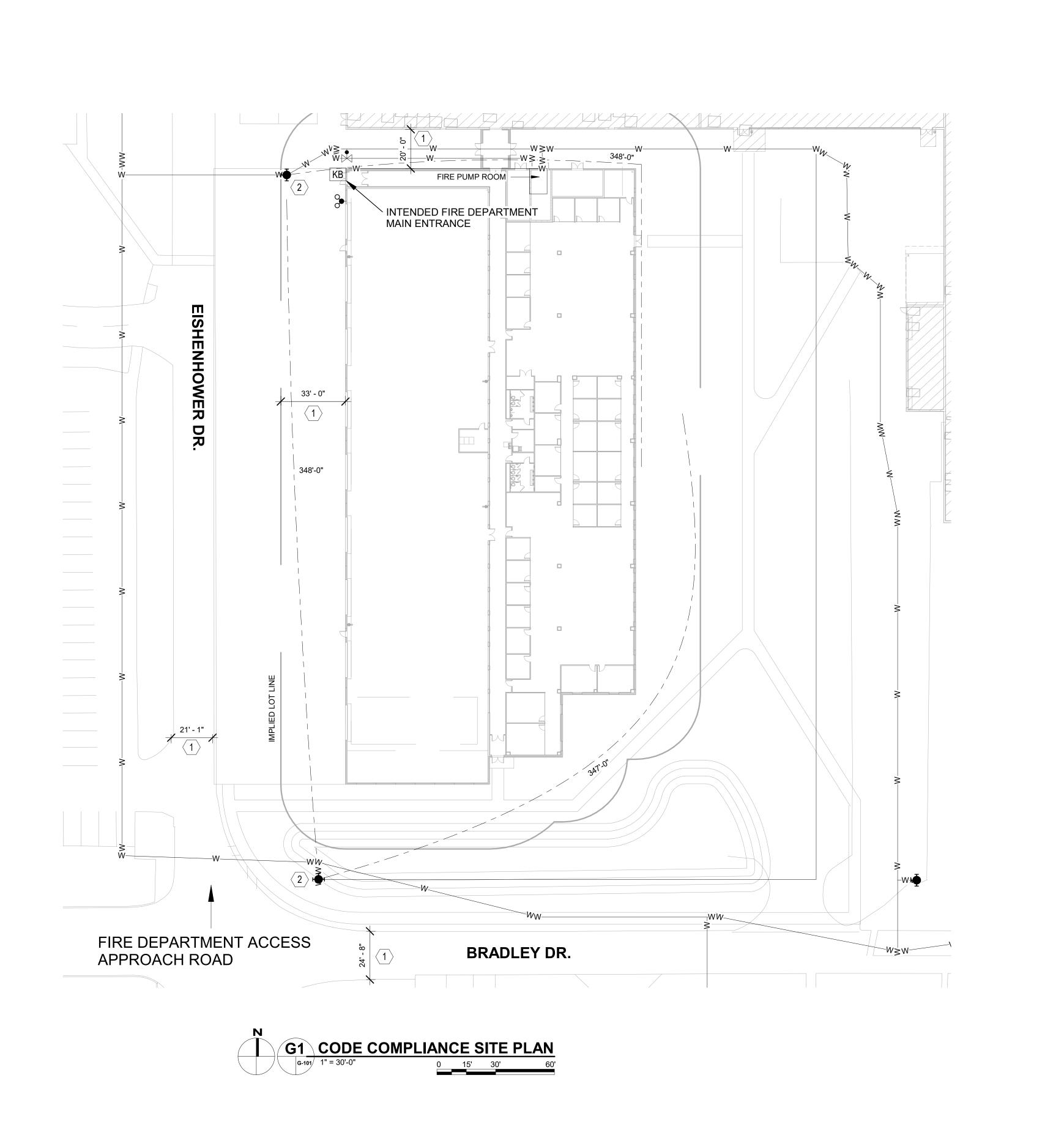
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─W─ UNDERGROUND WATER LINE

→ HOSE LAY LENGTH < 350 FT
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FIRE HYDRANT

FIRE DEPARTMENT CONNECTION

KEYED LOCK BOX

POST INDICATOR VALVE

KEYED NOTES #:

MORE THAN 20 FEET WIDE, WHICH IS SUFFICIENT FOR FIRE DEPARTMENT APPARATUS ACCESS.

FLOW DATA:

DATE: 10-13-2022 PERFORMED BY: K. CLAY STATIC: 47 PSI

RESIDUAL: 39 PSI

FLOW: 876 GPM FIRE FLOW IS 1,125 GPM AT 20 PSI FOR 2 HOURS

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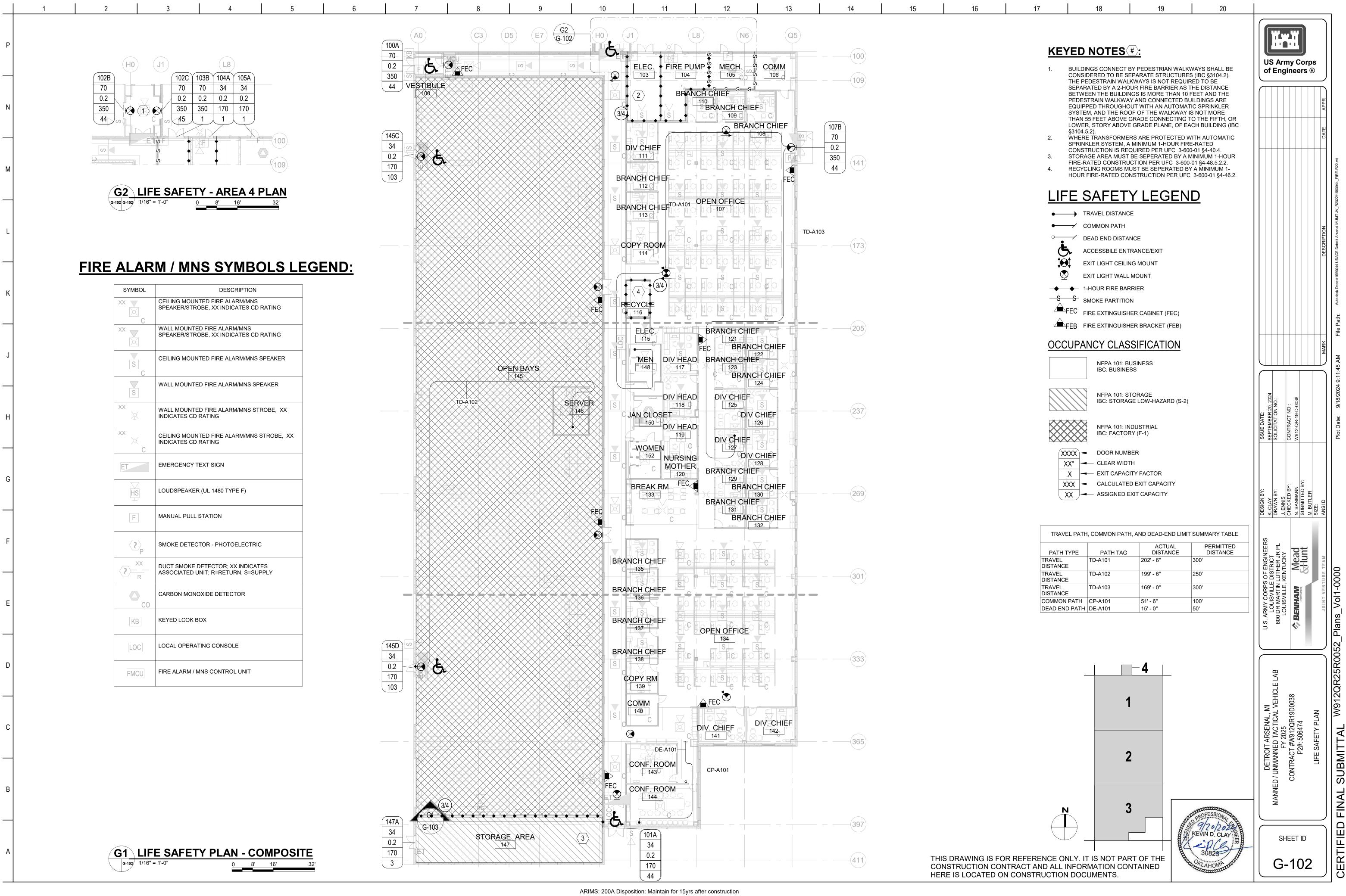
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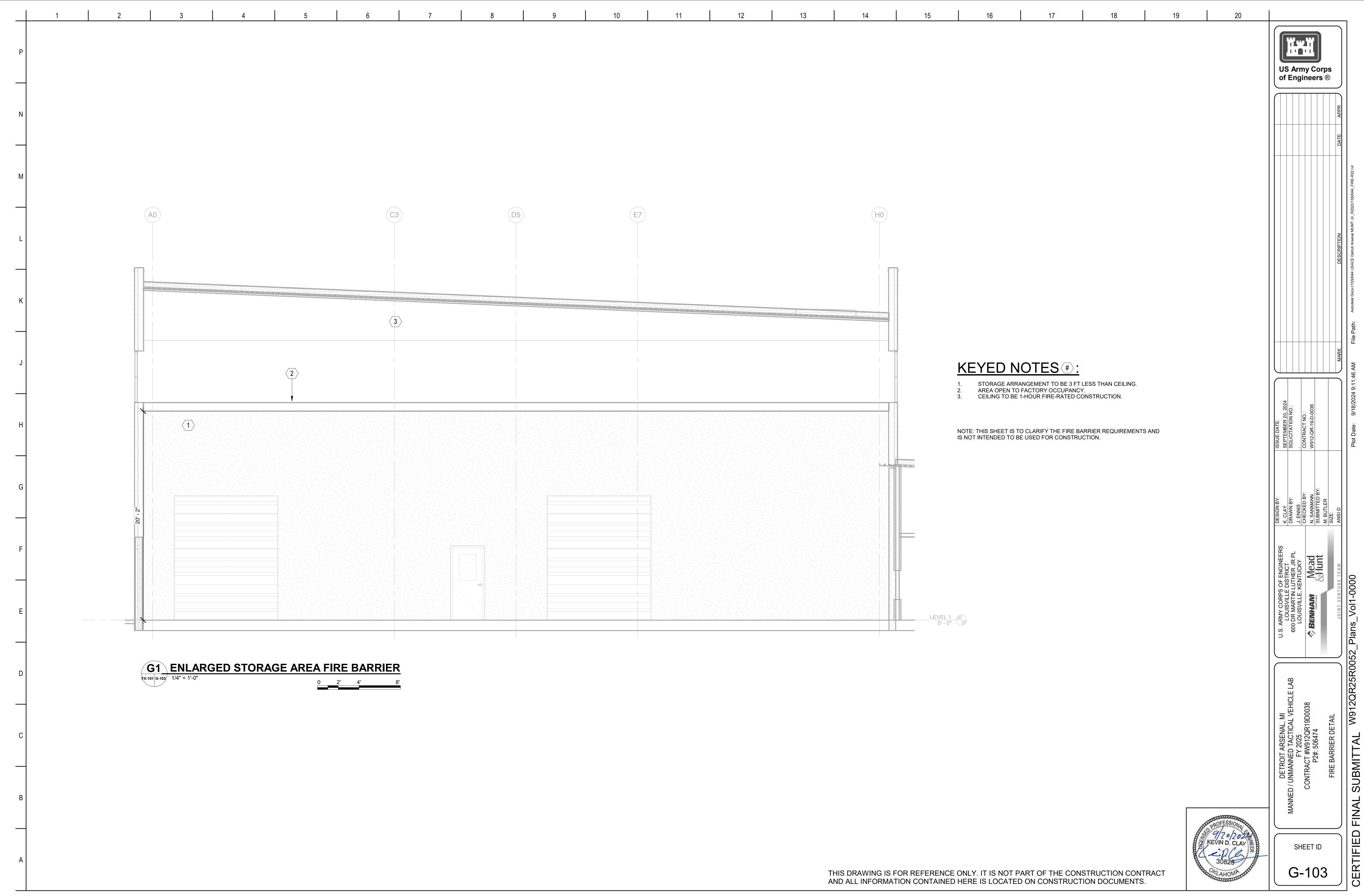
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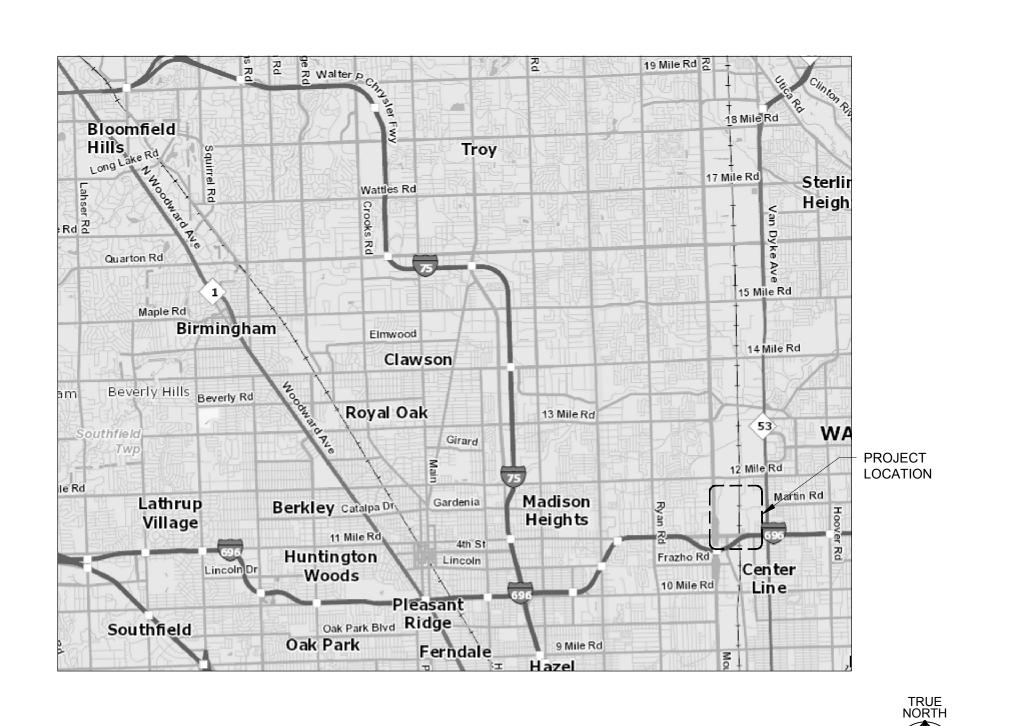
SHEET ID

G-101

THIS DRAWING IS FOR REFERENCE ONLY. IT IS NOT PART OF THE CONSTRUCTION CONTRACT AND ALL INFORMATION CONTAINED HERE IS LOCATED ON CONSTRUCTION DOCUMENTS.







VICINITY MAP

SCALE: NTS

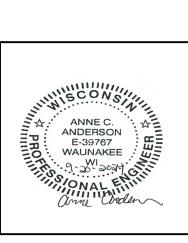
(C1



LOCATION MAP

SCALE: NTS

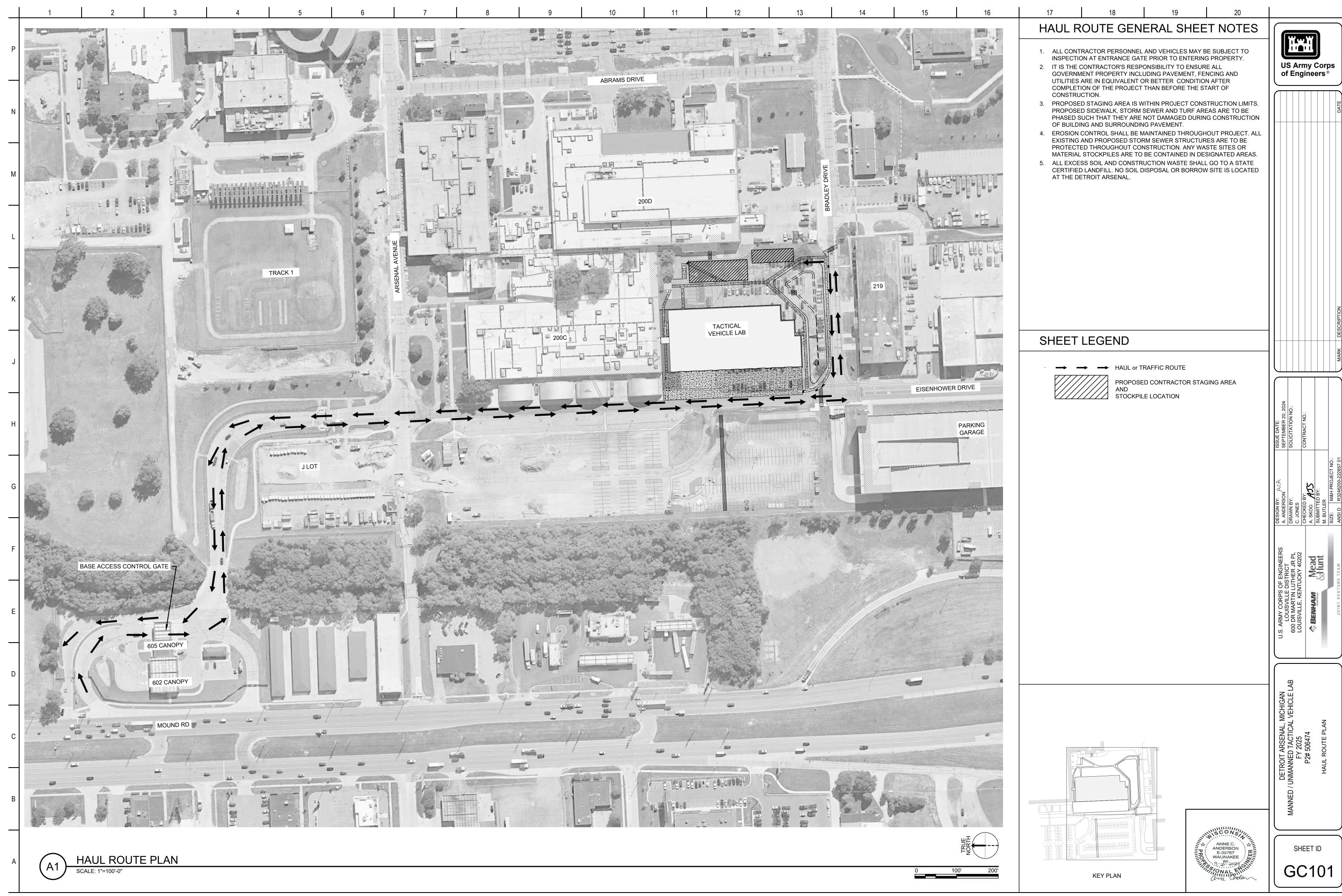
ANDERS E-GSPA

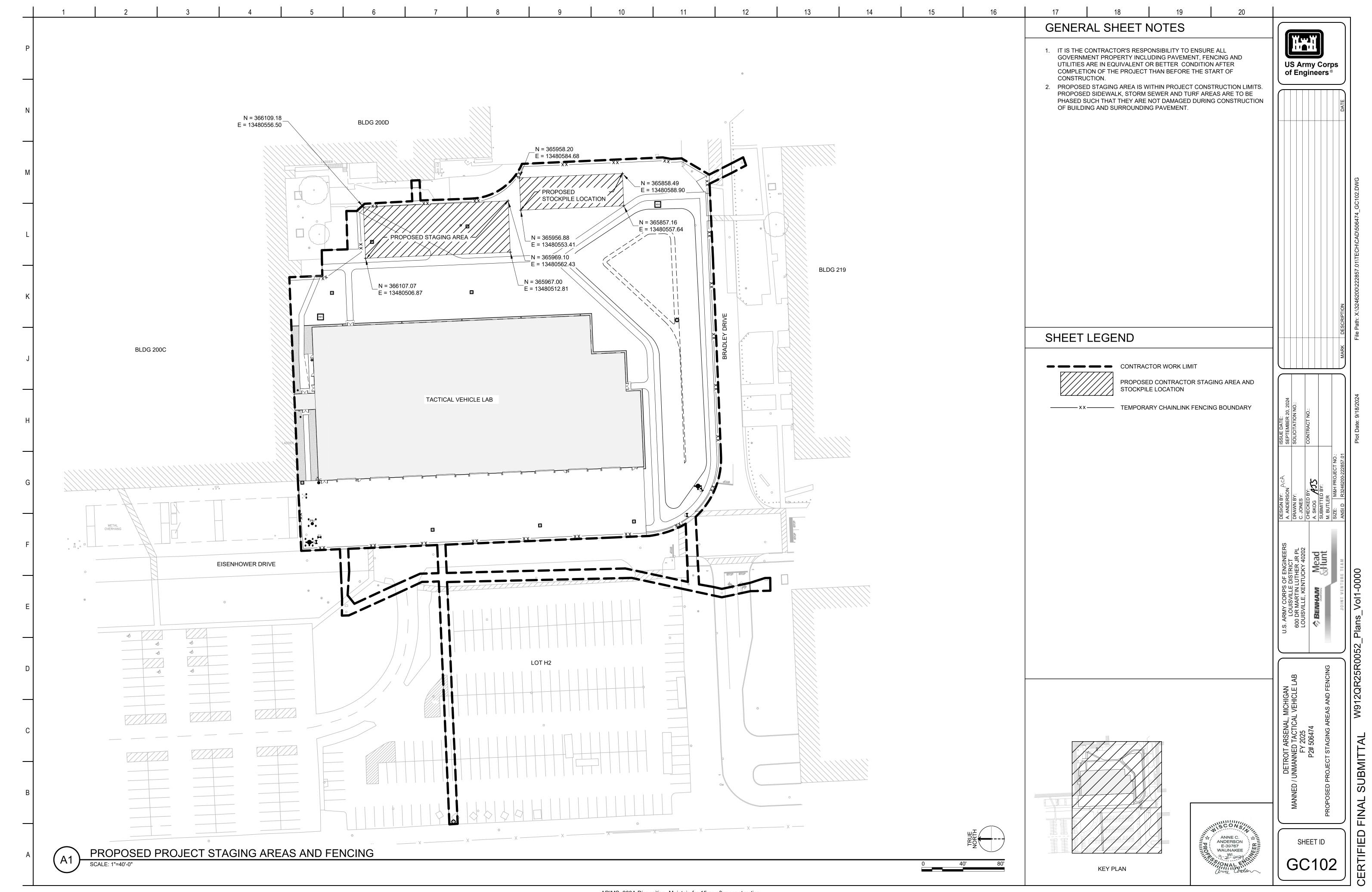


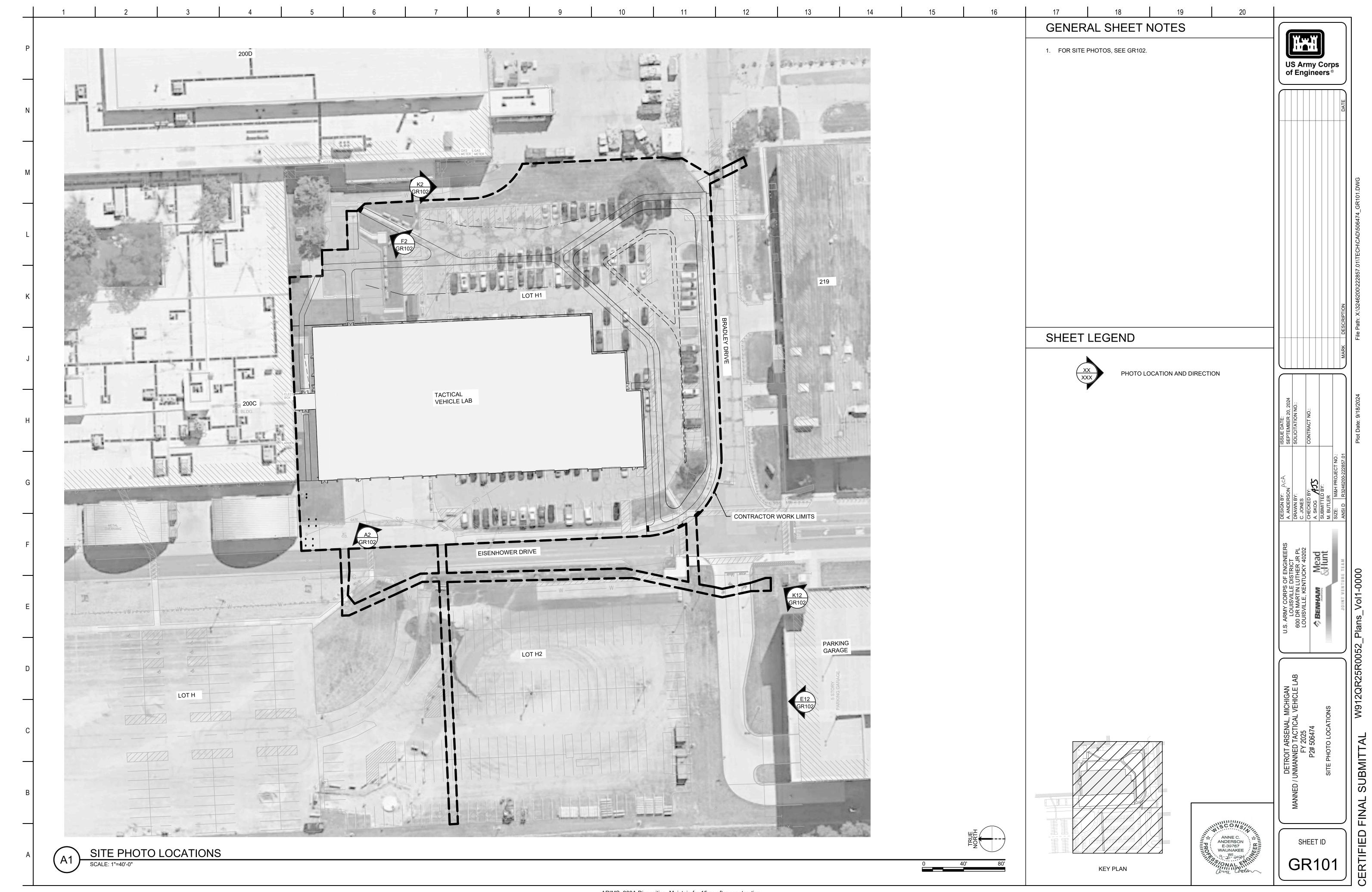
D FY 202 PY 202 PY 202 PY 5064 PY 5064

DESI A. AI DRA C. JC CHE CHE A. SI SUB M. BI M. BI SIZE ANS

US Army Corps of Engineers®







LOOKING SOUTH AT BLDG 219



LOOKING NORTHEAST
SCALE: NTS



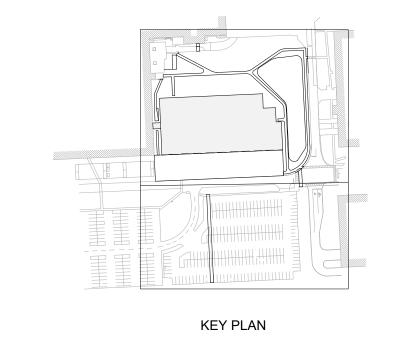
LOOKING NORTHEAST AT THE SOUTHWEST CORNER OF BLDG 200C
SCALE: NTS (A2)

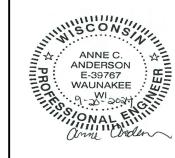


LOOKING NORTHEAST
SCALE: NTS



LOOKING NORTH AT THE EXISTING LOT
SCALE: NTS



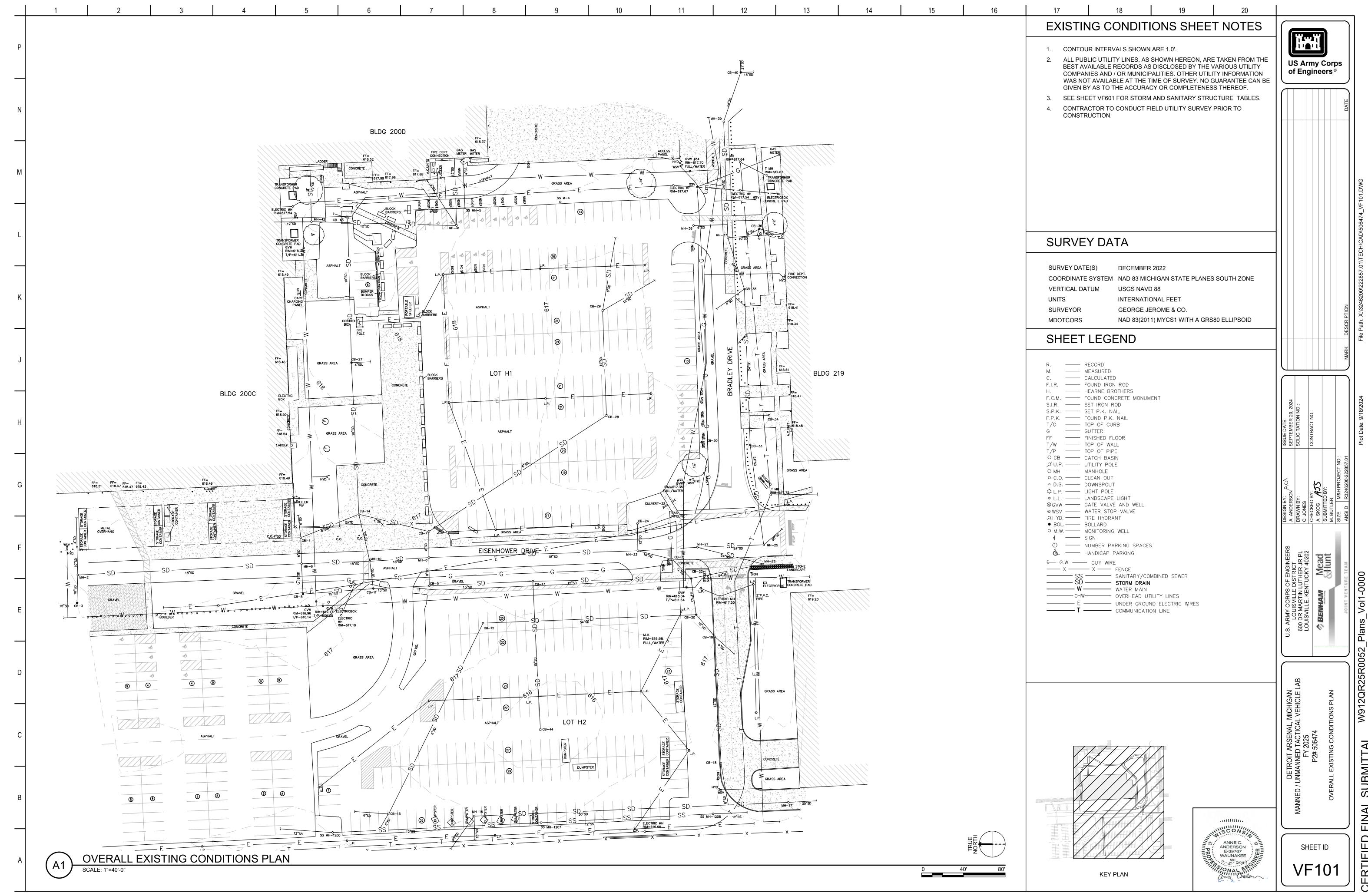


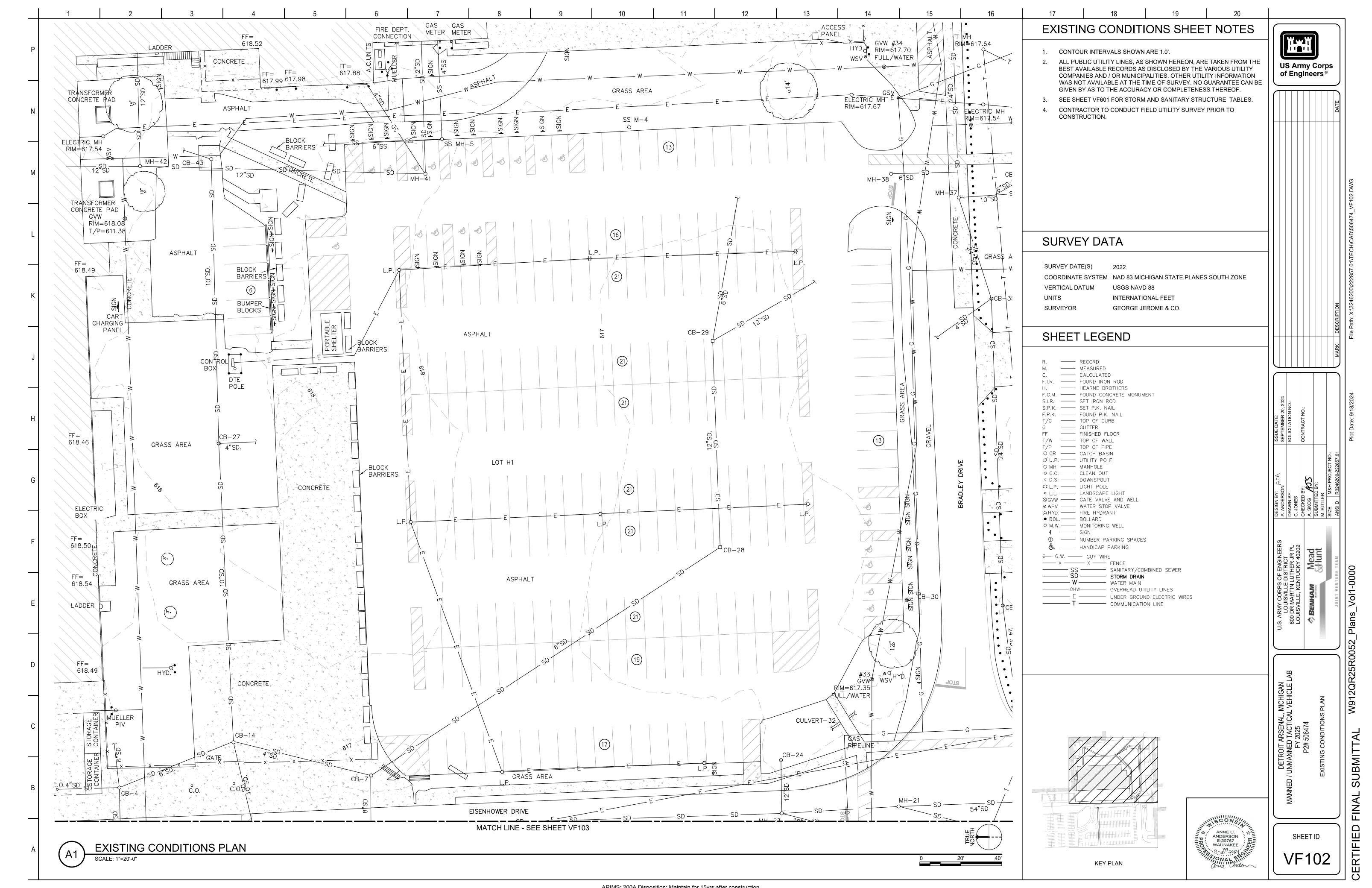
SHEET ID GR102

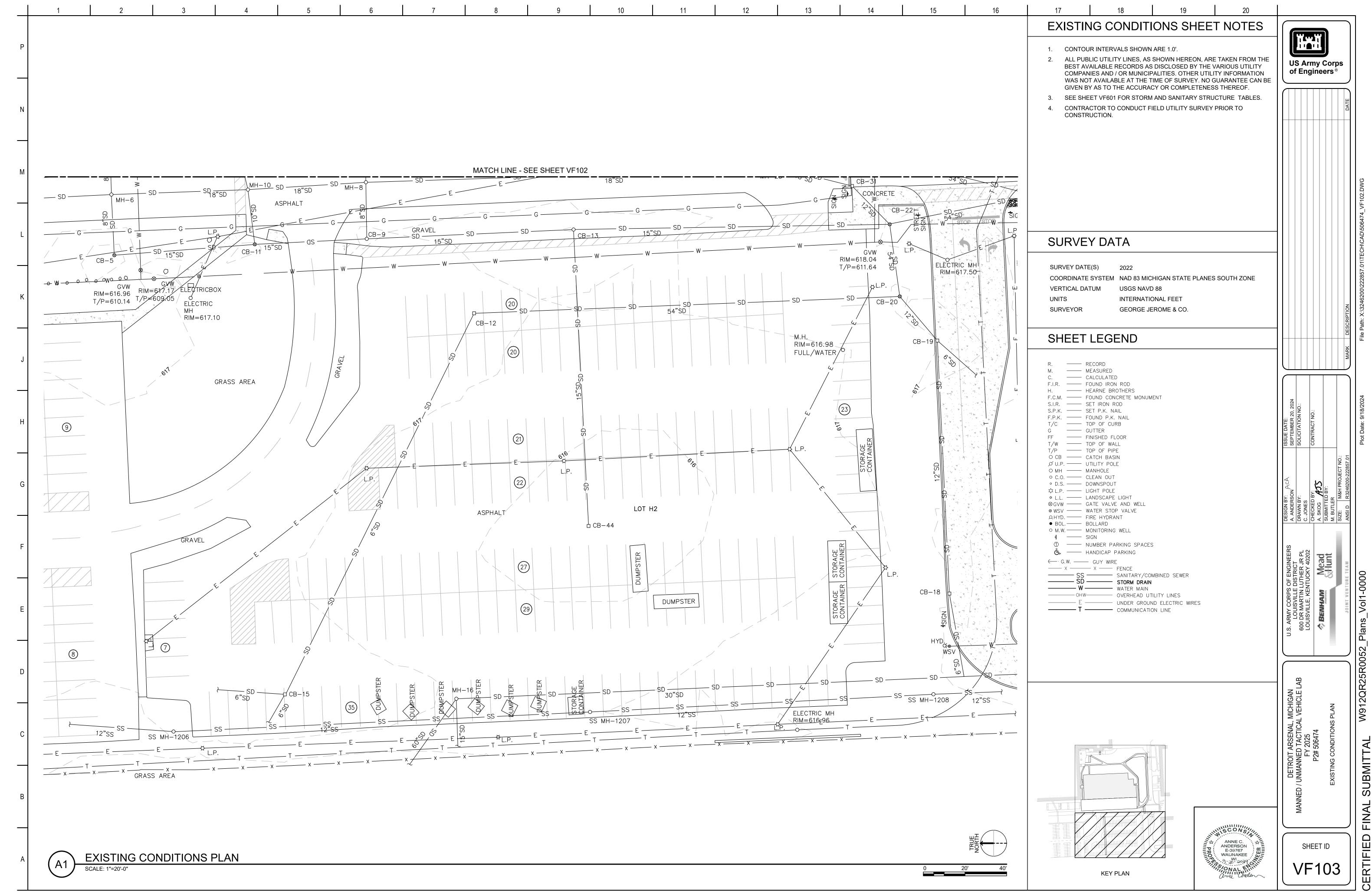
ARIMS: 200A Disposition: Maintain for 15yrs after construction

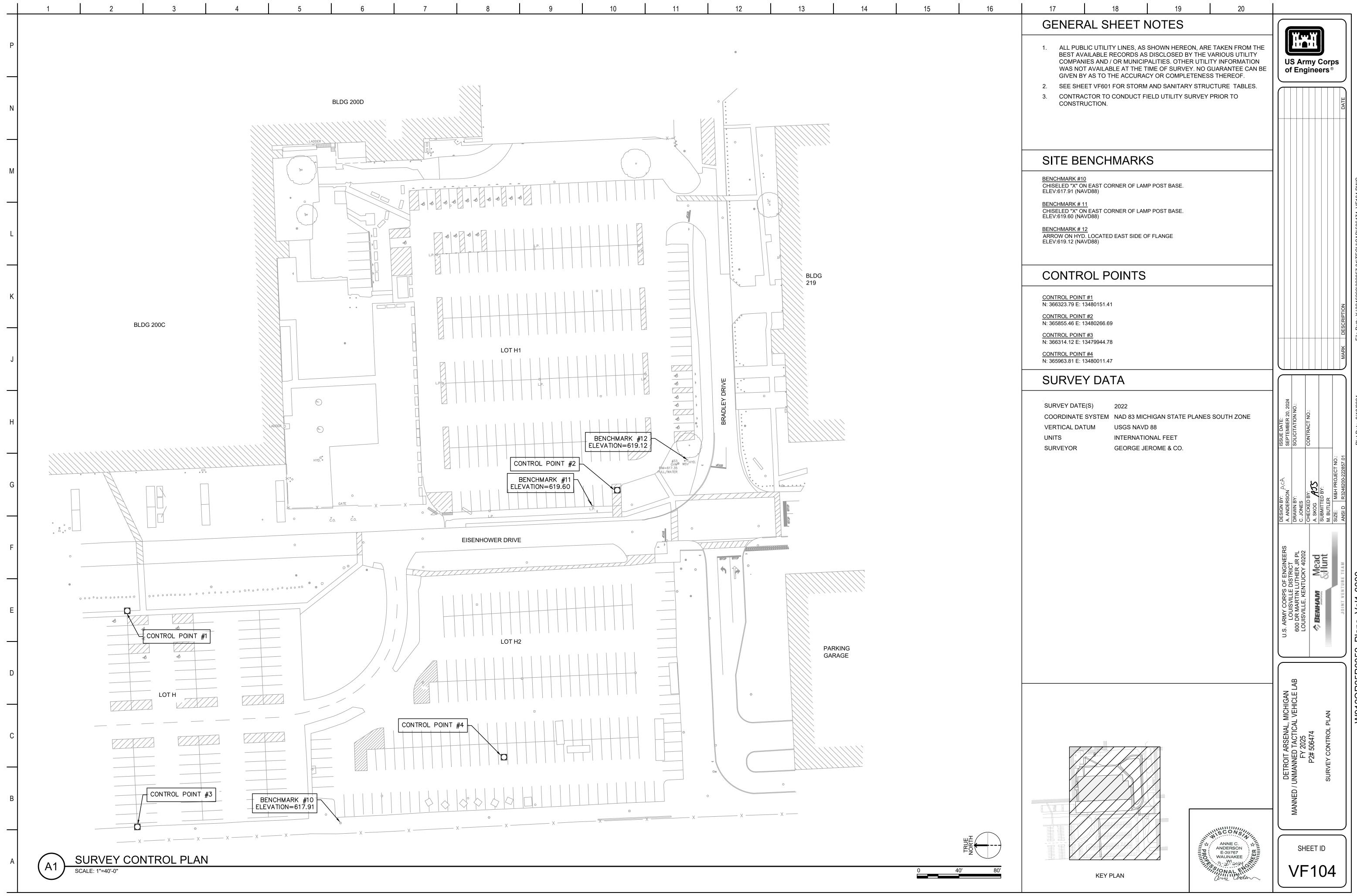
US Army Corps of Engineers®

DES A. AI DRA C. JC CHE A. SI SUB SIZE SIZE









	1	2	3	4	5	6	7	8	9		10	1	11	12	2	13	1	14
Р																EXISTING STRUCTURE	STOR	M
																CB-1	617.29	F
																MH-2	617.62	-
N																CB-3	615.91	Ė
																CB-4	616.81	
																CB-5	615.33	
М																MH-6	617.69	
																	017.00	-
																CB-7 REMOVE	616.51	
L																MH-8	617.66	
																CB-9	616.62	F
																OD-9	010.02	_
K																MH-10	617.69	
_																CB-11	616.87	F
																CB-12	617.02	+
J																CB-13	616.12	<u> </u>
_																CB-14 REMOVE	617.25	
																CB-15	617.29	
Н																MH-16	616.95	
-																MH-17	618.69	
G																CB-18	617.68	+
																CB-19	616.60	
_																CB-20	616.70	
F																MH-21	617.44	
																CB-22	618.21	E
																		F
Е																MH-23 CB-24	617.69	-
																REMOVE	615.97	+
																MH-25 MH-26	617.48	+
D																CB-27	616.98	+
																REMOVE CB-28	616.08	+
																CB-29	616.31	+
С																REMOVE CB-30 REMOVE	616.67	
В																		
А																		
										Al	RIMS: 200A Dis	position: Maint	tain for 15yr	rs after constru	uction			

EXISTING	STOR	M STRUCTURES
STRUCTURE	RIM	INVERTS
CB-1	617.29	10" W INV= 615.21
CD-1	017.29	4" E INV = 615.02
		10" W INV=614.38
MH-2	617.62	10" E INV=614.77
		18" S INV=614.53
CB-3	615.91	15" N INV=613.48
		10" E INV=614.06
		4" N INV=614.09
CB-4	616.81	6" E INV=614.69
		6" SE INV=614.12
		8" W INV=613.99
CB-5	615.33	8" E INV=UNABLE TO GET
		15" S INV=612.28
		18" N INV=613.52
MH-6	617.69	8" E INV=613.67
		18" S INV=612.57
		8" W INV=613.60 4" NE INV=612.53
CB-7	616.51	6" SE INV=612.49
REMOVE	010.51	8" W INV=612.50
		18" N INV=612.25
		8" E INV=612.44
MH-8	617.66	18" S INV=612.44
		8" W INV=612.36
		15" N INV=612.36
CB-9	616.62	8" E INV=612.11
OD-8	010.02	15" S INV=611.76
		18" N INV=612.49
		10"E INV=612.72
MH-10	617.69	18" S INV=612.48
		10" W INV=612.57
		15" N INV=UNABLE TO GET
CB-11	616.87	10" E INV=612.22
0511		15" S INV=UNABLE TO GET
CB-12	617.02	FULL/WATER
		15" N INV=611.53
CB-13	616.12	15" S INV=611.54
		15" W INV=611.90
		10" E INV=613.35
CB-14	617.25	4" SE INV=614.06
REMOVE		10" SW INV=613.37
		6" NW INV=602.73
CB-15	617.29	6" N INV=601.73
		6" SE INV=600.98
		60"NW INV=600.79
MH-16	616.95	15"W INV=602.76
		30" S INV=601.76
MH-17	618.69	30" N INV=602.41
IVII 12 1 /	510.03	30" S INV=602.37
CB-18	617.68	6" W INV=614.38
	317.00	12" E INV=613.49
		12" W INV=612.99
CB-19	616.60	12" NE INV=612.86
		6" SW INV=613.65
		54" N INV=603.70
CB-20	616.70	54" E INV=603.18
		12" SW INV=UNABLE TO GET
	047	18" N INV=606.01
MH-21	617.44	54 " S INV=UNABLE TO GET
		54" SW INV=UNABLE TO GET
		15" N INV=610.40
CB-22	618.21	12" NE INV=UNABLE TO GET
		54" SE INV=604.61
		54" W INV=604.56
MH-23	617.69	18" NE INV=607.10 12" E INV=611.96
IVI∏-∠3	017.09	12" E INV=611.96 18" SW INV=607.18
CD 24		10 SVV IINV-007.10
CB-24 REMOVE	615.97	12" W INV=612.64
I CLIVIO V L		54" NE INV=604.78
MH-25	617.48	24" E INV=608.68
IVII 1º20	317.70	30" SE INV=606.58
		54" NW INV=603.92
MH-26	617.62	54" NE INV=603.92
		10" W INV=613.88
CB-27		10 11 11 010.00

10" E INV=613.92 4" S INV=614.65

6" NW INV=613.57

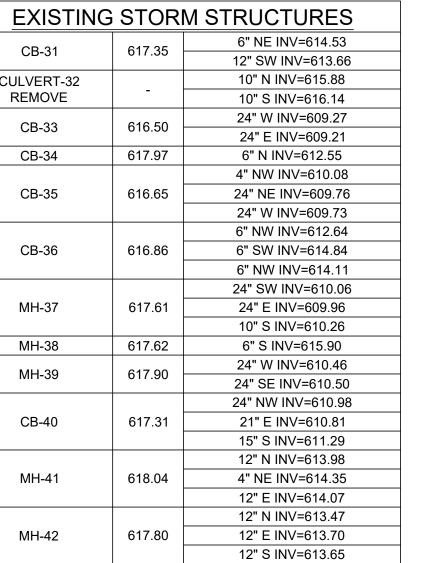
12" SE INV=612.81

12" W INV=613.11 FULL/CONCRETE

12" E INV=612.97 6" E INV=614.70

CD 24	6" NE INV=614.53	
CB-31	617.35	12" SW INV=613.66
CULVERT-32		10" N INV=615.88
REMOVE	- [10" S INV=616.14
CB-33	616.50	24" W INV=609.27
CD-33	010.30	24" E INV=609.21
CB-34	617.97	6" N INV=612.55
		4" NW INV=610.08
CB-35	616.65	24" NE INV=609.76
		24" W INV=609.73
		6" NW INV=612.64
CB-36	616.86	6" SW INV=614.84
		6" NW INV=614.11
		24" SW INV=610.06
MH-37	617.61	24" E INV=609.96
		10" S INV=610.26
MH-38	617.62	6" S INV=615.90
MLL 20	617.00	24" W INV=610.46
MH-39	617.90	24" SE INV=610.50
		24" NW INV=610.98
CB-40	617.31	21" E INV=610.81
		15" S INV=611.29
		12" N INV=613.98
MH-41	618.04	4" NE INV=614.35
		12" E INV=614.07
		12" N INV=613.47
MH-42	617.80	12" E INV=613.70
		12" S INV=613.65
CB-43	617.40	6" N INV=615.30
REMOVE	017.40	10" W INV=615.05
CB-44	615.13	FULL/WATER

EXISTING SANITARY STRUCTURES									
STRUCTURE	RIM	INVERTS							
SAN MH-1206	617.16	12" N INV=600.95							
SAN WIT-1200	017.10	12" S INV=600.87							
SAN MH-1207	616.94	12" N INV=604.74							
SAN WIT-1207	010.94	12" S INV=604.80							
SAN MH-1208	617.61	12" N INV=605.64							
3AN WII I-1200	017.01	12" S INV=605.78							
SAN MH-4	517.68	-							
SAN MH-5	618.13	6" N INV=613.70							
OAN WILL-O	010.13	4" E INV=613.53							



DES A. A. A. DRA DRA C. JG C. JG N. B SUB SIZE ANS

US Army Corps of Engineers®

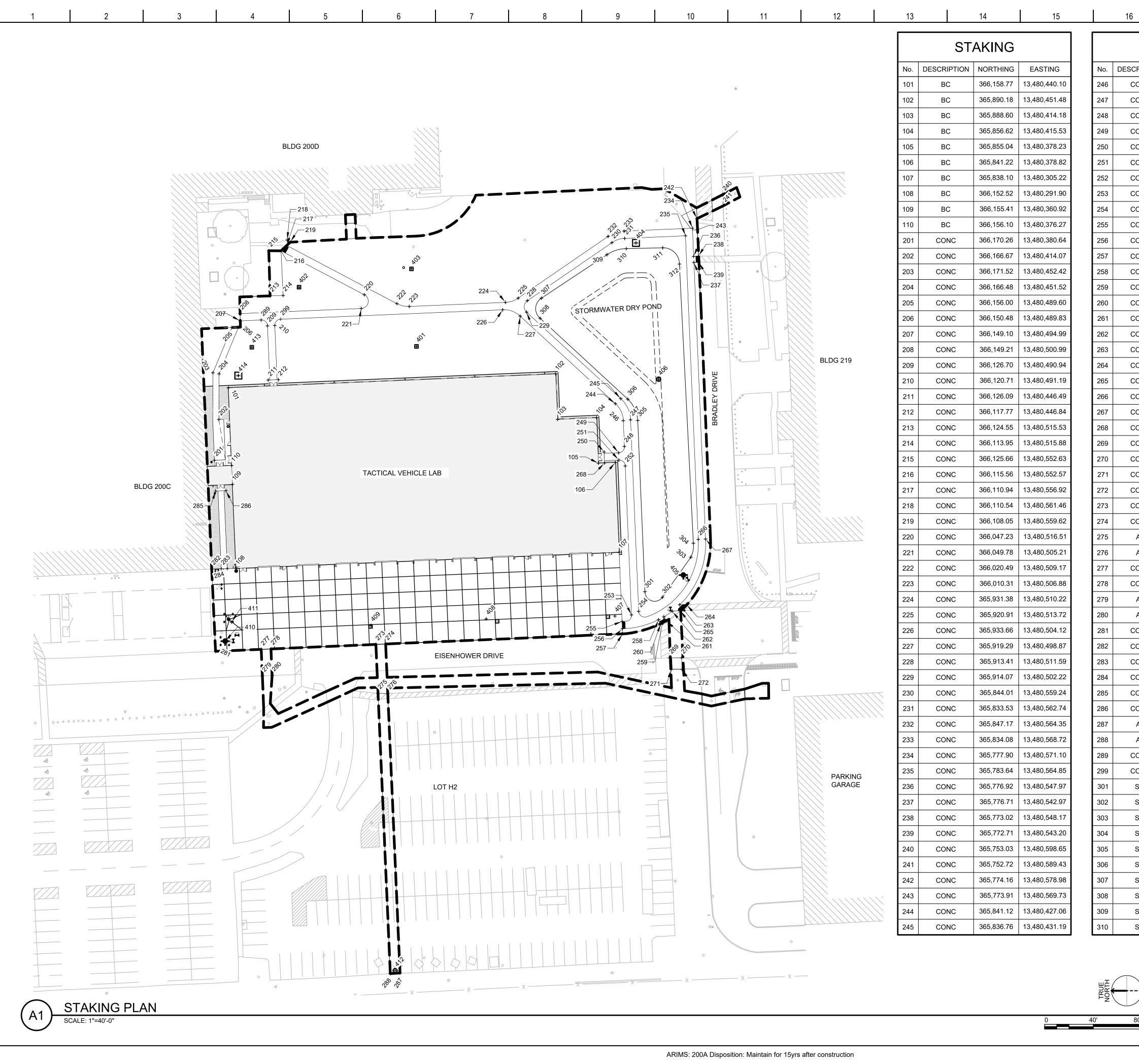
SHEET ID

CERTIFIED FINAL SUBMITTAL

ANNE C. ANDERSON E-39767 WAUNAKEE

ONAL

ONAL VF601



	ST	AKING			ST	AKING	
	DESCRIPTION	NORTHING	EASTING	No.	DESCRIPTION	NORTHING	EASTING
l	ВС	366,158.77	13,480,440.10	246	CONC	365,834.67	13,480,413.17
)	ВС	365,890.18	13,480,451.48	247	CONC	365,828.69	13,480,413.84
}	ВС	365,888.60	13,480,414.18	248	CONC	365,833.77	13,480,391.97
	ВС	365,856.62	13,480,415.53	249	CONC	365,838.56	13,480,386.77
;	ВС	365,855.04	13,480,378.23	250	CONC	365,850.43	13,480,387.44
;	ВС	365,841.22	13,480,378.82	251	CONC	365,838.30	13,480,380.77
,	BC	365,838.10	13,480,305.22	252	CONC	365,833.10	13,480,375.99
}	BC	366,152.52	13,480,291.90	253	CONC	365,827.91	13,480,253.67
)	BC	366,155.41	13,480,360.92	254	CONC	365,822.03	13,480,256.60
)	BC	366,156.10	13,480,376.27	255	CONC	365,835.58	13,480,248.33
<u> </u>	CONC	366,170.26	13,480,380.64	256	CONC	365,835.44	13,480,242.34
,	CONC	366,166.67	13,480,414.07	257	CONC	365,835.26	13,480,238.19
		366,171.52	13,480,414.07			365,835.26	13,480,249.81
,	CONC			258	CONC	-	
	CONC	366,166.48	13,480,451.52	259	CONC	365,801.41	13,480,252.10
)	CONC	366,156.00	13,480,489.60	260	CONC	365,803.94	13,480,246.41
; —	CONC	366,150.48	13,480,489.83	261	CONC	365,799.33	13,480,248.81
•	CONC	366,149.10	13,480,494.99	262	CONC	365,794.44	13,480,256.78
}	CONC	366,149.21	13,480,500.99	263	CONC	365,788.34	13,480,262.04
)	CONC	366,126.70	13,480,490.94	264	CONC	365,782.86	13,480,262.25
)	CONC	366,120.71	13,480,491.19	265	CONC	365,787.92	13,480,257.32
1	CONC	366,126.09	13,480,446.49	266	CONC	365,773.13	13,480,315.70
2	CONC	366,117.77	13,480,446.84	267	CONC	365,767.13	13,480,315.99
}	CONC	366,124.55	13,480,515.53	268	CONC	365,850.05	13,480,378.45
ļ.	CONC	366,113.95	13,480,515.88	269	CONC	365,796.67	13,480,218.41
; _	CONC	366,125.66	13,480,552.63	270	CONC	365,786.84	13,480,218.48
;	CONC	366,115.56	13,480,552.57	271	CONC	365,795.32	13,480,208.89
,	CONC	366,110.94	13,480,556.92	272	CONC	365,786.41	13,480,208.98
}	CONC	366,110.54	13,480,561.46	273	CONC	366,037.75	13,480,229.50
)	CONC	366,108.05	13,480,559.62	274	CONC	366,029.75	13,480,229.84
)	CONC	366,047.23	13,480,516.51	275	AP	366,035.99	13,480,189.45
1	CONC	366,049.78	13,480,505.21	276	AP	366,027.98	13,480,189.25
2	CONC	366,020.49	13,480,509.17	277	CONC	366,131.87	13,480,225.46
3	CONC	366,010.31	13,480,506.88	278	CONC	366,123.88	13,480,225.71
ļ	CONC	365,931.38	13,480,510.22	279	AP	366,130.92	13,480,203.76
5	CONC	365,920.91	13,480,513.72	280	AP	366,122.93	13,480,204.11
}	CONC	365,933.66	13,480,504.12	281	CONC	366,169.33	13,480,223.85
,	CONC	365,919.29	13,480,498.87	282	CONC	366,172.52	13,480,291.38
}	CONC	365,913.41	13,480,511.59	283	CONC	366,164.70	13,480,291.54
)	CONC	365,914.07	13,480,502.22	284	CONC	366,159.71	13,480,291.75
)	CONC	365,844.01	13,480,559.24	285	CONC	366,169.19	13,480,355.33
1	CONC	365,833.53	13,480,562.74	286	CONC	366,160.86	13,480,355.68
,	CONC	365,847.17	13,480,564.35	287	AP	366,017.93	13,479,959.82
- }	CONC	365,834.08	13,480,568.72	288	AP	366,025.92	13,479,959.82
, I							
	CONC	365,777.90	13,480,571.10	289	CONC	366,131.91	13,480,495.72
	CONC	365,783.64	13,480,564.85	299	CONC	366,115.93	13,480,496.40
,	CONC	365,776.92	13,480,547.97	301	SW	365,816.91	13,480,272.79
	CONC	365,776.71	13,480,542.97	302	SW	365,802.51	13,480,268.20
}	CONC	365,773.02	13,480,548.17	303	SW	365,779.21	13,480,301.11
)	CONC	365,772.71	13,480,543.20	304	SW	365,777.14	13,480,312.56
)	CONC	365,753.03	13,480,598.65	305	SW	365,822.79	13,480,413.26
١	CONC	365,752.72	13,480,589.43	306	SW	365,830.91	13,480,430.77
2	CONC	365,774.16	13,480,578.98	307	SW	365,901.87	13,480,513.65
}	CONC	365,773.91	13,480,569.73	308	SW	365,902.91	13,480,497.16
. –	CONC	365,841.12	13,480,427.06	309	SW	365,848.07	13,480,549.33
							. —

	18		
			5
ASTING		No.	DESCRIPTION
480,413.17		311	SW
480,413.84			SW
480,391.97		312	
		401	DS
480,386.77		402	DS
480,387.44		403	DS
480,380.77		404	CH
480,375.99		405	HYD
480,253.67		406	DS
480,256.60		407	DS
480,248.33		408	DS
480,242.34		409	DS
480,238.19		410	HYD
480,249.81		411	PIV
480,252.10		412	SS
480,246.41		413	DS
480,248.81		414	СН
480,256.78			
480,262.04			
480,262.25			
480,257.32			
480,315.70			
480,315.99			
480,378.45			
480,218.41			
480,218.48			
480,208.89			
480,208.98			
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480,229.84			
480,189.45			
480,189.25			
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480,225.71			
480,203.76			
480,204.11			
480,223.85			
480,291.38			
480,291.54			
480,291.75			
480,355.33			
480,355.68	9	SHE	ET LE
479,959.82		<u> </u>	AP
479,959.31			BC
480,495.72			СН
480,496.40			CONC
480,272.79			DS
480,268.20			HYD
480,301.11			PIV
480,312.56			SS
480,413.26			SW
	_		

No.	DESCRIPTION	DESCRIPTION NORTHING					
311	SW	365,802.25	13,480,555.01				
312	SW	365,788.58	13,480,541.65				
401	DS	366,004.46	13,480,474.11				
402	DS	366,100.83	13,480,522.70				
403	DS	366,008.60	13,480,537.80				
404	СН	365,824.24	13,480,559.01				
405	HYD	365,785.38	13,480,286.46				
406	DS	365,805.67	13,480,447.16				
407	DS	365,841.56	13,480,252.76				
408	DS	365,947.19	13,480,250.42				
409	DS	366,041.74	13,480,245.03				
410	HYD	366,161.48	13,480,232.15				
411	PIV	366,156.22	13,480,247.75				
412	SS	366,022.02	13,479,961.73				
413	DS	366,139.58	13,480,473.41				
414	СН	366,150.64	13,480,450.13				

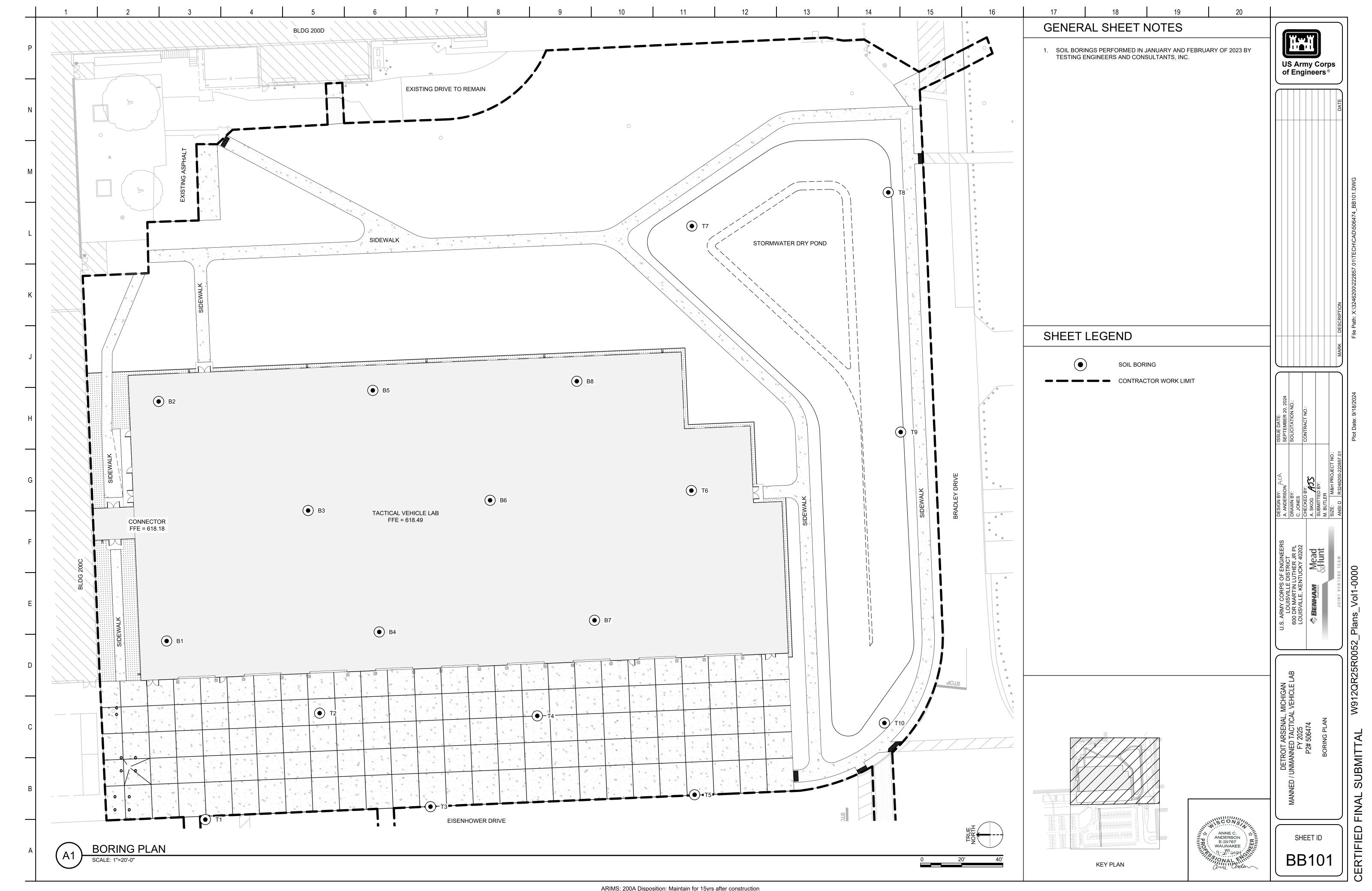
											MARK
	ISSUE DATE:	SEPTEMBER 20, 2024	SOLICITATION NO.:		CONTRACT NO :						
	3Y: ACA	A. ANDERSON	37:) BY:	A SKOG ATK	722	ED BY:	œ	M&H PROJECT NO.:	ANSI D R3246200-222857.01
	DESIGN B	A. ANDEF	DRAWN BY:	C. JONES	CHECKED BY:	0000	A. SNOG	SUBMITTED BY:	M. BUTLER	SIZE:	ANSI D
	٥٢	2									

US Army Corps of Engineers®

EGEND:	COR JISVIL MART ILLE, F
ASPHALT	ARMY LOU 0 DR N
BUILDING CORNER	J.S. <i>P</i>
COMM HANDHOLE	
CONCRETE	
DRAINAGE STRUCTURE	
HYDRANT	AB
PI VALVE	AN LE L
SANITARY STRUCTURE	일 :

SHEET ID





Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249 (248) 588-6200 or (313) T-E-S-T-I-N-G Fax (248) 588-6232

Boring No.: 1 Job No.: 63229	Project: Detroit Arsenal Manned-Unmanned Tactica Vehicle Laboratory
Client: Benham	
Type of Rig: Truck	Location: Warren, Michigan
"	Drilled By: I. Mickle
Drilling Method: Solid Stem Augers	•
Ground Surface Elevation: 618	Started: 1/27/2023
	Completed: 1/27/2023

				Completed: 1/27/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5—	LS	3 5 8	.42	Moist Black Clayey TOPSOIL (5") Firm Moist Brown Oxidized CLAY With Some Silt	19.3	128	2390
5.0	LS	4 4 5	5.5	Stiff Moist Brown Oxidized CLAY With Some Silt	20.0	124	4700
- - 7.5—	LS	5 8 11		Stiff Moist Brown CLAY With Some Silt & Wet Sand Seam	13.5	128	5440
10.0	LS	6 8 15			12.1	136	7090
12.5			13				
15.0	LS	6 8 13	16	Extremely Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	12.6	137	8570
- - 17.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
20.0	LS	5 7 10			12.9	137	6590
22.5-	LS	5 9 12			12.6	138	
SS - 2" I.I	dard Penetrati D. Split Spoon	on Resistanc	e w - H2O, d - Bulk	% of dry weight Water Enco Density, pcf onfined Compression, psf	ountered:	9'0"	I
LS - Sect ST - Shel AS - Aug	ional Liner Sar by Tube Samp er Sample	mple ble	qu - Unco DP - Dire RC - Roo	ect Push At Complete	ion: 29'0"	ı	
9				Boring No.	1 F	PAGE 1 OF	= 2

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CONSULTANTS
VSULTAN

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Boring N	lo.: 1	J	ob No.: 63229	Project: Detroit Arsenal Manned-Unmanne Vehicle Laboratory	d Tactio	28
Client: B	enham					
Type of I	Rig: Truck	,		Location: Warren, Michigan		
••	Method: S		ı Augers	Drilled By: I. Mickle		
•	Surface E		· ·	Started: 1/27/2023		
Ground	ourrace L	ievation.	010	Completed: 1/27/2023		
Depth (ft)	Sample Type	N	Strata Change	Soil Classification w	d	

Ground	Surface E	levation:	618	Completed: 1/27/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5			27	Firm Maint Const Ol AV Mith Const Cit 9 Tong Of Const	_		
30.0	LS	4 5 6	30	Firm Moist Gray CLAY With Some Silt & Trace Of Gravel	16.8	133	272
32.5				Bottom of Boring at 30'			
35.0							
- - -							
37.5							
40.0							
42.5— - -							
45.0							
47.5— - -							
'N" - Stan	ndard Penetrati	ion Resistano	ce w - H2O,	% of dry weight Water Enc	ountered:	9'0"	
LS - Sect	ndard Penetrati D. Split Spoon tional Liner Sa lby Tube Sam ler Sample	mple ole	qu - Unco	% of dry weight Water Enc Density, pcf on onfined Compression, psf At Completed Push	tion: 29'0"		
AS - Aug	er Sample		RC - Roo	k Core Boring No	1	PAGE 2	OF 2



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Project: Detroit Arsenal Manned-Unmanned Tactical Job No.: 63229 Boring No.: 2 Vehicle Laboratory Client: Benham Location: Warren, Michigan Type of Rig: Truck Drilled By: I. Mickle Drilling Method: Hollow Stem Augers **Started:** 1/24/2023 Ground Surface Elevation: 618

	Completed: 1/24/2023									
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu			
2.5	LS	4 6 6	.17 1.7	Moist Dark Brown Sandy TOPSOIL (2") Loose Moist To Wet Brown SAND With Trace Of Gravel	18.5	130	4370			
5.0	LS	4 5 6		Stiff Moist Variegated CLAY With Some Silt LL=56 PL=22 Pl=34	23.6	119	5190			
7.5—	LS	4 5 5	8		27.5	118	4700			
10.0—	LS	6 13 19		Extremely Stiff Moist Brown CLAY With Some Silt	10.9	140				
- 12.5 <i>-</i>			13							
15.0—	LS	4 6 7		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	12.1	129				
17.5—										
20.0	LS	3 5 8			18.5	128	6180			
22.5— 	LS	4 6 8		Wet Sand Seam At 23'0"	7.1	135	6180			
"N" - Stan SS - 2" I.	dard Penetration D. Split Spoon ional Liner Sar	on Resistanc Sample	e w - H2O, d - Bulk	Water Enco Density, pcf onfined Compression, psf						
LS - Sect ST - Shel AS - Aug	by Tube Samp	npie le	qu - Unco DP - Dire RC - Roc	ct Push At Complete	ion: 25'7"	1				



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Boring N		Jo	ob No.: 63	Project: Detroit Arsenal Man Vehicle Laboratory	ned-Unmar	nned Tacti	cal
Client: B				Location: Warren, Michigan			
	Rig: Truck			Drilled By: I. Mickle			
	Method: H			Started: 1/24/2023			
Ground	Surface El	levation:	618	Completed: 1/24/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qı
<u>-</u>							
27.5 <i>-</i>							
- - -	LS	5			14.6		
30.0	LO	5 7 8	30		14.0		
-		_		Bottom of Boring at 30'			
32.5							
32.5 - -							
-							
35.0							
-							
37.5 <i>-</i>							
- - -							
40.0							
-							
42.5							
- -							
45.0							
- - -							
47.5 <i>-</i>							
-							



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Project: Detroit Arsenal Manned-Unmanned Tactical Vehicle Laboratory Job No.: 63229 Boring No.: 3 Client: Benham Location: Warren, Michigan Type of Rig: Truck Drilled By: I. Mickle Drilling Method: Solid Stem Augers Started: 1/24/2023 **Ground Surface Elevation:** 618 Completed: 1/24/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	5 5 6		Medium Compact Moist To Wet Brown Sand With Trace Of Gravel & Clay Layer-FILL	10.2	140	
5.0	LS	3 3 4	4	Firm Moist Variegated CLAY With Some Silt	26.3	117	3300
7.5	LS	3 3 4	8		26.5	115	3300
10.0—	LS	4 8 8		Stiff Moist Brown CLAY With Some Silt	12.7	138	
12.5— 12.5— - - 15.0—	LS	6 10 13	12.5	Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	12.2	139	
17.5—	LS	4 6 8			12.5	132	4940
22.5— - - -	LS	6 9 13	22	Stiff Moist Gray CLAY With Some Silt	13.8	139	5360
SS - 2" I.	dard Penetrati D. Split Spoon ional Liner Sar by Tube Samp	Sample	e w - H2O, d - Bulk [% of dry weight Water End Jensity, pcf rifined Compression, psf tt Push At Comple	countered:		

Boring No. 3 PAGE 1 OF 2



Boring No.: 3

Job No.: 63229

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Boring No. 1

Project: Detroit Arsenal Manned-Unmanned Tactical

Vehicle Laboratory

Client: Benham			•						
Type of Rig: Tru	ıck		Location: Warren, Michigan						
Drilling Method		Augere	Drilled By: I. Mickle						
Ground Surface			Started: 1/24/2023						
Ground Surface	Elevation:	010	Completed: 1/24/2023						
Depth Samp	e N	Strata Change	Soil Classification	w	d	qu			
27.5- LS 30.0-	6 8 12	30	Bottom of Boring at 30'	14.7	131	6260			
32.5 – 35.0 – 37.5 – 40.0 –									
42.5 — 45.0 — 47.5 —									
"N" - Standard Pen "SS - 2" I.D. Split S _I LS - Sectional Line	tration Resistano	Ce W - H2O,	% of dry weight Water Enco	ountered:	2'0"				
LS - Sectional Line ST - Shelby Tube S AS - Auger Sample	Sample Sample ample	DP - Dire	onfined Compression, psf act Push At Complete	tion: 22'4"					
AS - Auger Sample		RC - Roo	k Core Boring No.	3	PAGE 2	OF 2			



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Boring No. 2 PAGE 1 OF 2

Boring No. 4 PAGE 1 OF 2

Project: Detroit Arsenal Manned-Unmanned Tactical Job No.: 63229 Boring No.: 4 Vehicle Laboratory Client: Benham Location: Warren, Michigan Type of Rig: Truck Drilled By: I. Mickle Drilling Method: Solid Stem Augers **Started:** 2/16/2023 Ground Surface Flevation: 618

2.5	27.7 24.1 29.5 13.3 15.4 11.1 11.6	130 123 119 138 134 143 135	6060 5730 7260 4910 12520 13090
2.5— SS 3 4 4 5 5 3 4 4 5 5.0— SS 3 4 5 5 5 6 6 6 7.5— SS 6 6 6 7 11 13 7 10 14 12.5— SS 6 8 8 11 1 17 Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	29.5 13.3 15.4 11.1 11.6	119 138 134 143 135	5730 7260 4910 12520 13090
SS 4 3 5 5 5 5 5 5 5 6 7.5 SS 6 6 6 6 6 6 6 6	13.3 15.4 11.1 11.6	138 134 143 135	7260 4910 12520 13090
SS 5 3 5 5 6 6 7 5 7 10 11 13 13 13 13 13 13 13 13 13 13 14 14 15 15 15 15 15 15 15 15 15 15 15 15 15	15.4 11.1 11.6	134 143 135	4910 12520 13090
7.5— SS 6 3 SS 6 6 11 SS 13 7 10 14 12.5— SS 6 8 11	11.1	143 135	12520 13090
SS 6 6 11 13 7 10 14 13 SS 6 8 11 SS 6 8 11 SS 6 8 11 SS 7 10 14 SS 8 11 SS 8 11 SS 8 11 SS 9 Extremely Stiff Moist Gray Oxidized CLAY With Some Silt & Trace Of Gravel	11.6	135	13090
12.5 — SS 13 7 10 14 13 Extremely Stiff Moist Gray Oxidized CLAY With Some Trace Of Gravel 17 Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel 17 Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel 17 Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel 18 19 19 19 19 19 19 19			
12.5— SS 6 8 15.0— 17.5— SS 6 8 11 SS 6 8 11 SExtremely Stiff Moist Gray Oxidized CLAY With Some Trace Of Gravel Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	e Silt & 13.0	140	12640
Trace Of Gravel 17.5— Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	e Silt & 13.0	140	12640
17.5 - Stiff Moist Gray CLAY With Some Silt & Trace Of Gra			-510
- SS 4			
20.0 — SS 4 5 7	12.0	134	7370
22.5— SS 4 7 9 Extremely Stiff Moist Gray CLAY With Some Silt & Tr. Gravel	race Of	141	9080
v" - Standard Penetration Resistance S - 2" I.D. Split Spoon Sample d - Bulk Density, pcf S - Sectional Liner Sample qu - Unconfined Compression, psf	Water Encountered At Completion: No		

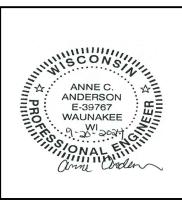


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Ground	Surface El	evation:	618	Started: 1/24/2023 Completed: 1/24/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
- - -							
27.5— - -	LS	E			14.6		
30.0	LS	5 7 8	30				
-				Bottom of Boring at 30'			
32.5							
35.0							
-							
37.5 — - -							
40.0							
42.5							
-							
45.0							
- - 47.5							
- -							
"N" - Star	ndard Penetration	on Resistano	ce w - H2O,	% of dry weight Water En	countered:	4" & 23'0"	
LS - Sec ST - She AS - Aug	D. Split Spoon tional Liner San lby Tube Samp er Sample	nple le	qu - Unco DP - Dire RC - Roc		letion: 25'7"	'	
				Boring N	o. 2	PAGE 2	OF 2



SHEET ID BB102

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DES A. A. A. A. DRA DRA C. J. C. J.

Boring No. 3

Ground	Surface El	levation:	618	Started: 2/16/2023	Completed: 2/16/2023						
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	q				
-			26								
27.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel							
- - -	SS	5 8			12.1	135	70				
30.0		10	30	Bottom of Boring at 30'	1						
32.5											
35.0											
-											
37.5											
40.0											
_ 											
42.5— -											
45.0											
47.5—											
47.5 - -											
"N" - Stan	ndard Penetrati D. Split Spoon	on Resistano	e w - H2O,	% of dry weight Water End	countered:	None	<u> </u>				
LS - Sect	tional Liner Sai lby Tube Samp er Sample	mple	qu - Unco DP - Dire RC - Roc		etion: Non	е					
, o - Aug	or Jampio		NO - NOC	Boring No	. 4	PAGE 2 O	F 2				



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Boring I	lo.: 5	Jo	ob No.: 63	Project: Detroit Arsenal Mann Vehicle Laboratory	ed-Unmar	ned Tacti	Ci
Drilling	Benham Rig: Truck Method: S Surface E	olid Stem	Ū	Location: Warren, Michigan Drilled By: I. Mickle Started: 2/16/2023 Completed: 2/16/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	
- - - 2.5—	SS	5 6 6 3	1.2 2.3	Moist Dark Brown Sandy TOPSOIL Medium Compact Moist Brown Fine SAND	15.0		

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
	- SS	5	1.2 2.3	Moist Dark Brown Sandy TOPSOIL	15.0		
2.5-	SS	6 3 5		Medium Compact Moist Brown Fine SAND	21.9	128	6380
5.0-	SS	7 4		Stiff Moist Brown Oxidized CLAY With Some Silt	19.0	132	7200
	SS	5 7 5 6			19.7	129	5480
7.5	SS	7 4	7.5		11.8	135	5260
-	SS	7 9 5		Stiff Moist Brown CLAY With Some Silt	12.2	141	6610
10.0-	SS	7 10 4	10.5		11.7	143	3760
12.5-		5 6	13	Firm Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seam			
15.0-	SS	3 4 6		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	11.6	141	5400
17.5 – 17.5 – 20.0 –	SS	4 6 9			13.8	132	6380
22.5- 22.5- - - -	ss	4 5 7			14.7	133	7840
SS - 2" I	ndard Penetrat .D. Split Spoor	n Sample	d - Bulk	Water Enco Density, pcf onfined Compression, psf			"0"
ST - She	ctional Liner Sa elby Tube Sam ger Sample		qu - Unco DP - Dire RC - Roc	ect Push At Complete	_	PAGE 1 OF	= 2
				Boring No.	J I		



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Completed: 2/16/2023

Boring No.: 5	Job No. : 63229	Project: Detroit Arsenal Manned-Unmanned Tactical Vehicle Laboratory
Client: Benham		
Type of Rig: Truck		Location: Warren, Michigan
Drilling Method: So	lid Stem Augers	Drilled By: I. Mickle
Ground Surface Ele	· ·	Started: 2/16/2023

Depth (ft) Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5—		27				
- - - - -	7 9	30	Stiff Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seam	10.0	144	548
30.0	12		Bottom of Boring at 30'			
32.5						
35.0						
37.5						
40.0						
42.5						
45.0						
47.5—						
"N" - Standard Penetra SS - 2" I.D. Split Spoo	tion Resistance	e w - H2O,	% of dry weight Water Enco Density, pcf onfined Compression, psf ct Push At Comple	ountered:	12'6" & 27	7'0"
LS - Sectional Liner Sa ST - Shelby Tube Sam	ample	qu - Unco	ct Push At Comple At Comple	tion: 26'0"	1	



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Boring I	No. : 6	Jo	bb No. : 63	Project: Detroit Arsenal Man Vehicle Laboratory	ned-Unmar	nned Tacti	cal
Client: E	Benham						
Type of	Rig: Truck	•		Location: Warren, Michigan			
*	·			Drilled By: I. Mickle			
Drilling	Method: S	olid Stem	Augers	·			
Ground	Surface E	levation:	617	Started: 2/24/2023			
				Completed: 2/24/2023			
Depth	Sample		Strata				

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
- - -	LS	9 7	.21 2	ASPHALT (2 1/2")	12.6		
2.5 - -	LS	4 3 4		\Medium Compact Moist To Wet Crushed Concrete-FILL	27.5	119	379
5.0	LS	3 3 4		Firm Moist Brown Oxidized CLAY With Some Silt	26.2	117	239
-	LS	5 3 3			25.7	119	371
7.5 -	ST	4	8.5				
10.0	LS	4 7		Firm Moist Brown CLAY With Some Silt & Sand Seam Shelby Tube 7.5' - 9' = 1.5' Recovery	23.9	125	272
-	LS	9 8 10	11	Unconfined Compressive Strength 3,430 psfLL=23 PL=16 Pl=7	12.0	139	783
12.5 -		16	13	Stiff Moist Brown CLAY With Some Silt			
15.0	LS	6 8 11		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	11.7	142	536
17.5—	LS	4			11.1	139	544
20.0	10	7 9				100	011
22.5	LS	5 6 8			13.7	134	560
SS - 2" I I	dard Penetrati D. Split Spoon	Sample	e w - H2O, d - Bulk l	Water Enco Density, pcf onfined Compression, psf At Complet			
ST - Shel AS - Aug	ional Liner Sa by Tube Sam er Sample	ple	DP - Dire RC - Roc	ct Push		PAGE 1 OF	



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Boring No. 4 PAGE 2 OF 2

Boring No. 6 PAGE 2 OF 2

Depth	Sample		Strata				
				Completed: 2/24/2023			
Ground	Surface E	levation:	617	Started: 2/24/2023			
Drilling	Method: S	olid Stem	Augers	Drilled By: I. Mickle			
Type of	Rig: Truck			Location: Warren, Michigan			
Client: E	Benham						
Boring l	No .: 6	Jo	ob No.: 63229	Project: Detroit Arsenal Manne Vehicle Laboratory	ed-Unmar	ned Tacti	cal

				Completed: 2/24/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
-			26				
27.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
1	LS	5			15.9	130	3540
30.0		5 6 7	30				
-				Bottom of Boring at 30'			
32.5							
-							
35.0							
37.5							
40.0							
42.5							
-							
45.0 -							
47.5							
"NIII - Ct	land Danatt	ion Decister -	1100	% of dry weight Water Enc		2'0"	
SS - 2" I.E LS - Section	iaru Henetrat). Split Spoor onal Liner Sa ov Tube Sami	ion Resistanc n Sample mple ple	d - Bulk (qu - Unco DP - Dire	% of dry weight Water Enco- Density, pcf Infined Compression, psf ct Push At Comple			
AS - Auge	er Sample	P	RC - Roc	k Core		PAGE 2 OF	= 2



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Type of I	enham Rig: Truck			Location: Warren, Michigan			
	Method: So	olid Stem	Augers	Drilled By: I. Mickle			
	Surface El			Started: 2/24/2023			
				Completed: 2/24/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
1 1 1	LS	17	.17	ASPHALT (2")	11.0	138	
2.5-	LS	8 7 4	2.2	Medium Compact Moist To Wet Brown Sand With Crushed Concrete-FILL	31.1	111	
5.0—	LS	4 4 3 4		Firm Moist Brown CLAY With Some Silt	26.7	119	3210
-	LS	4 3	6		28.7	121	
7.5 <i>-</i>	ST	9 11		Extremely Stiff Moist Brown Oxidized CLAY With Some Silt & Trace Of Gravel Shelby Tube 7.5' - 8.3' = Very Poor Recovery LL=23 PL=16 Pl=7			
10.0	LS	7 10			12.2	136	9480
-	LS	13 10			11.1	142	9480
12.5		12 14	13				
-	LS	7 8		Extremely Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	14.0	131	9720
15.0 — - -		11	16				
17.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
20.0	LS	5 9 11			11.3	135	6260
22.5		_			46.	455	
-	LS	5 8 10			13.1	132	6260
	dard Penetrati D. Split Spoon			% of dry weight Water Enco	ountered:	2'0"	



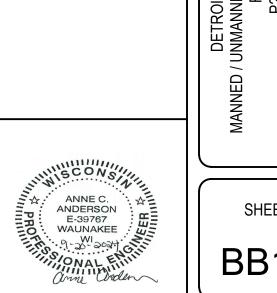
Job No.: 63229

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Project: Detroit Arsenal Manned-Unmanned Tactical Vehicle Laboratory

Boring No. 5 PAGE 2 OF 2

Depth (ft) S	ample Type	N	Strata				
			Change	Soil Classification	w	d	qu
27.5							2000
30.0	LS	6 8 9	30	Bottom of Boring at 30'	11.7	140	6260
32.5							
35.0							
37.5							
40.0							
42.5							
45.0							
47.5—							



Boring No. 6 PAGE 1 OF 2

SHEET ID BB103

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DES A. A. A. CHE CHE A. SI SUB SIZE ANS

Drilled By: I. Mickle

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Soil Classification

Vehicle Laboratory

Drilled By: I. Mickle

Started: 2/23/2023

Completed: 2/23/2023

Location: Warren, Michigan

Project: Detroit Arsenal Manned-Unmanned Tactical

17.2

31.4

29.1

11.4

11.2

11.8

11.4

13.2

13.8

13.8

Boring No. 8 PAGE 1 OF 2

Water Encountered: 1'6" At Completion: 1'6"

Water Encountered: 4'0"

At Completion: None

Boring No. T-2

115

114

142

135

139

142

132

136

137

4530

3870

12030

12770

10790

5110

5600

5440

4780

45.0-

47.5-

Boring No.: T-3

Client: Benham

Type of Rig: Truck

Depth Sample (ft) Type

2.5

5.0

7.5

10.0

12.5

15.0

17.5

20.0-

22.5-

"N" - Standard Penetration Resistance
SS - 2" I.D. Split Spoon Sample
LS - Sectional Liner Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

LS

LS

Drilling Method: Solid Stem Augers

Ground Surface Elevation: 617

"N" - Standard Penetration Resistance
SS - 2" I.D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

RC - Rock Core

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Job No.: 63229

_	Surface El			Started: 1/24/2023 Completed: 1/24/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qı
-	LS	15	.67	CONCRETE (8")	12.9	136	
2.5	LO	15 13	3	Medium Compact Moist Brown Clayey SAND	12.9	130	
- -	LS	9		Medium Compact Moist To Wet Brown Very Fine Sand & Clay	19.7	128	
5.0		8 5	5.5				
7.5	LS	5 7 10		Stiff Moist Brown CLAY With Some Silt	23.1	124	700
7.5	LS	4	8	Extremely Stiff Moist Brown CLAY With Some Silt	16.8	131	857
10.0	20	10 14	10	Extremely Still Moist Brown CLAT With Some Silt	10.0		007
-				Bottom of Boring at 10'			
12.5							
45.0							
15.0 — -							
17.5							
-							
20.0							
22.5—							
22.5— - -							
-							

"N" - Standard Penetration Resistance
SS - 2" I.D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample
C - Rock Core

W - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core



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Boring N		J	ob No.: 632	Project: Detroit Ars Vehicle Laboratory	enal Manned-Unma	nned Tacti	ical		
Client: E				Location: Warren,	Michigan				
	Rig: Truck Method: Se		Augere	Drilled By: I. Mickle	9				
	Surface El			Started: 2/23/2023	Started : 2/23/2023				
0.00			017	Completed: 2/23/20	Completed: 2/23/2023				
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d			
- - -									
27.5 <i>-</i>									
-	LS	5 10			12.7	139	Į		
30.0		13	30						
-				Bottom of Boring at 30'					
32.5									
-									
35.0									
-									
37.5									
-									
40.0									
-									
_	i I								



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- 1				D • • D • · · · A • • • • • • • • • • • • • • •			
	Boring No.: T-1	Job No.:	63229	Project: Detroit Arsenal Mann Vehicle Laboratory	ied-Unmar	nned Lactio	cai
	Client: Benham						
	Type of Rig: Truck			Location: Warren, Michigan			
				Drilled By: I. Mickle			
	Drilling Method: Solid Ster	n Augers		•			
	Ground Surface Elevation	617		Started: 1/27/2023			
				Completed: 1/27/2023			
H			T				

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	16 9 4	.75 2	CONCRETE (9") Medium Compact Moist Brown Sand With Trace Of Crushed Concrete-FILL	12.8	136	
5.0	LS	4 5 5	5.5	Stiff Moist Brown Oxidized CLAY With Some Silt	19.4	122	5030
7.5—	LS	6 8 11	8	Extremely Stiff Moist Brown CLAY With Some Silt	13.1	134	9480
10.0	LS	5 9 13	10	Stiff Moist Brown CLAY With Some Silt	11.6	138	7990
12.5				Bottom of Boring at 10'			
15.0							
17.5—							
20.0-							
22.5—							
"N" - Standard SS - 2" I.I	dard Penetrati	ion Resistand	ce w - H2O, d - Bulk	% of dry weight Water Enco Density, pcf onfined Compression, psf At Complete			
ST - Shel AS - Aug	D. Split Spoon ional Liner Sa by Tube Samper Sample	ple	DP - Dire RC - Roo	ect Push		9	



Water Encountered: 1'6"

Boring No. 8 PAGE 2 OF 2

At Completion: 1'6"

Project: Detroit Arsenal Manned-Unmanned Tactical

140

10.6

12.7

14.2

Water Encountered: 2'0"

At Completion: None

Boring No. T-3

140 6920

137 6670

136 5770

Testing Engineers & Consultants, Inc.

Vehicle Laboratory

Drilled By: I. Mickle

Started: 2/2/2023

Completed: 2/2/2023

Location: Warren, Michigan

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Soil Classification

Medium Compact Moist To Wet Brown Gravelly Medium To Fine SAND With Some Silt

\Broken CONCRETE (9")

Loose Wet Brown SAND

Bottom of Boring at 10'

Stiff Moist Brown CLAY With Some Silt

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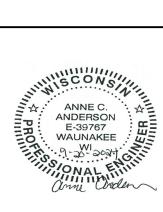
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Boring No. T-1

Project: Detroit Arsenal Manned-Unmanned Tactical

Boring No. T-4

Drilling Method: Solid Stem Augers Ground Surface Elevation: 618			618	Started: 2/2/2023 Completed: 2/2/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	11 6 4	.25 2 3	ASPHALT (3") Medium Compact Moist Brown Sand With Crushed Concrete-FILL	9.6	132	
5.0	LS	2 4 5		Plastic Moist Gray CLAY With Some Silt	21.5	128	
- - - 7.5	LS	3 4 6	8	Firm Moist Brown CLAY With Some Silt LL=52 PL=25 PI=27	9.9	135	3630
10.0	LS	6 10 14	10	Stiff Moist Brown CLAY With Some Silt Moved 17 East Due To Utilities	12.0	138	7000
12.5 - - - -				Bottom of Boring at 10'			
15.0							
17.5 - - -							
20.0							
22.5 -							



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LS

10.0

15.0-

17.5

20.0

22.5-

"N" - Standard Penetration Resistance
SS - 2" I.D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

RC - Rock Core

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

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Soil Classification

Vehicle Laboratory

Drilled By: I. Mickle

Started: 2/16/2023

Completed: 2/16/2023

Location: Warren, Michigan

Project: Detroit Arsenal Manned-Unmanned Tactical

12.5

19.8

24.6

11.0

Water Encountered: 1'6" & 7'0"

12.1

Water Encountered: None

At Completion: None

Boring No. T-8

At Completion: 4'5"

Boring No. T-5

129

121

138

3630

1320

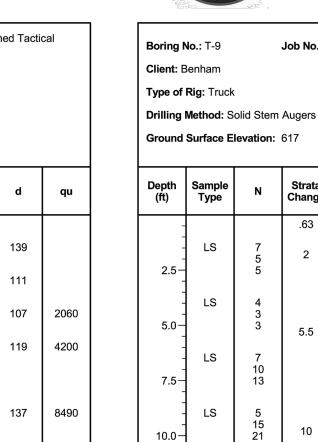
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715-	000						
Boring N	lo.: T-8		Job No.:	63229 Project: Detroit Arsenal Mann Vehicle Laboratory	ed-Unmar	ned Tacti	cal
Client: B	Benham						
Type of	Rig: Truck	Location: Warren, Michigan					
Drilling I	Method: S	Drilled By: I. Mickle					
•	Drilling Method: Solid Stem Augers Ground Surface Elevation: 617 Started: 2/24/2023						
Ground	Completed: 2/24/202						
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	q
-	LS	9 5 5 4	.17 1.5	ASPHALT (2") Madium Compact Maint Brown Sand With Crushed	12.2	139	
2.5-	LS	4	3	Medium Compact Moist Brown Sand With Crushed Concrete-FILL	30.9	111	
5.0	LS	4 2 3 4 5 7		Firm Moist Variegated CLAY With Some Silt	29.2	107	20
- -	LS	4 5 7	6	Firm Moist Brown Oxidized CLAY With Some Silt	27.6	119	42

Stiff Moist Brown Oxidized CLAY With Some Silt

Bottom of Boring at 10'

Extremely Stiff Moist Brown CLAY With Some Silt



LS

LS

LS

12.5

15.0 -

17.5

20.0-

22.5-

15 21

"N" - Standard Penetration Resistance
SS - 2" I.D. Split Spoon Sample
LS - Sectional Liner Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core



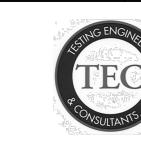
"N" - Standard Penetration Resistance
SS - 2" I.D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

W - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Job No.: 63229

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Boring N			Job No.:	63229 Project: Detroit Arsenal Mann Vehicle Laboratory	ed-Unmar	nned Tacti	ical
Client: B	enham Rig: Truck			Location: Warren, Michigan			
•	Method: So		Augore	Drilled By: I. Mickle			
	Surface El			Started: 2/16/2023			
Ground	ourrace Li	evation.	017	Completed: 2/16/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	q
	LS	10	.17	ASPHALT (2")	42.9		
2.5	LS	6 4 3 4		Loose Moist Brown Sand With Crushed Concrete-FILL	16.9	132	
5.0	LS	4 5 3 3		Firm Moist Brown Oxidized CLAY With Some Silt	24.3	119	34
-	LS	4	6		14.3	131	46
7.5 <i>-</i> 7.5	LS	5 6 4 7	7.5 8.5	Stiff Moist Brown CLAY With Some Silt & Sand Seams	14.8	137	50:
10.0	LS	11 5 12	10	Stiff Moist Brown CLAY With Some Silt & Trace Of Gravel Extremely Stiff Moist Brown CLAY With Some Silt	11.3	138	99
10.0		17		Bottom of Boring at 10'			
12.5 - -							
15.0 —							
- 17.5—							
20.0 —							
22.5							



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Boring N Client: B			Job No.: 6	3229 Vehicle	e Laboratory			
Type of	Rig: Truck			Locati	on: Warren, Michigan			
Drilling I	Method: So	olid Stem	Augers	Drilled	d By: I. Mickle			
				Starte	d: 2/16/2023			
	Ground Surface Elevation: 617 Completed: 2/16/2023							
Depth (ft)	Sample Type	N	Strata Change	Soil Classification		w	d	
	SS	7 7	1.5	ASPHALT (18")	_	13.1		
2.5-	SS	4 4		Medium Compact Moist To Wet Crushed C		25.5	117	;
5.0—	SS	3 4 2 3 2 7	5.5	Firm Moist Brown Oxidized CLAY With Sor	ne Silt	26.3	120	2
- - 	SS	2 7 9 12	7	Stiff Moist Brown CLAY With Some Silt & C	Occasional Sand	11.1	143	
7.5— - -	SS SS	6 11 15		Extremely Stiff Moist Brown CLAY With So Occasional Sand Seams	ome Silt &	11.4 10.7	134 138	1
10.0— - -		5 11 13	10	Bottom of Boring at 10'				
12.5 - - -				3				
15.0 - -								
17.5 - 17.5								
20.0 - -								
22.5— - - - -								
"N" - Stan	dard Penetratio	on Resistan	ce w - H2O,	% of dry weight	Water Enco	untered:	2'0"	L
LS - Sect	D. Split Spoon ional Liner San lby Tube Samp	nple		lensity, pcf fined Compression, psf	At Completic	on: 8'0"		



Boring No.: T-10

Job No.: 63229

Water Encountered: None

At Completion: None

Boring No. T-6

Project: Detroit Arsenal Manned-Unmanned Tactical

21.4

11.1

Water Encountered: None

At Completion: None

Boring No. T-9

119

141 10960

135 11120

Testing Engineers & Consultants, Inc.

Vehicle Laboratory

Drilled By: I. Mickle

Started: 2/2/2023

Completed: 2/2/2023

Location: Warren, Michigan

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Soil Classification

\Loose Moist Brown Sand & Crushed Concrete-FILL

Extremely Stiff Moist Brown CLAY With Some Silt

Moved 15' North Due To Utilities & Parked Cars

Plastic Moist Brown CLAY With Some Silt

ASPHALT (7 1/2")

Bottom of Boring at 10'

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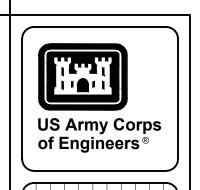
Vehicle Laboratory

Boring No. T-7

Project: Detroit Arsenal Manned-Unmanned Tactical

Boring No. T-10

Drilling Method: Solid Stem Augers Ground Surface Elevation: 617				Started: 2/23/2023			
Ground Surface Elevation: 617				Completed: 2/23/2023			
Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS LS LS	3 4 5 3 3 3 2 6 15	2 3.5 4.7	Firm Moist Brown Clay With Some Silt & Sand Seams-FILL Loose Moist Brown Sand With Trace Of Gravel & Clayey Seams-FILL Medium Compact Moist To Wet Brown SAND Bottom of Boring at 4.7'	18.0 16.7 20.5	129 124 127	2970
20.0 — - - - - 22.5 — -							



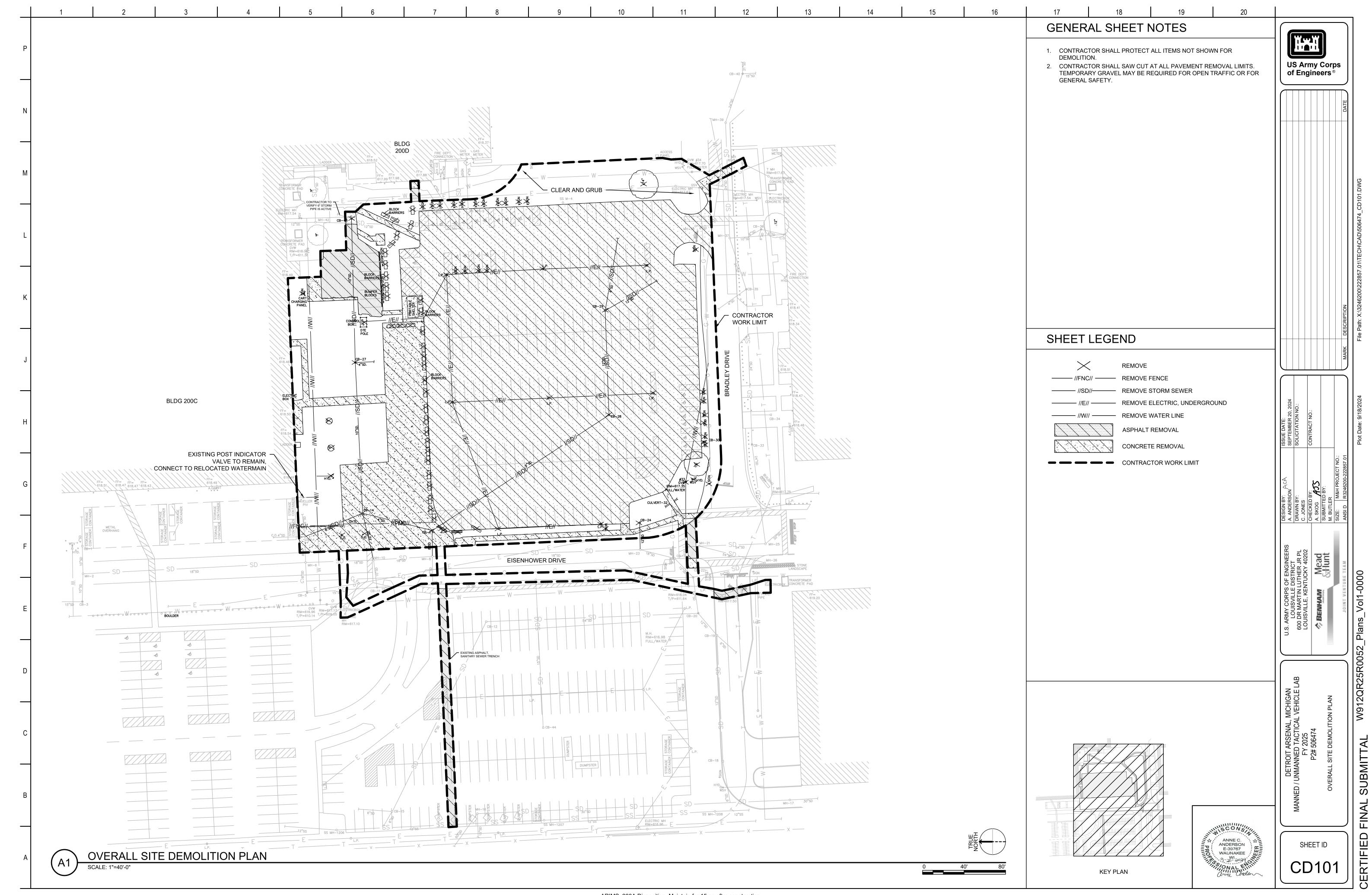
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ISSUE DATE: SEPTEMBER 20, 2024 SOLICITATION NO.: CONTRACT NO.: ECT NO.:	ISSUE DATE: SEPTEMBER 20, 2024 SOLICITATION NO.: CONTRACT NO.: ECT NO.:
ECT NO.:	ECT NO.:
N BY: ACA N BY: IES GED BY: TTED BY: TTED BY: ILER M&H PROJECT NO.: R3246200-222857.01	DESIGN BY: ACA A. ANDERSON DRAWN BY: C. JONES CHECKED BY: A. SKOG SUBMITTED BY: M. BUTLER SIZE: M&H PROJECT NO.: ANSI D R3246200-222857.01
	DESIGNAND DESIGN

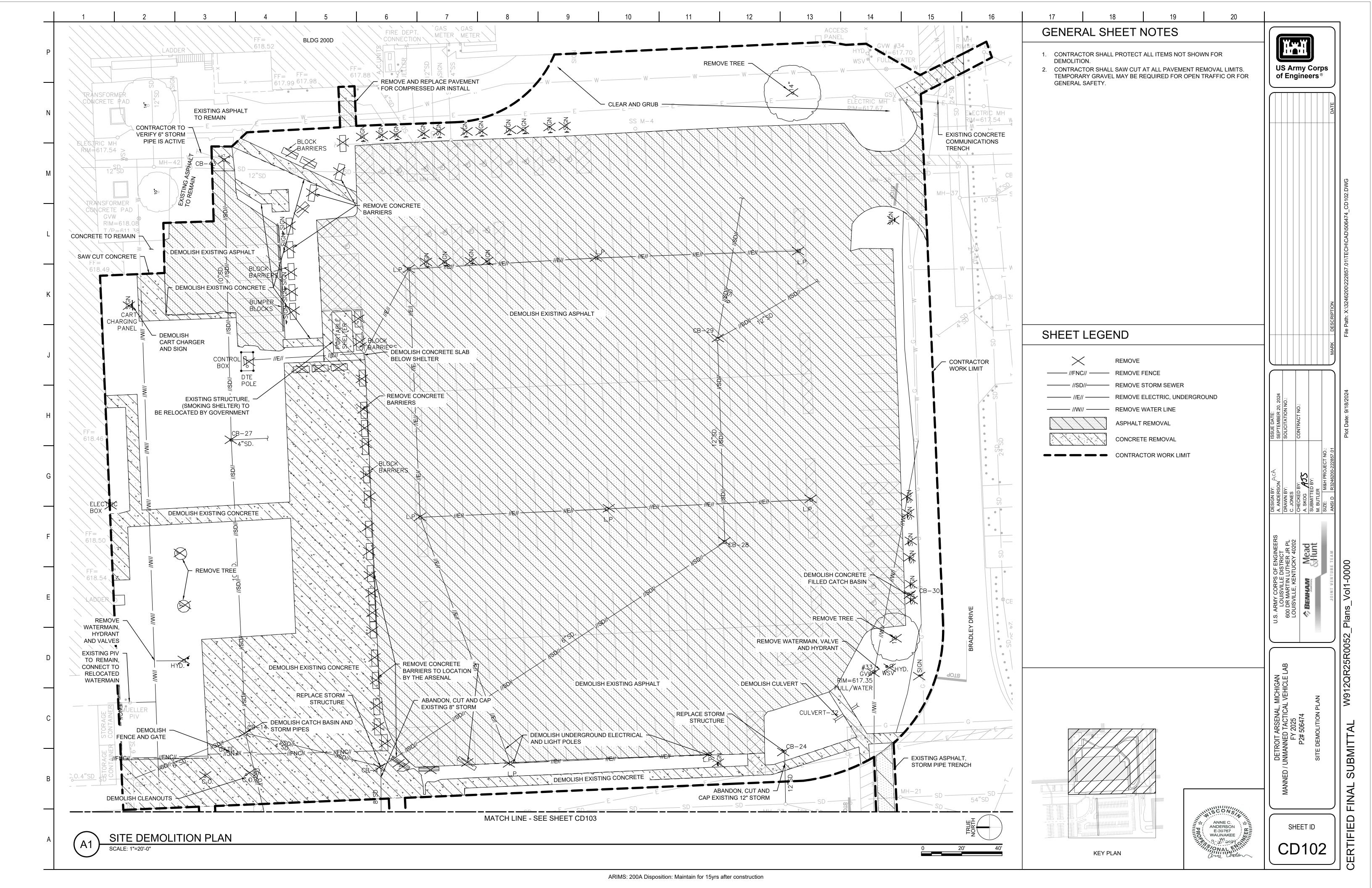
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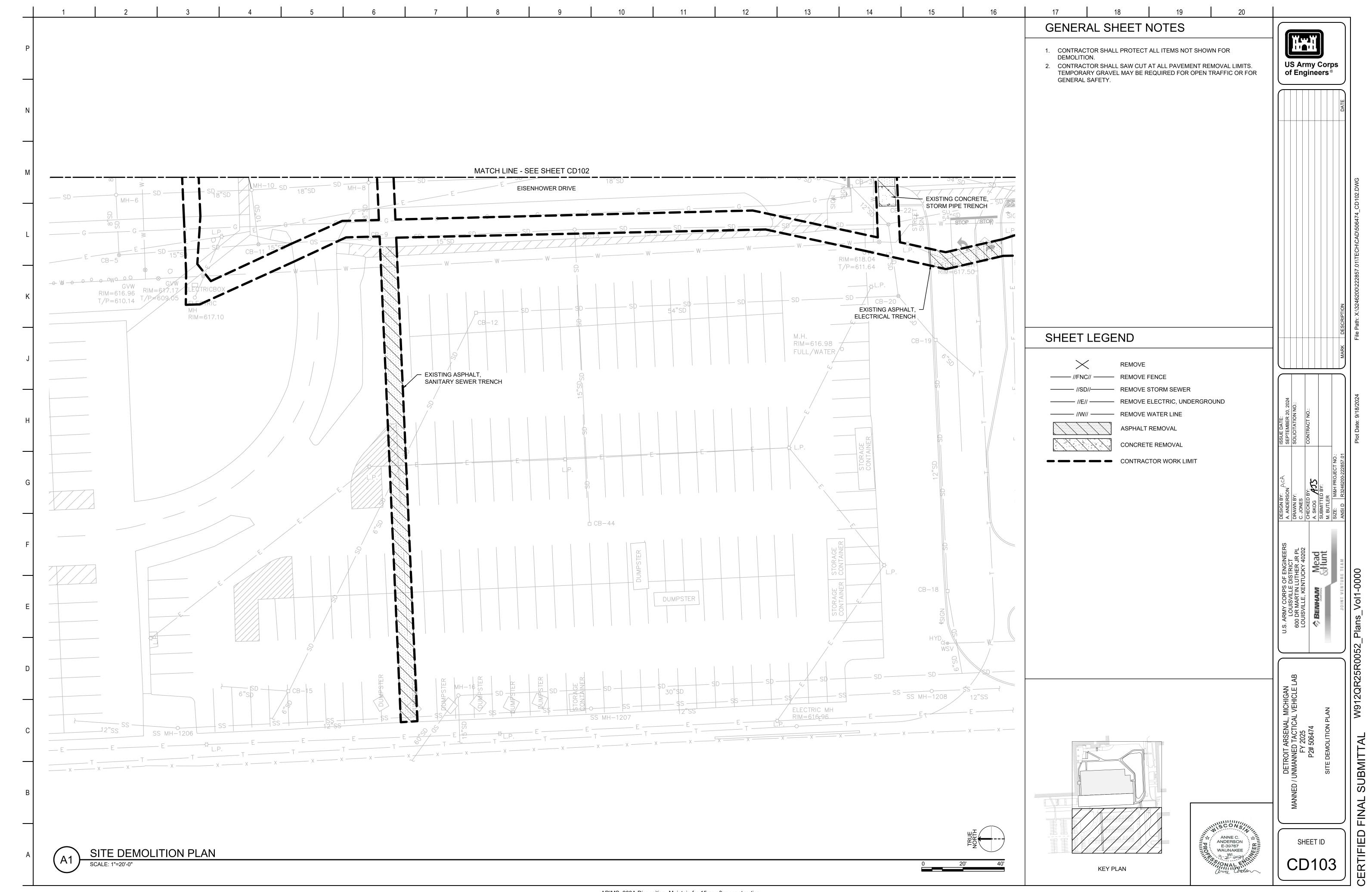
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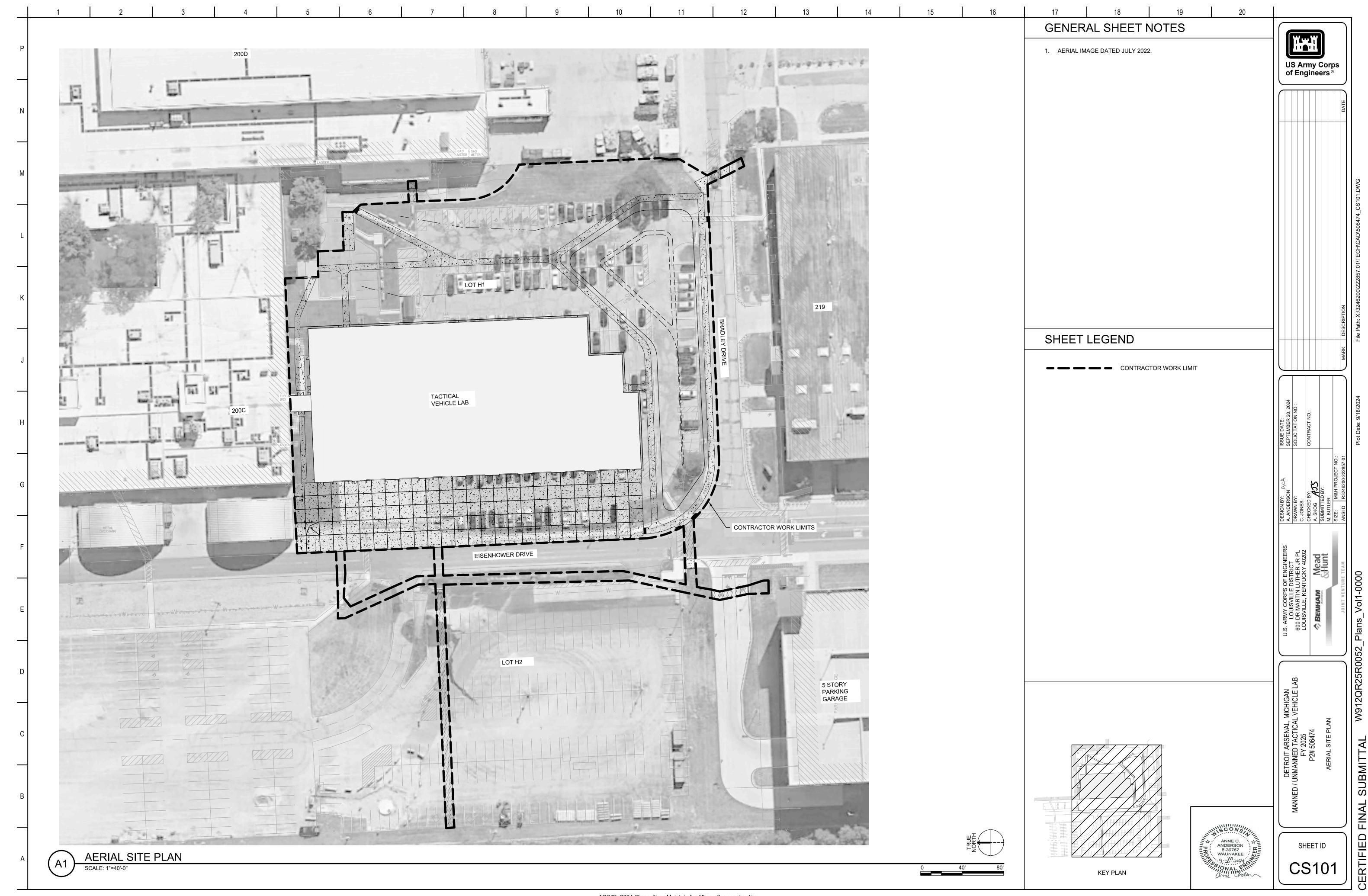
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ANDERSON
E-39767
WAUNAKEE

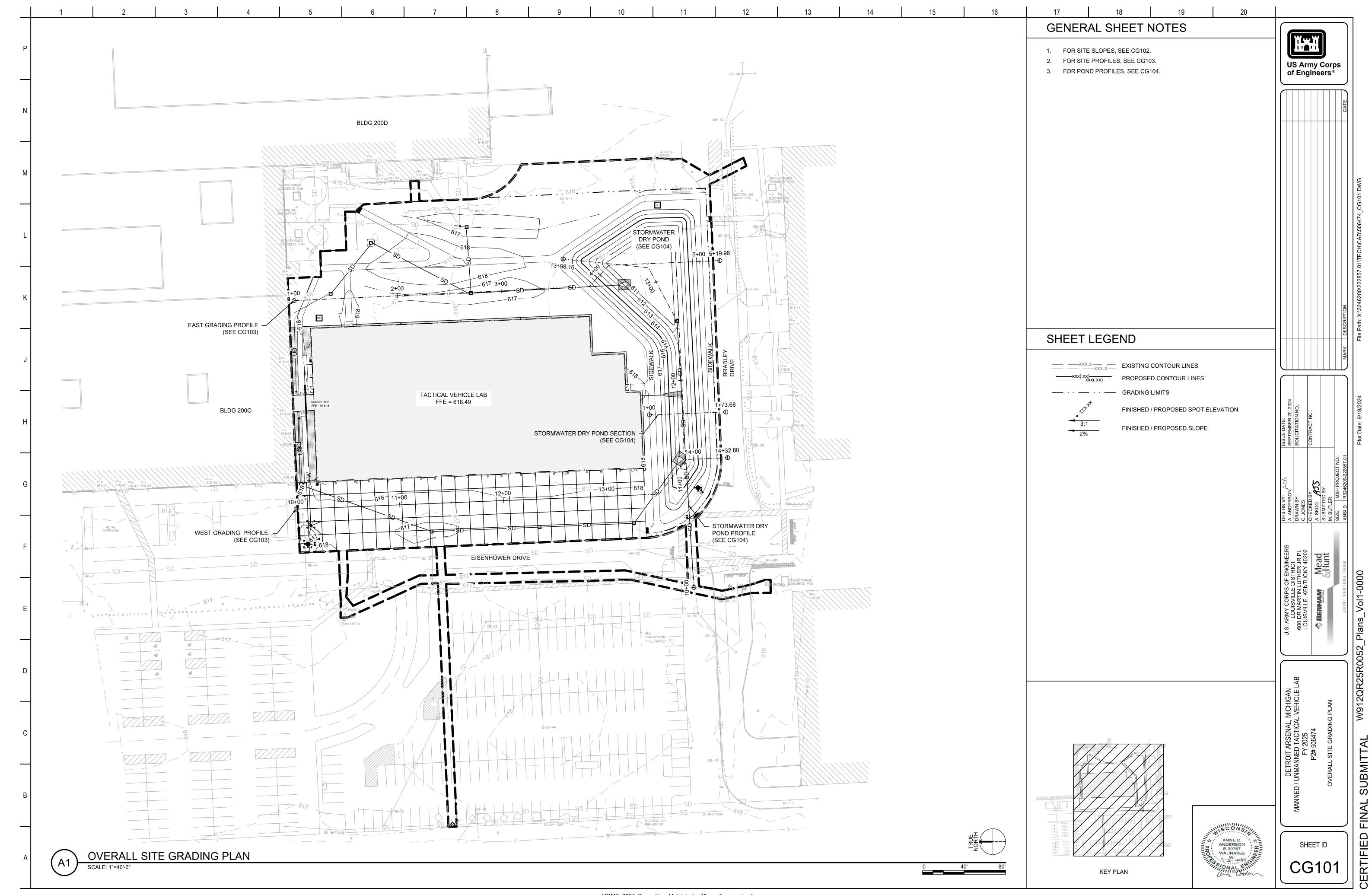
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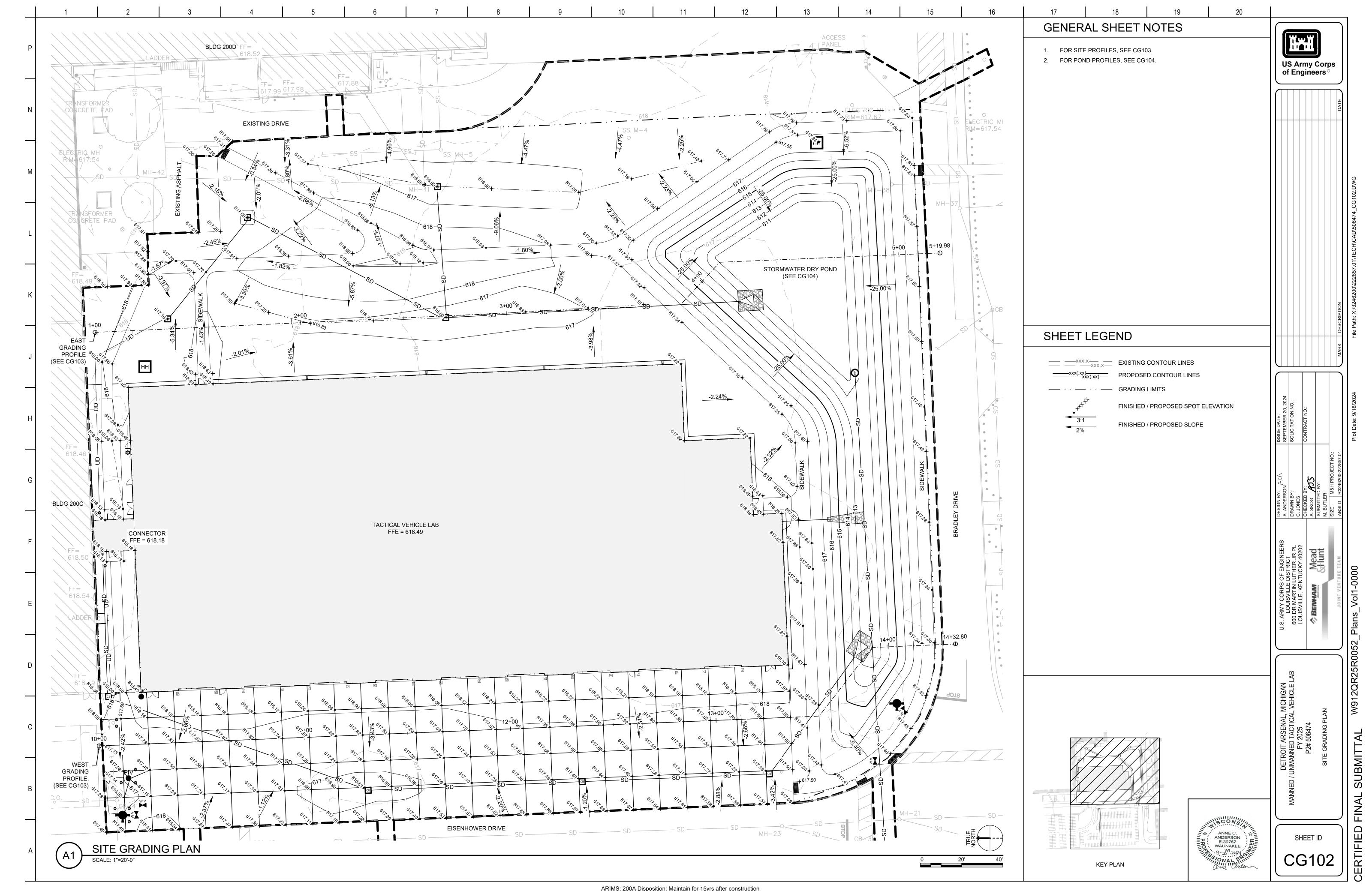


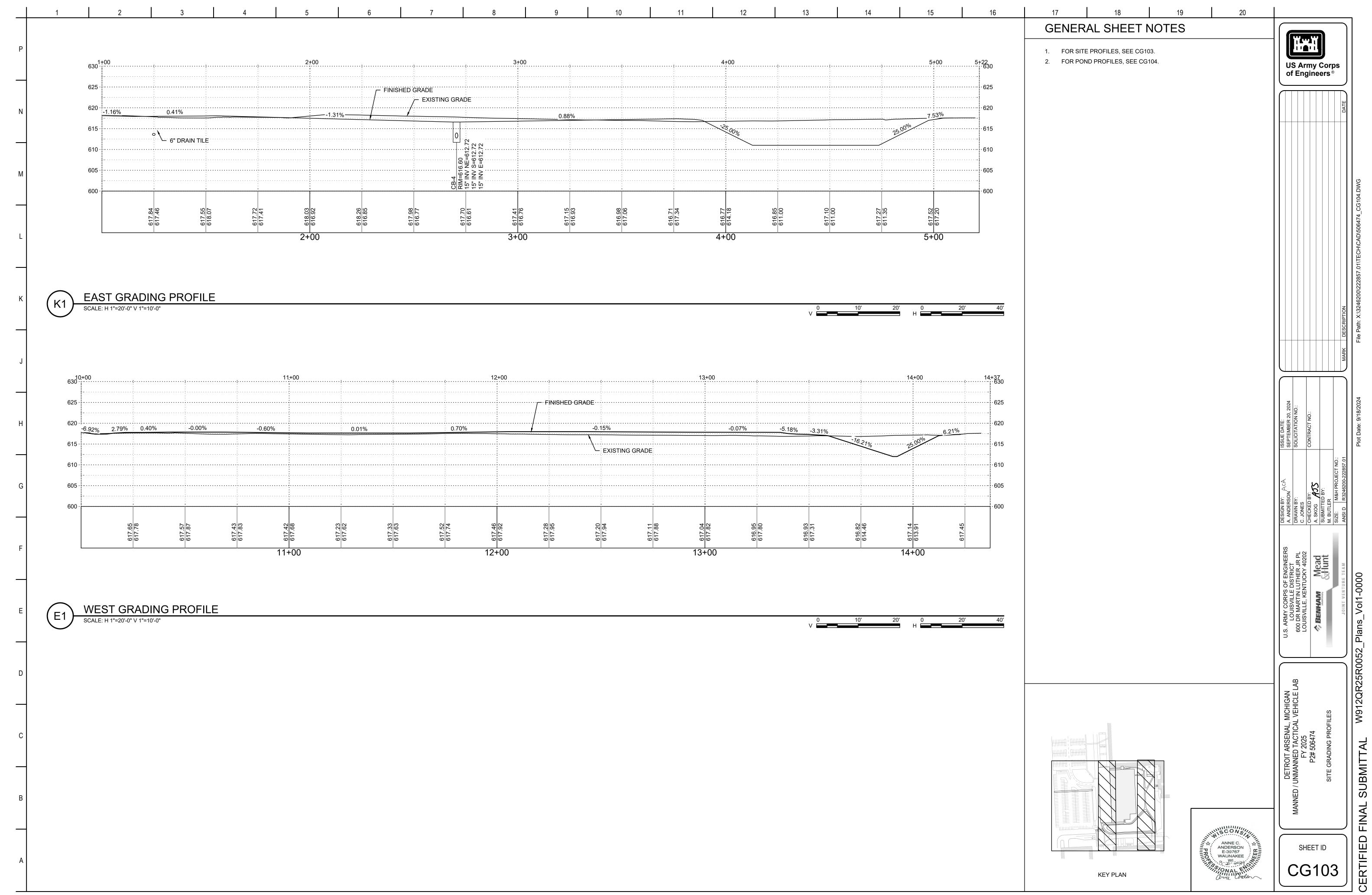


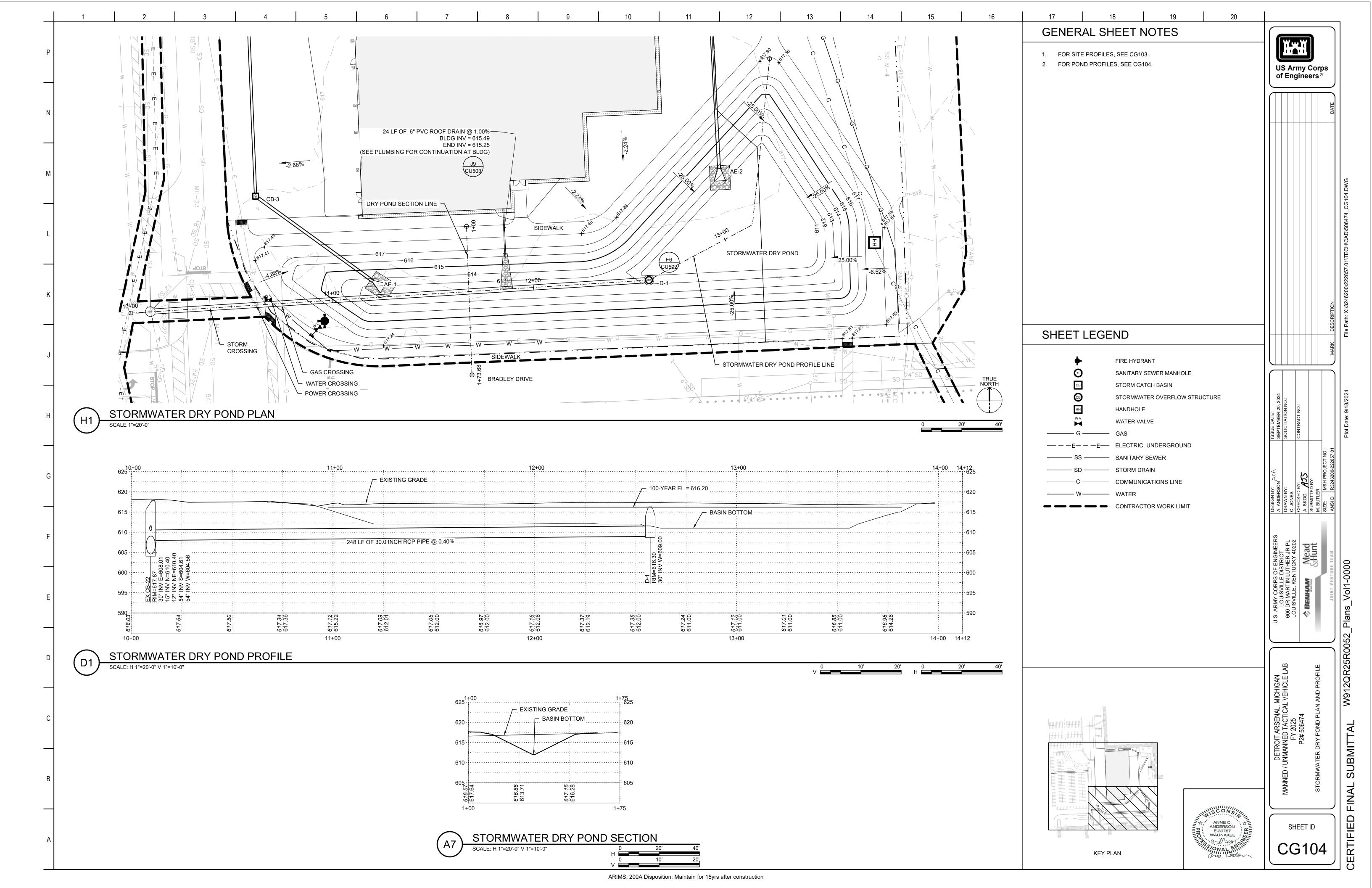


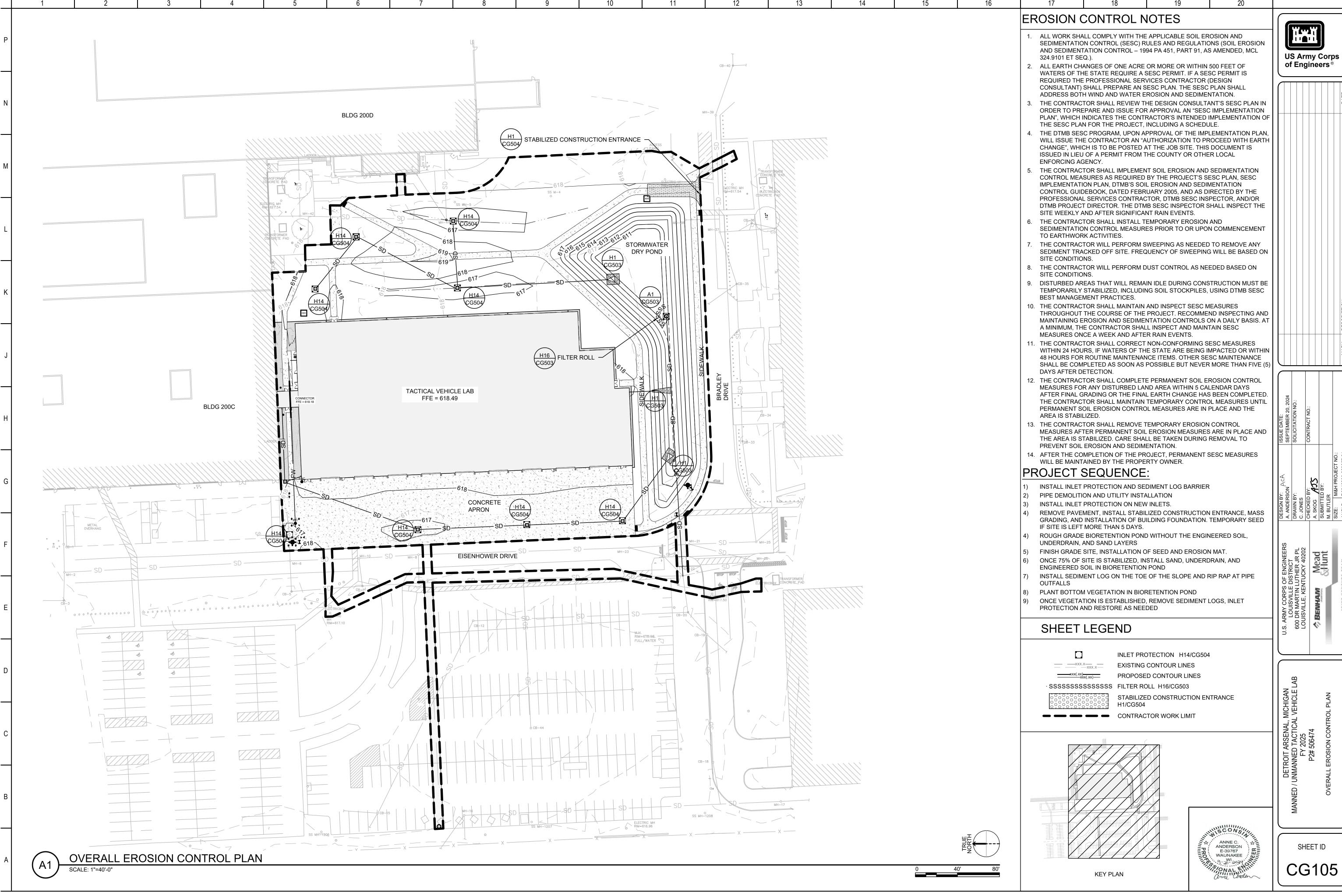


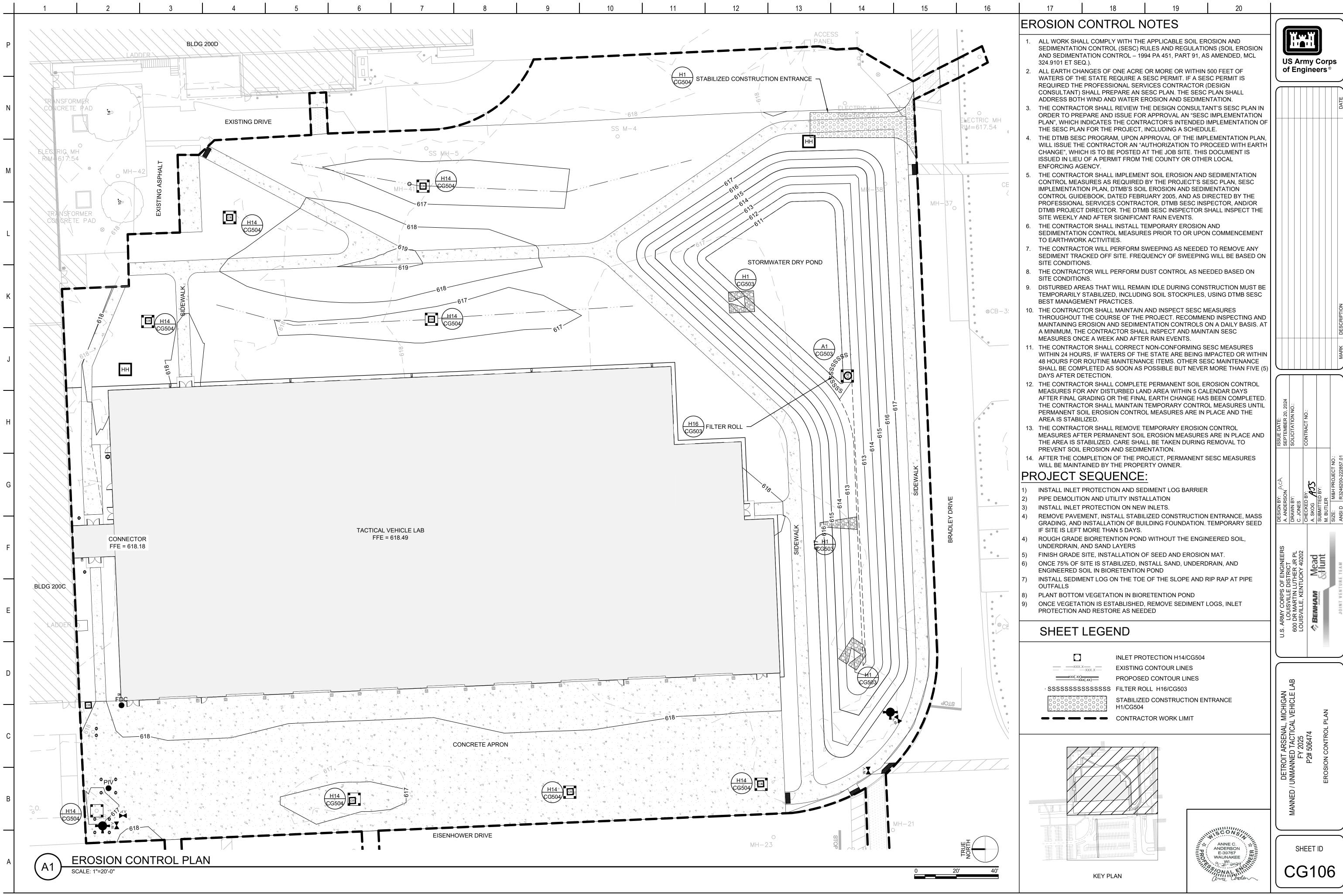












DUST CONTROL SPECIFICATIONS DUST CONTROL SPECIFICATIONS

• Frequent, even daily application may be required to increase Maintenance

• Do not overwater, as overwatering may cause erosion.

• Oil should not be used for dust control, as it may enter a drainageway through runoff or seeping into the soil.

• To continue its effectiveness, dust control application needs to be applied on a regular schedule.

• Applying too much water to surface may cause erosion.

• Some types of dust suppressants may make soil water repellant, increasing runoff.

EMPORARY SEEDING SPECIFICATIONS

• When an area needs stabilization during a break in construction.

• Stabilizes soil.

• Prevents erosion/sedimentation problems from developing.

• Allows runoff to infiltrate soil.

• Used on construction and earth change sites where earth change has been initiated but will not be completed within two normal work weeks.

• A temporary measure when an area needs stabilization during a break in construction.

1. Review construction phasing and soil erosion control plan to identify areas requiring temporary seeding.

2. Select annual grass seed for temporary cover areas.

3. Seed mixes may vary, should only contain annual, non-aggressive species, and generally include rye, wheat, or oat species. Seed mixes should be obtained from a seed supplier as seed mixes are dependent on soil type, light, moisture, and use application.

4. Prepare seedbed by removal of construction/woody debris. Then scarify or rake seedbed.

5. Slopes steeper than 1:3 should be roughened.

6. Apply seed as soon as possible after seedbed preparation. Mulch immediately after seeding all slopes, unstable soils, heavy clay soils, and all areas adjacent to wetlands, watercourses, or sensitive areas.

7. The time to seed is dependent on the climate of the area. Michigan has three climatic zones.

8. Protect seeded areas from pedestrian/vehicular traffic.

9. Divert concentrated flows away from seeded area until vegetation is

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TEMPORARY SEEDING DATES

10. Inspect temporary seeded areas weekly and following each rain (cont.) event until final grading and stabilization activities are completed.

11. Must be followed by permanent seeding.

Limitations • Seeds need adequate time to establish.

• May not be appropriate in areas with frequent traffic.

• Seeded area may require irrigation in dry periods.

	Zone 1	Zone 2	Zone 3	Amo	<u>ount</u>
<u>Seed Type</u>	Lower Peninsula (South of U.S. 10)	Lower Peninsula (North of U.S. 10)	Upper Peninsula	per 1,000 sq.ft.	per acre
Oats, barley	4/1 - 9/15	4/15 - 8/1	5/1 - 8/1	2 lbs.	96 lbs.
Annual Rye	8/1 - 10/15	8/1 - 10/10	8/1 - 11/1	3 lbs.	120 lbs.
Wheat	9/20 - 10/15	9/10 - 10/10	9/10 - 10/1	3 lbs.	120 lbs.
Buckwheat	6/1 - 7/15	6/1 - 7/15	6/15 - 7/15	2 lbs.	75 lbs.
Perennial Ryegrass	8/1 - 10/15	6/1 - 8/1	8/1 - 10/1	0.5 lbs.	20 lbs.

Source: Adapted from USDA NRCS Technical Guide #342 (1999)



PERMANENT SEEDING SPECIFICATIONS

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(cont.)

MANAGEMENT AND BUDGET

• To finalize stabilization of temporary seeding areas or when an area | How needs permanent stabilization following completion of construction. Also used when vegetative establishment can correct existing soil erosion or sedimentation problem.

• Within 5 days of final grade.

• To stabilize soil and prevent or reduce soil erosion/sedimentation problems from developing.

• Used on construction and earth change sites which require permanent vegetative stabilization.

1. Review SESC plan and construction phasing to identify areas in need of permanent vegetative stabilization.

2. Select perennial grass and ground cover for permanent cover.

3. Seed mixes vary. However, they should contain native species. 4. Seed mixes should be selected through consultation with a certified seed provider and with consideration of soil type, light, moisture, use applications, and native species content.

5. Soil tests should be performed to determine the nutrient and pH levels in the soil. The pH may need to be adjusted to between 6.5

6. Prepare a 3-5" deep seedbed, with the top 3-4" consisting of

7. Slopes steeper than 1:3 should be roughened.

8. Apply seed as soon as possible after seedbed preparation. Seed may be broadcast by hand, hydroseeding, or by using mechanical

9. Mulch immediately after seeding.

10. Dormant seed mixes are for use after the growing season, using seed which lies dormant in the winter and begins growing as soon as site conditions become favorable.

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11. Protect seeded areas from pedestrian or vehicular traffic. 12. Divert concentrated flows away from the seeded area until vegetation is established.

Maintenance •Inspect weekly and within 24 hours following each rain event in the first few months following installation to be sure seed has germinated and permanent vegetative cover is being established.

• Add supplemental seed as necessary.

Limitations • Seeds need adequate time to establish.

• May not be appropriate in areas with frequent traffic.

• Seeded areas may require irrigation during dry periods.

· Seeding success is site specific, consider mulching or sodding when

STANDARD SYMBOL

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PERMANENT SEEDING

<u>Planting Zones:</u>	Lower Peninsula (South of T20N) Zone 1	Lower Peninsula (North of T20N) Zone 2	Upper Peninsula Zone 3
Seeding Window Permanent Seeding	4/15 - 10/10	5/1 – 10/1	5/1 - 9/20
Seeding Window Dormant Seeding*	11/15 — Freeze	11/01 — Freeze	11/01 — Freeze

Source: Adapted from MDOT Interim 2003 Standard Specifications for Construction

	Zone 1 Lower Peninsula (South of U.S. 10)	Zone 2 Lower Peninsula (North of U.S. 10)	Zone 3 Upper Peninsula
Seeding Dates (with Irrigation or Mulch)	4/1 – 8/1	5/1 – 9/20	5/1 - 9/10
Seeding Dates (w/o Irrigation or Mulch)	4/1 - 5/20 or 8/10 - 10/1	5/1 - 6/10 or 8/1 - 9/20	5/1 - 6/15 or 8/1 - 9/20
Dormant Seeding Dates*	11/1 — Freeze	10/25 — Freeze	10/25 — Freeze

Source: Adapted from USDA NRCS Technical Guide #342 (1999)

* Dormant seeding is for use in the late fall after the soil temperature remains consistently below 50°F, prior to the ground freezing. This practice is appropriate if construction on a site is completed in the fall but the seed was not planted prior to recommended seeding dates. No seed germination will take place until spring. A cool season annual grass may be added in an attempt to have some fall growth.

• Mulch must be used with dormant seed.

• Do not seed when the ground is frozen or snow covered.

• Do not use a dormant seed mix on grassed waterways.



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ARIMS: 200A Disposition: Maintain for 15yrs after construction

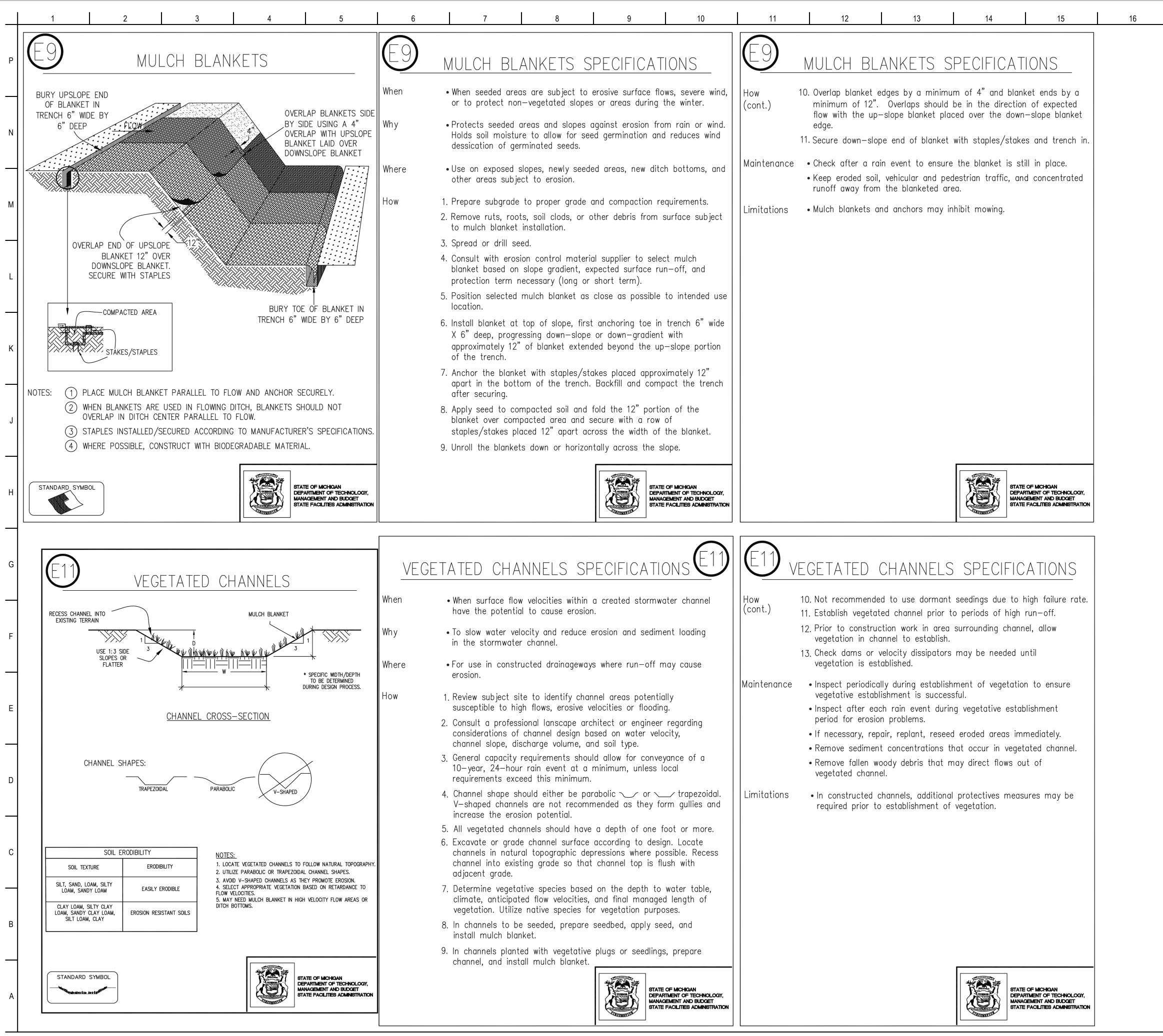
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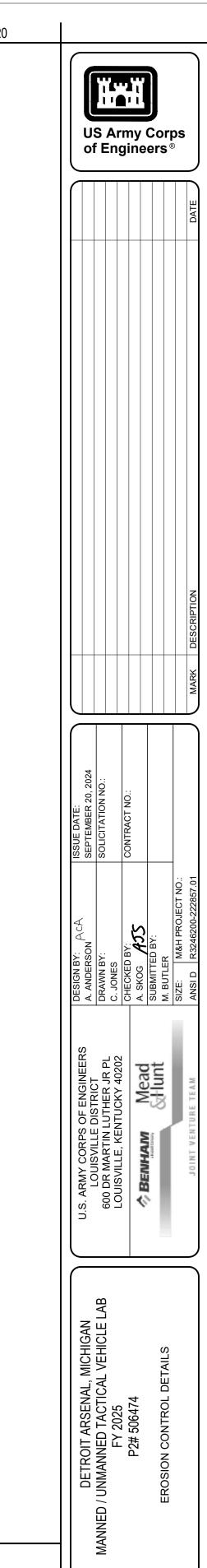
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MANAGEMENT AND BUDGET

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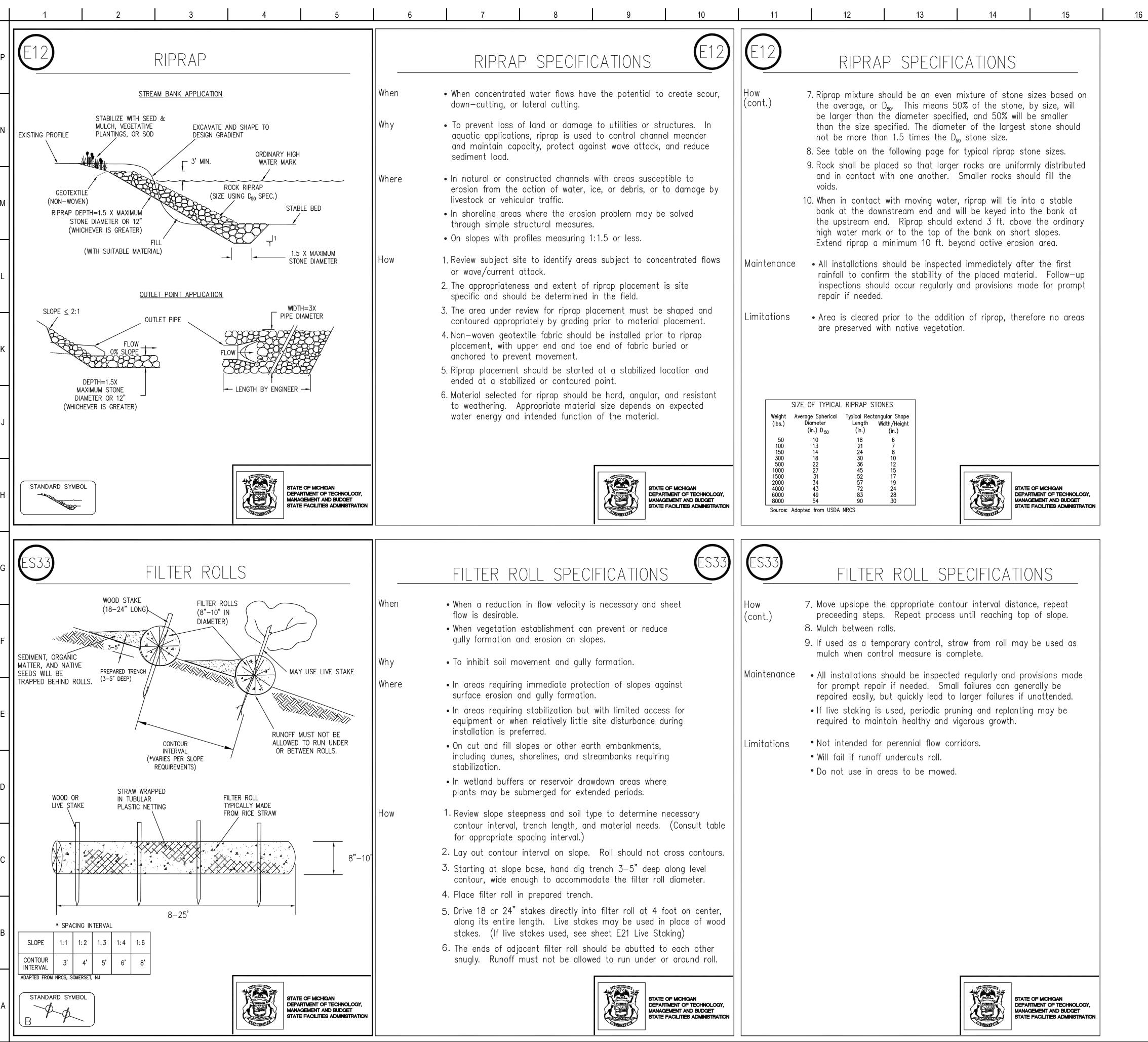


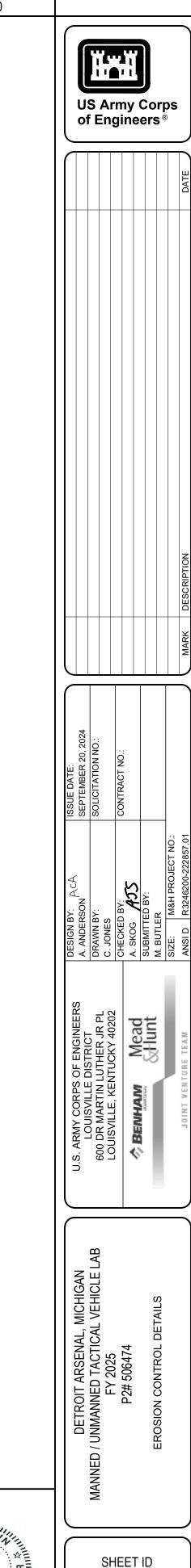


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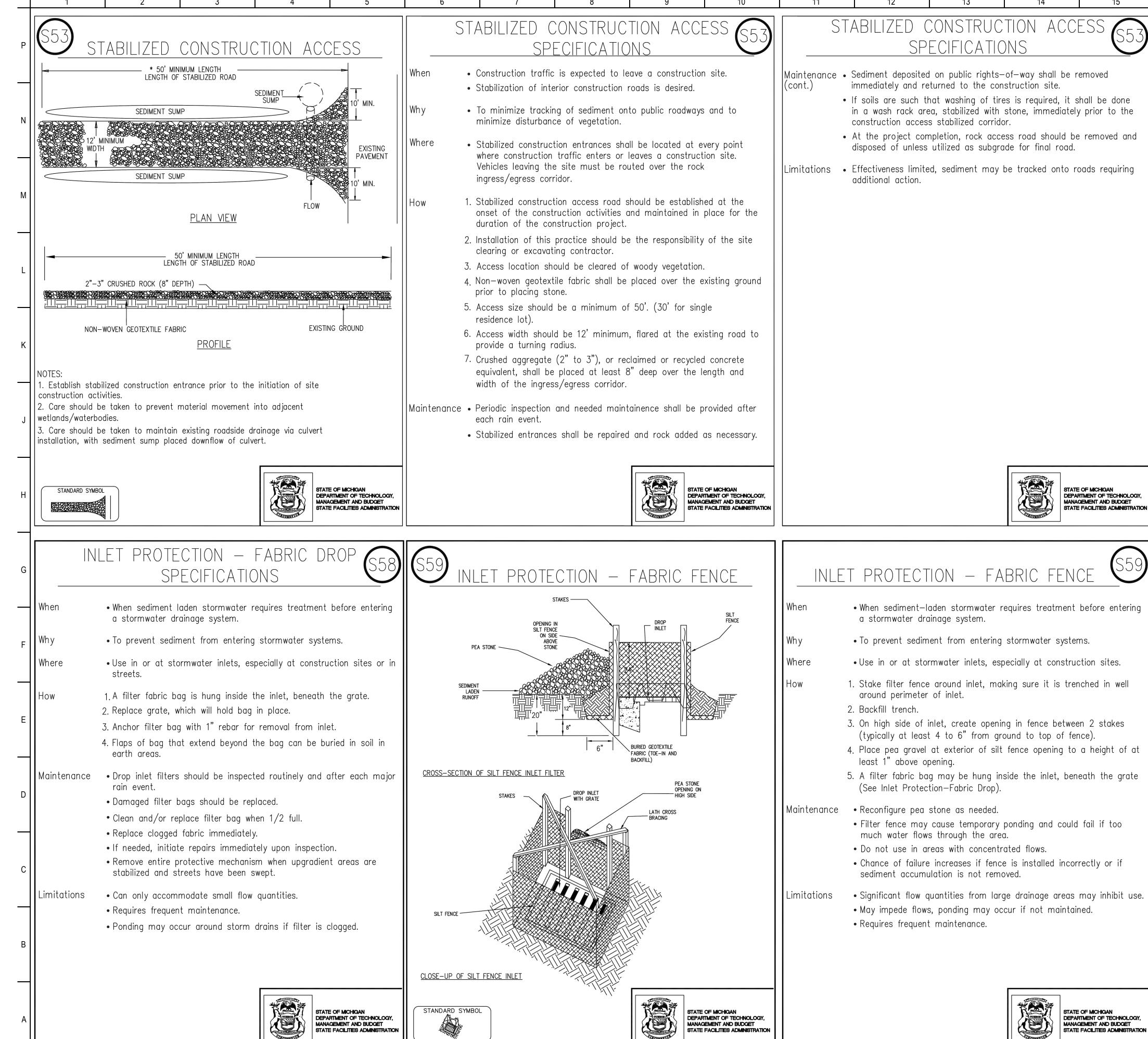




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CG503



STABILIZED CONSTRUCTION ACCESS

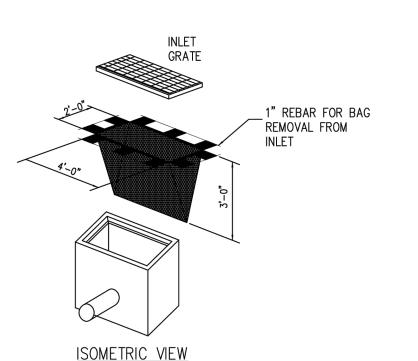
Maintenance • Sediment deposited on public rights—of—way shall be removed

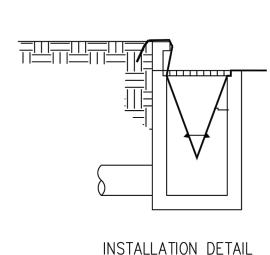
- If soils are such that washing of tires is required, it shall be done in a wash rack area, stabilized with stone, immediately prior to the
- At the project completion, rock access road should be removed and

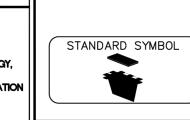
Limitations • Effectiveness limited, sediment may be tracked onto roads requiring



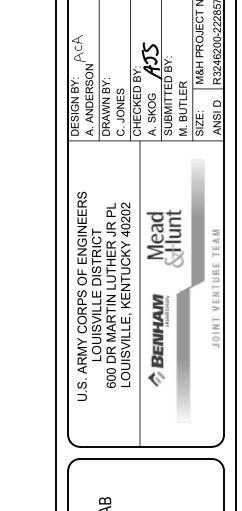
PROTECTION - FABRIC DROP







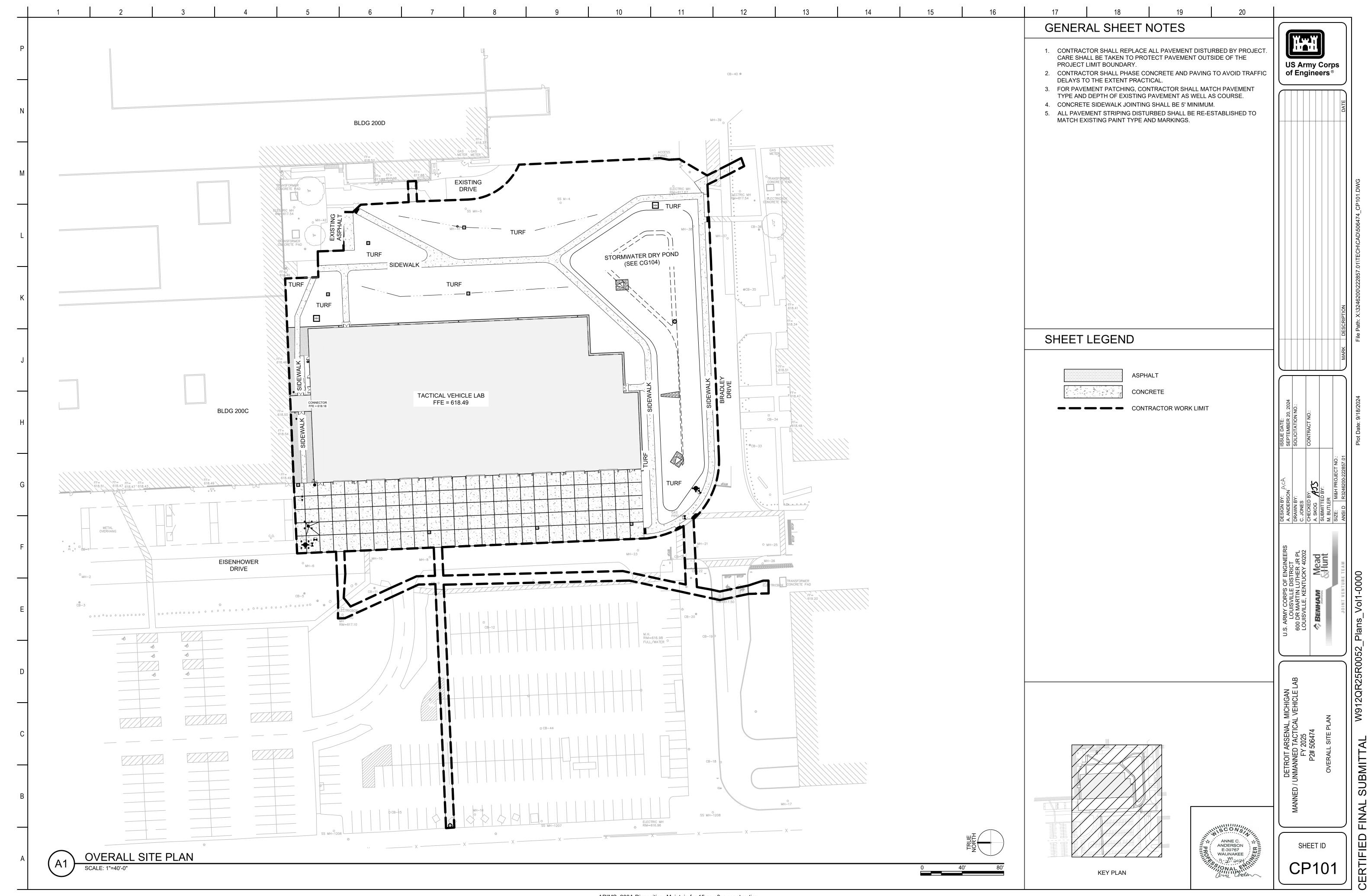


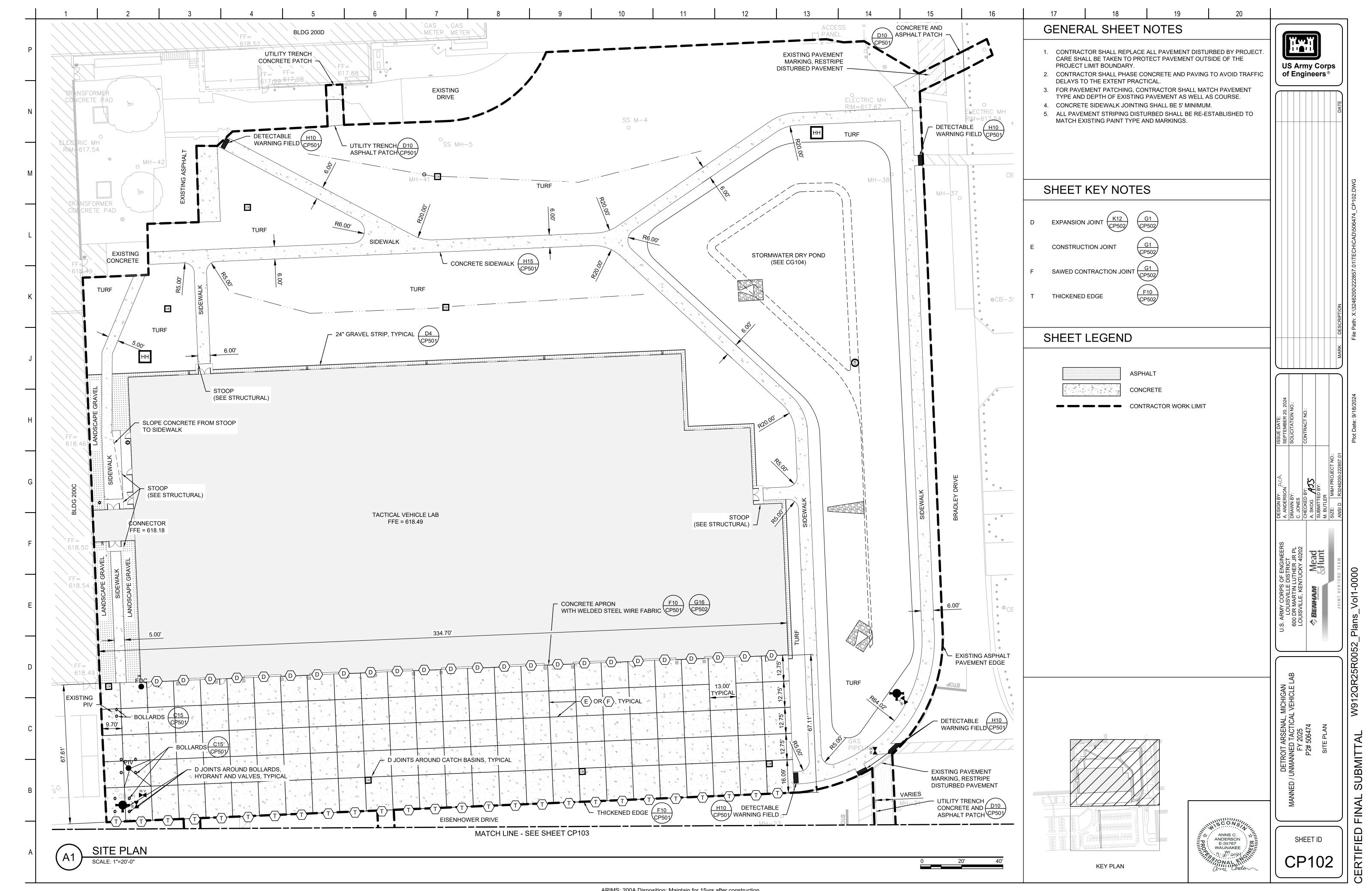


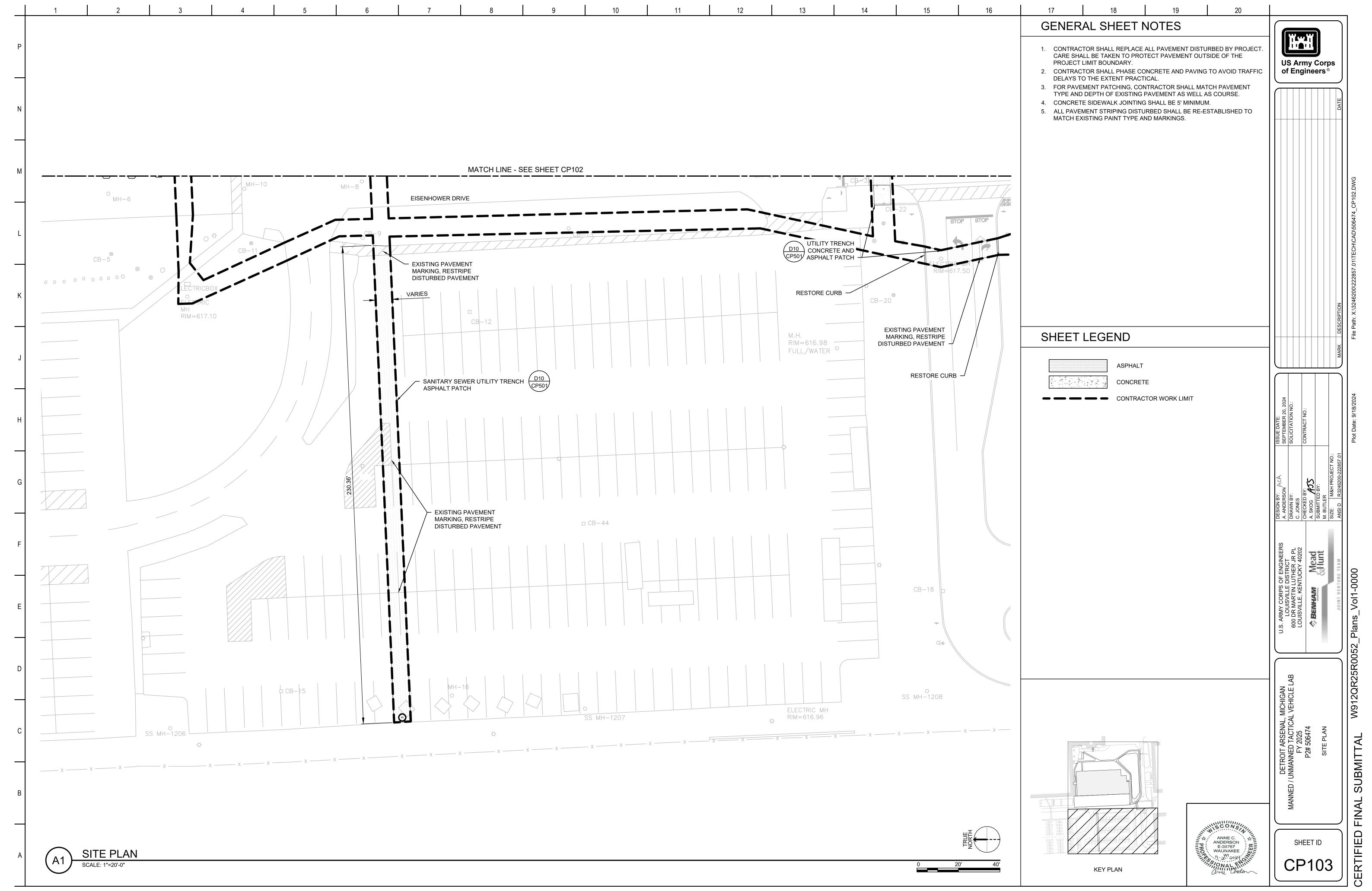
US Army Corps

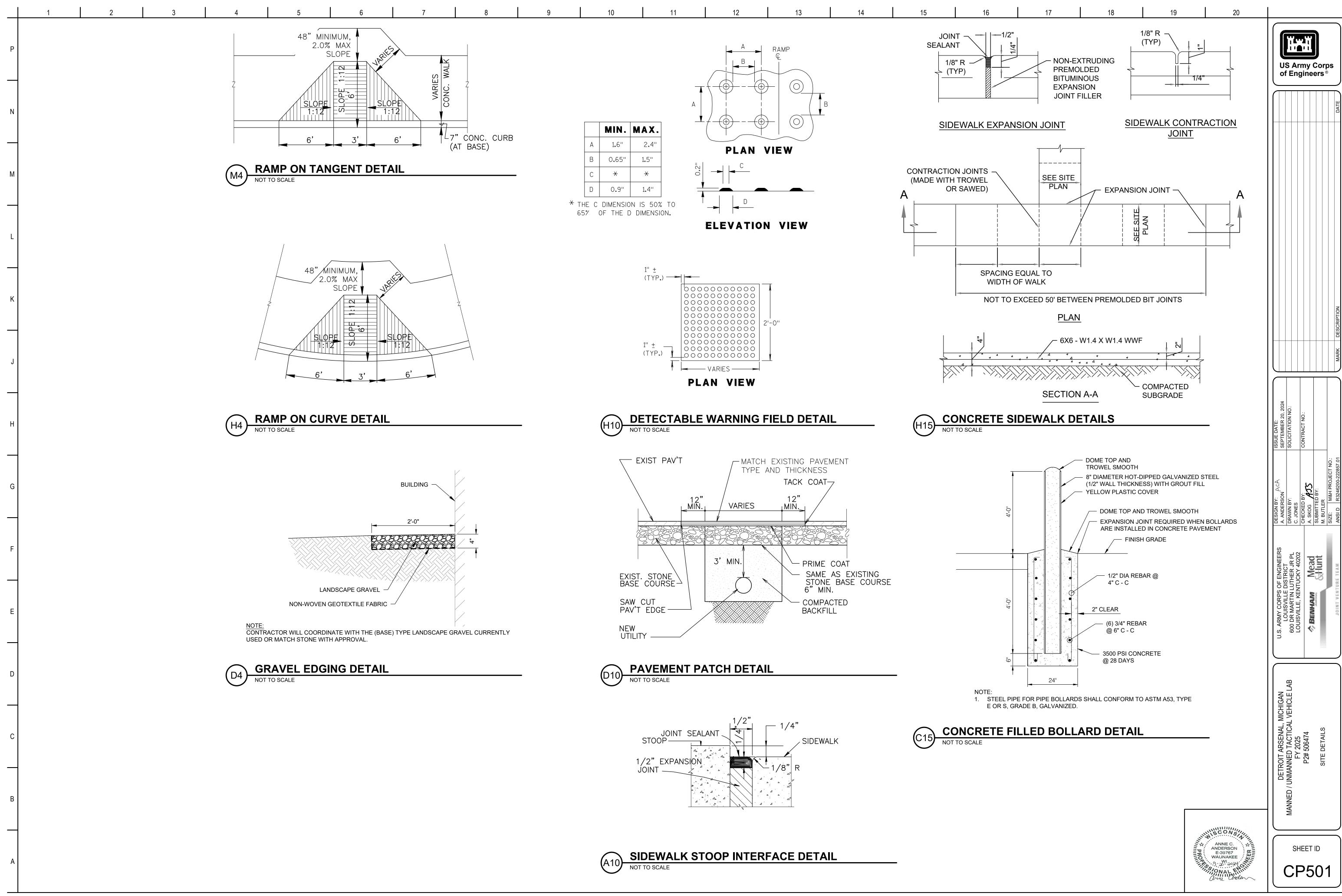
of Engineers®

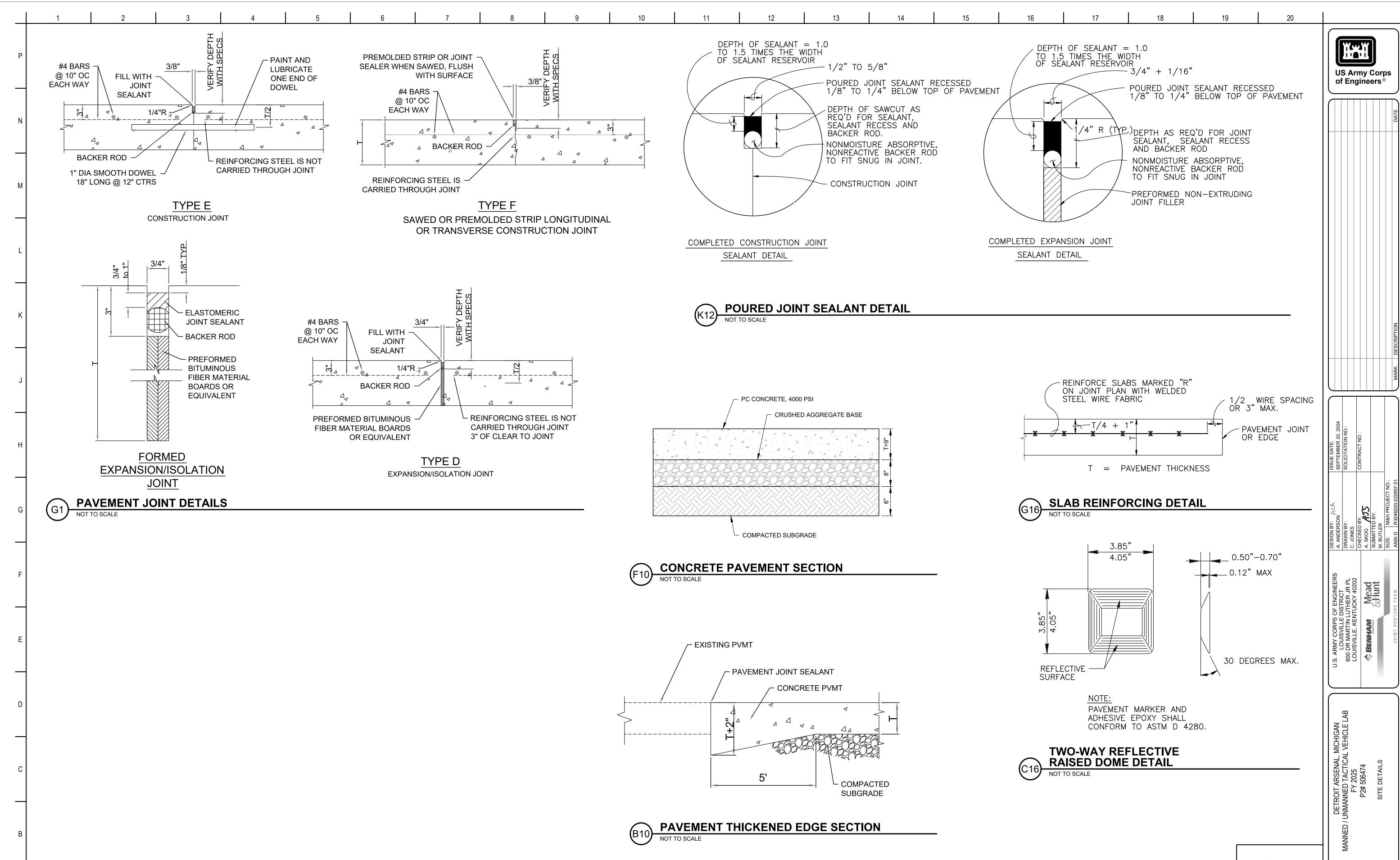
SHEET ID CG504





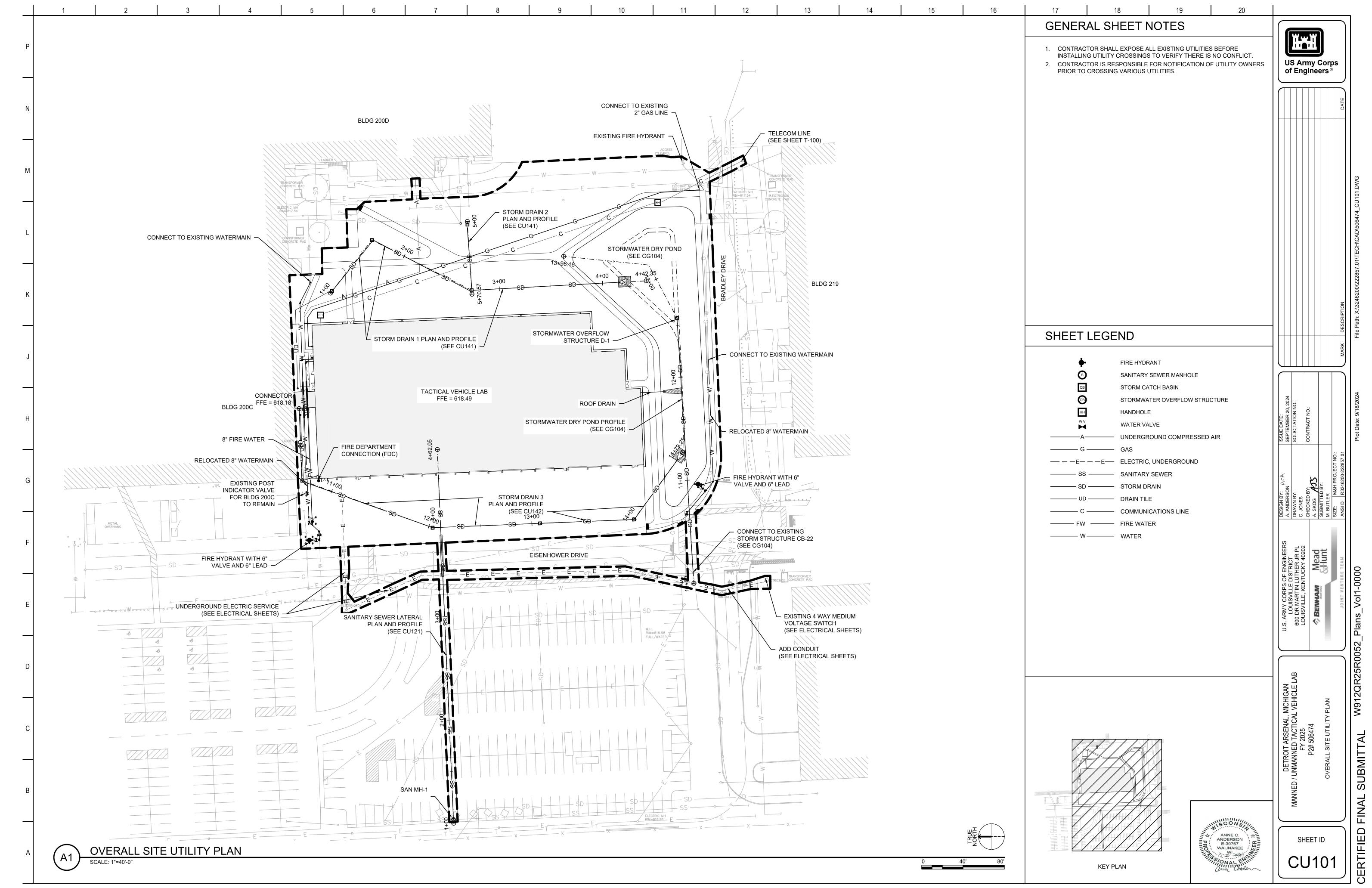


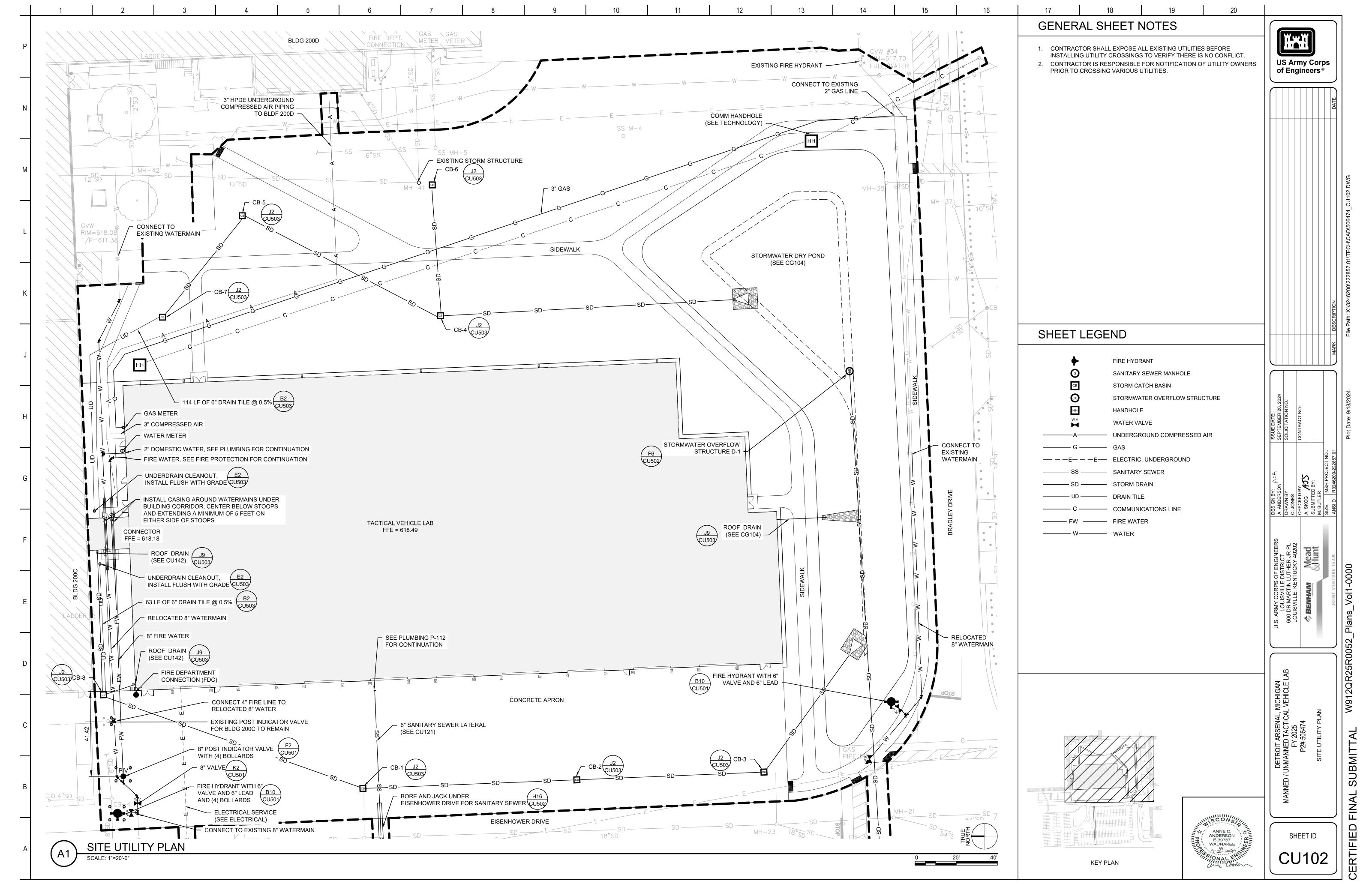


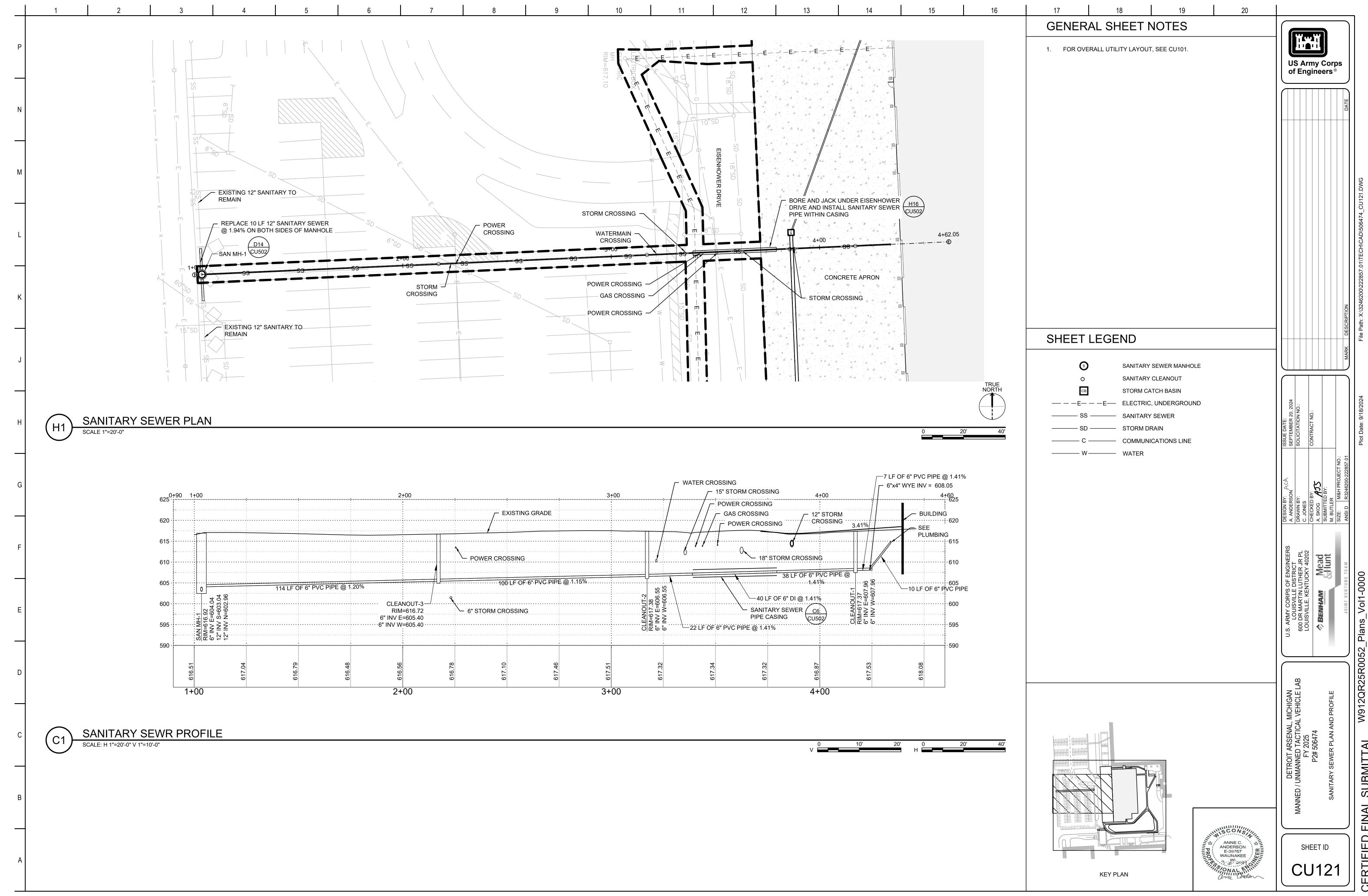


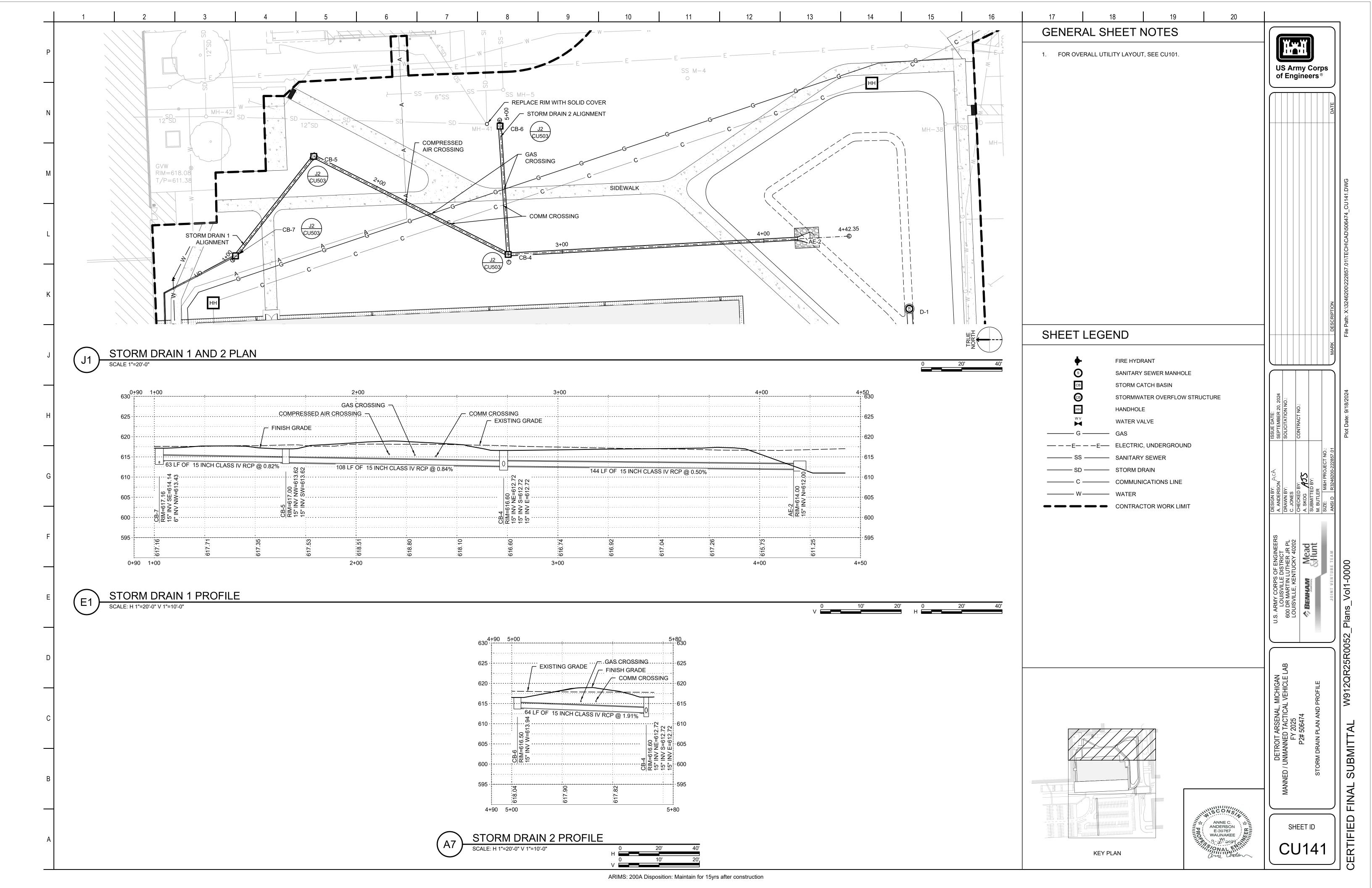
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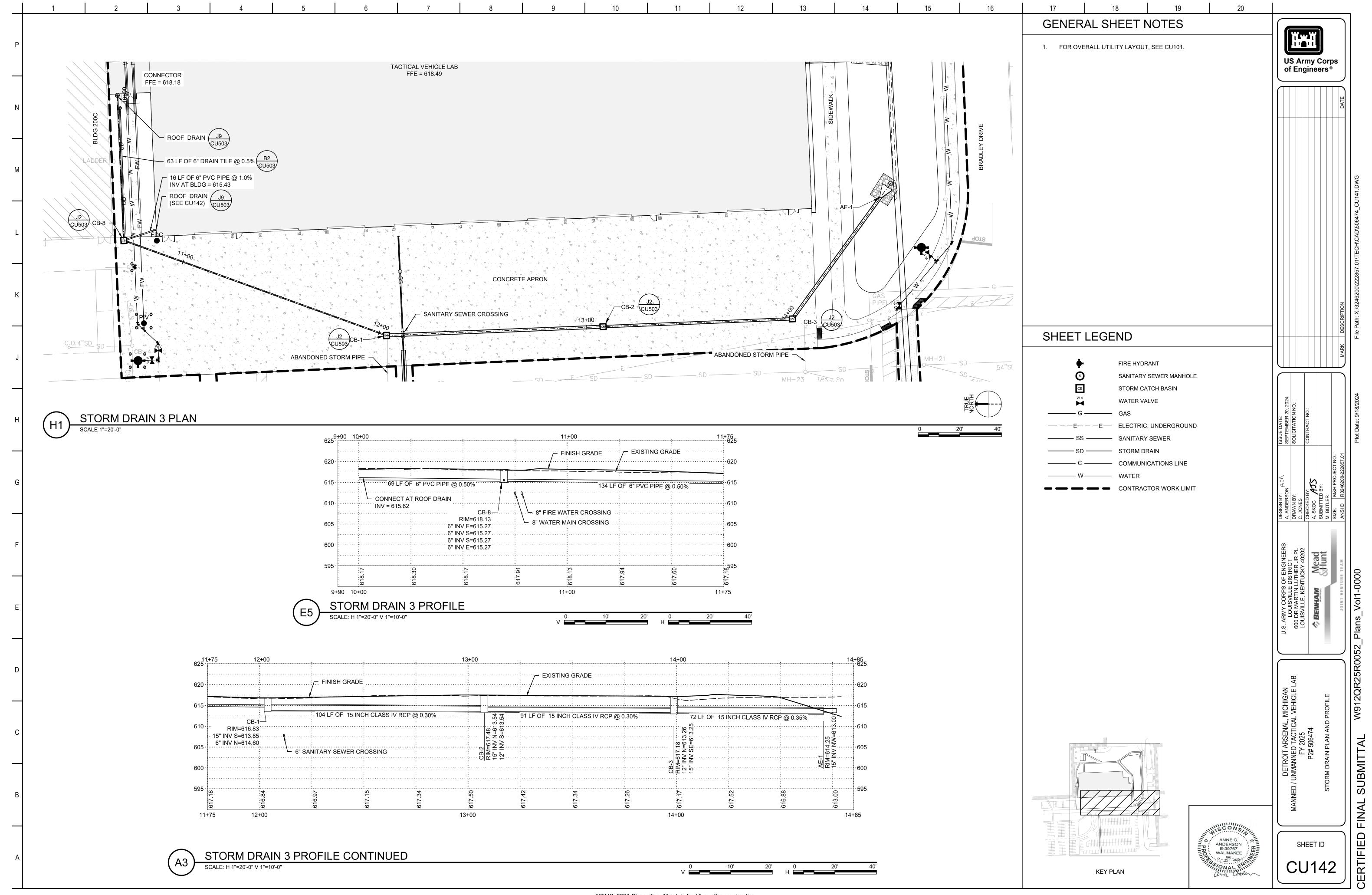
CP502

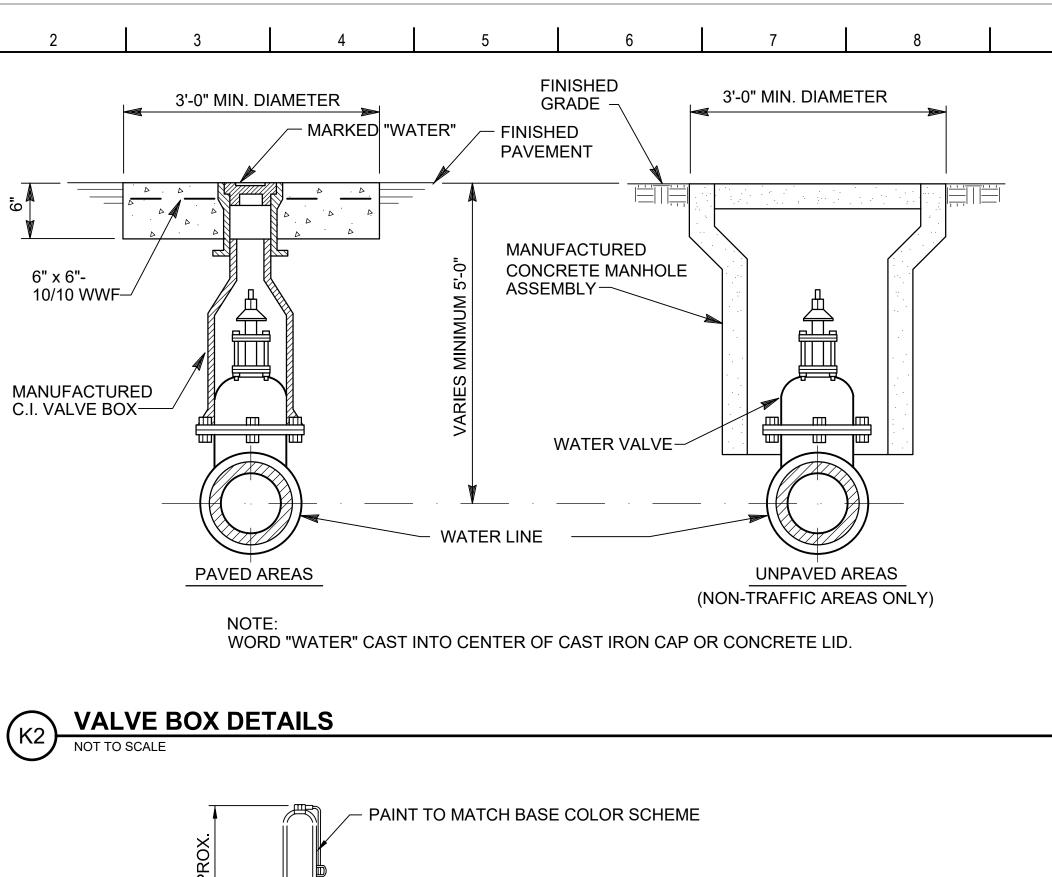


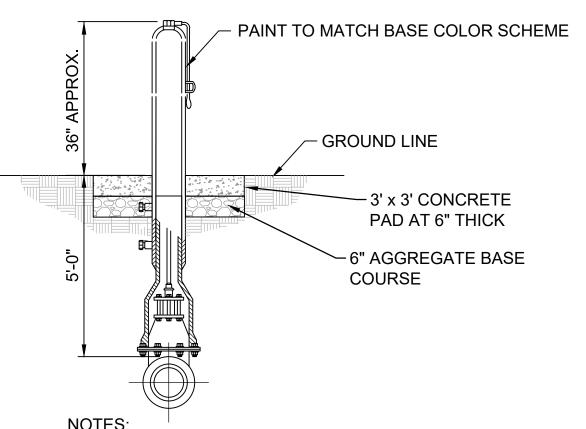










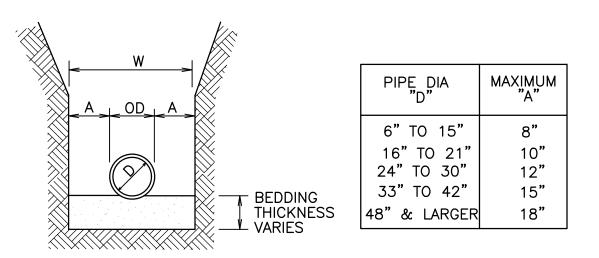


NOTES:

1. PROVIDE 4-8" BOLLARDS AT EACH VALVE LOCATION.

2. PLACE BOLLARD 1' IN FRONT AND 3' EACH SIDE OF PIV.

POST INDICATOR VALVE DETAIL



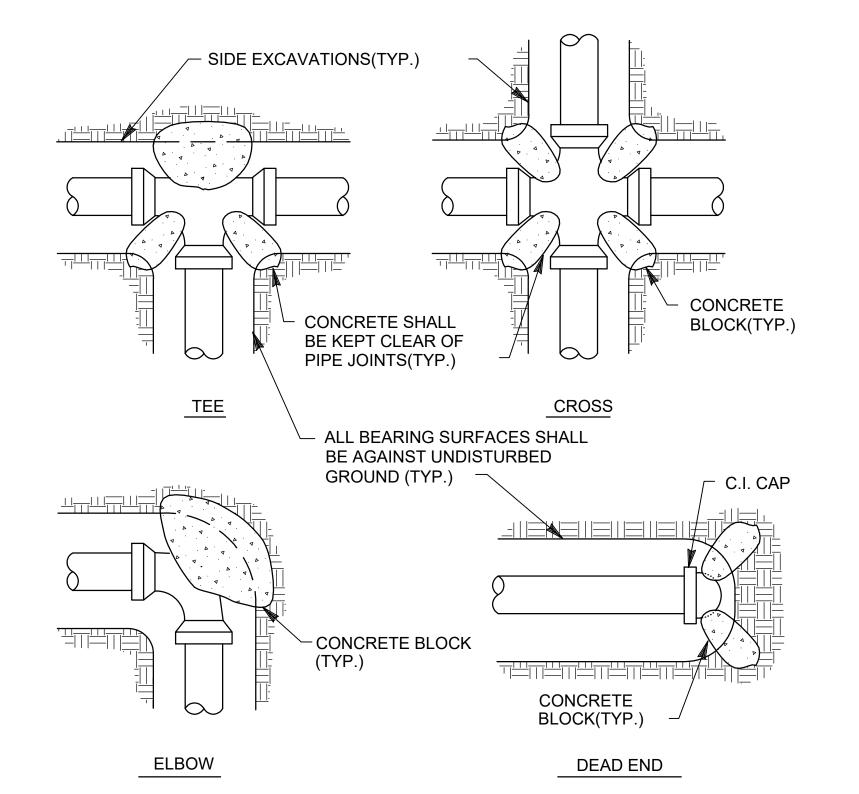
MAXIMUM TRENCH WIDTH "W" TAKEN AT TOP OF PIPE

NOTES:

1. PROVIDE BEDDING IN ACCORDANCE WITH THE SPECIFICATIONS.

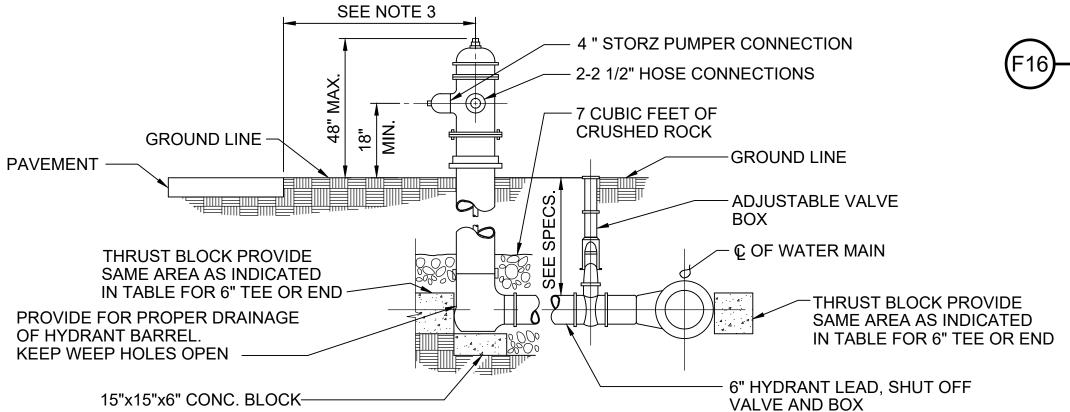
2. PROVIDE CLASS II BACKFILL.

B2 STANDARD PIPE TRENCH WIDTH
NOT TO SCALE



BEARING AREAS EACH DIRECTION OF THRUST IN SQUARE FEET				
PIPE SIZE	TEES & DEADENDS	90° ELBOWS	45° ELBOW CROSSES IN DIRECTION OF FLOW	22-1/2° ELBOWS
6"	4.0	5.5	3.0	2.0
8"	7.0	9.5	5.0	3.0
10"	9.5	13.5	7.0	4.0
12"	13.5	19.0	10.0	5.0
14"	18.0	23.5	14.0	7.0
16"	23.0	33.0	18.0	9.0

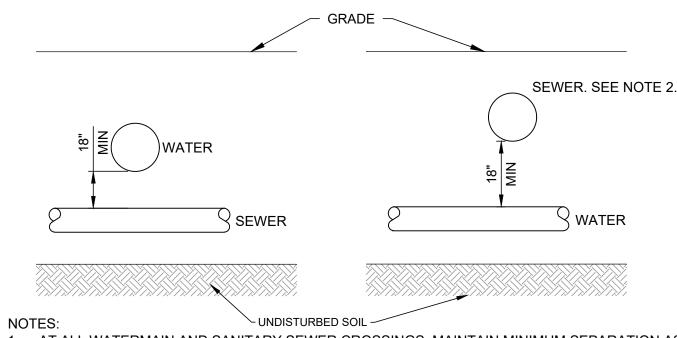
(G10) THRUST BLOCK INSTALLATION DETAIL



NOTES
1) PROVIDE (2) BOLLARDS AT EACH HYDRANT LOCATION.
2) PLACE BOLLARDS 1' IN FRONT OF AND 3' BESIDE HYDRANT.
3) INSTALL HYDRANT 3'-0" - 7'-0" FROM EDGE OF PAVEMENT.
4) HYDRANT TO MATCH BASE COLOR SCHEME.

FIRE HYDRANT SETTING - DRY TYPE

NOT TO SCALE



 AT ALL WATERMAIN AND SANITARY SEWER CROSSINGS, MAINTAIN MINIMUM SEPARATION AS FOLLOWS.

- 2. 18-INCH SEPARATION WHEN WATERMAIN CROSSES THE TOP OF THE SANITARY SEWER MAIN AND ENCASE SEWER OR INSTALL PRESSURE PIPE 10 FEET ON EITHER SIDE OF THE WATER WHEN THE SANITARY SEWER CROSSES OVER THE TOP OF THE WATERMAIN.
- 3. 10' HORIZONTAL SEPARATION REQUIRED.
- 4. SEE SPECIFICATION SECTIONS 33 11 00 AND 33 30 00 FOR ADDITIONAL INFORMATION



NATIVE MATERIAL. IF NATIVE
MATERIAL IS UNSUITABLE FOR
BACKFILL, APPROVED GRANULAR
MATERIAL WILL BE REQUIRED

NOM. PIPE
DIA. + 18"
PIPE
ZONE
BEDDING

DIA.

SECTION

1. ALL WATER MAINS SHALL HAVE A MIN. COVER OF 48".

2. ALL TRENCH BACKFILL AND PATCHING SHALL CONFORM TO THE SPECIFICATIONS.



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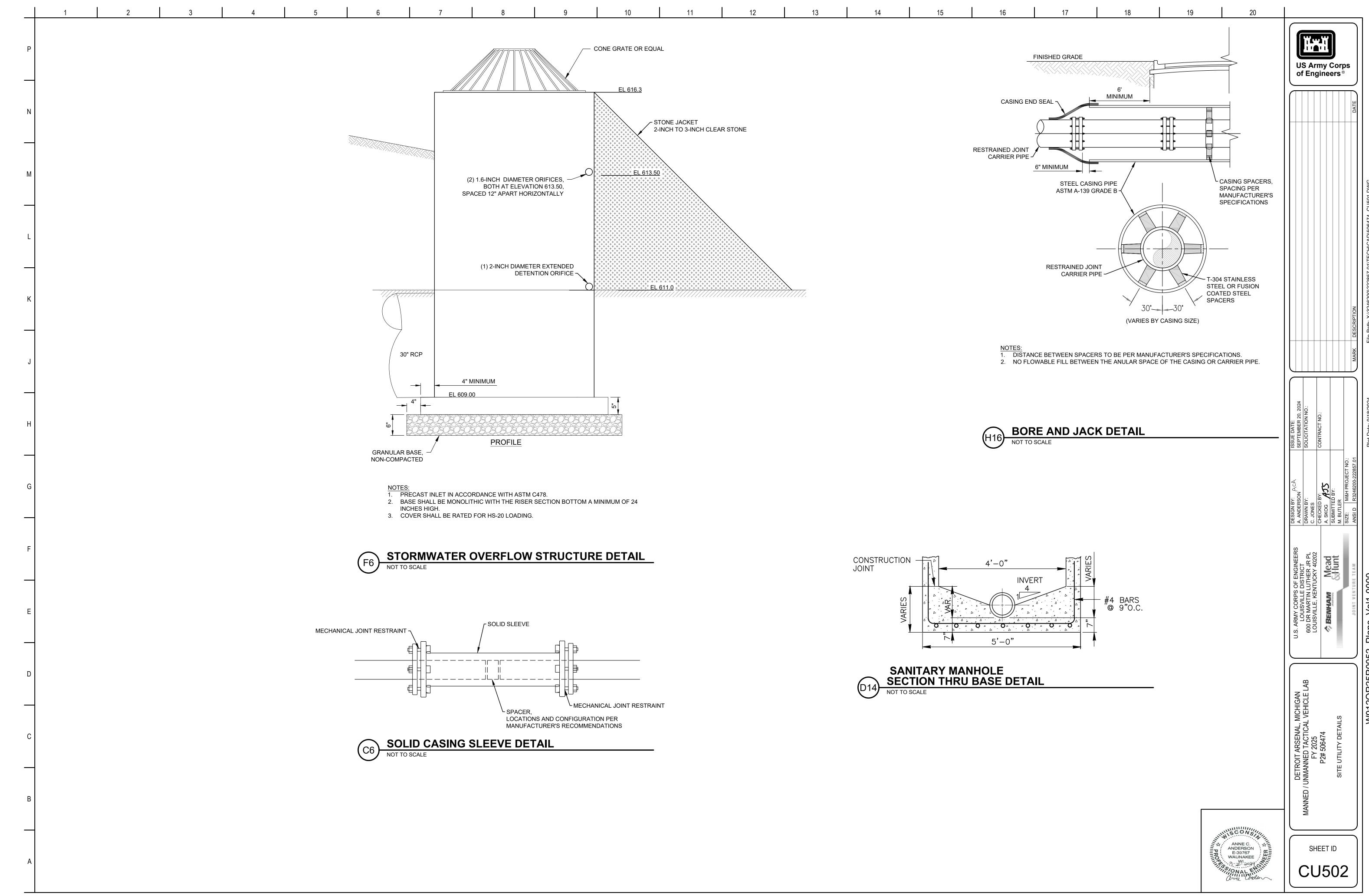
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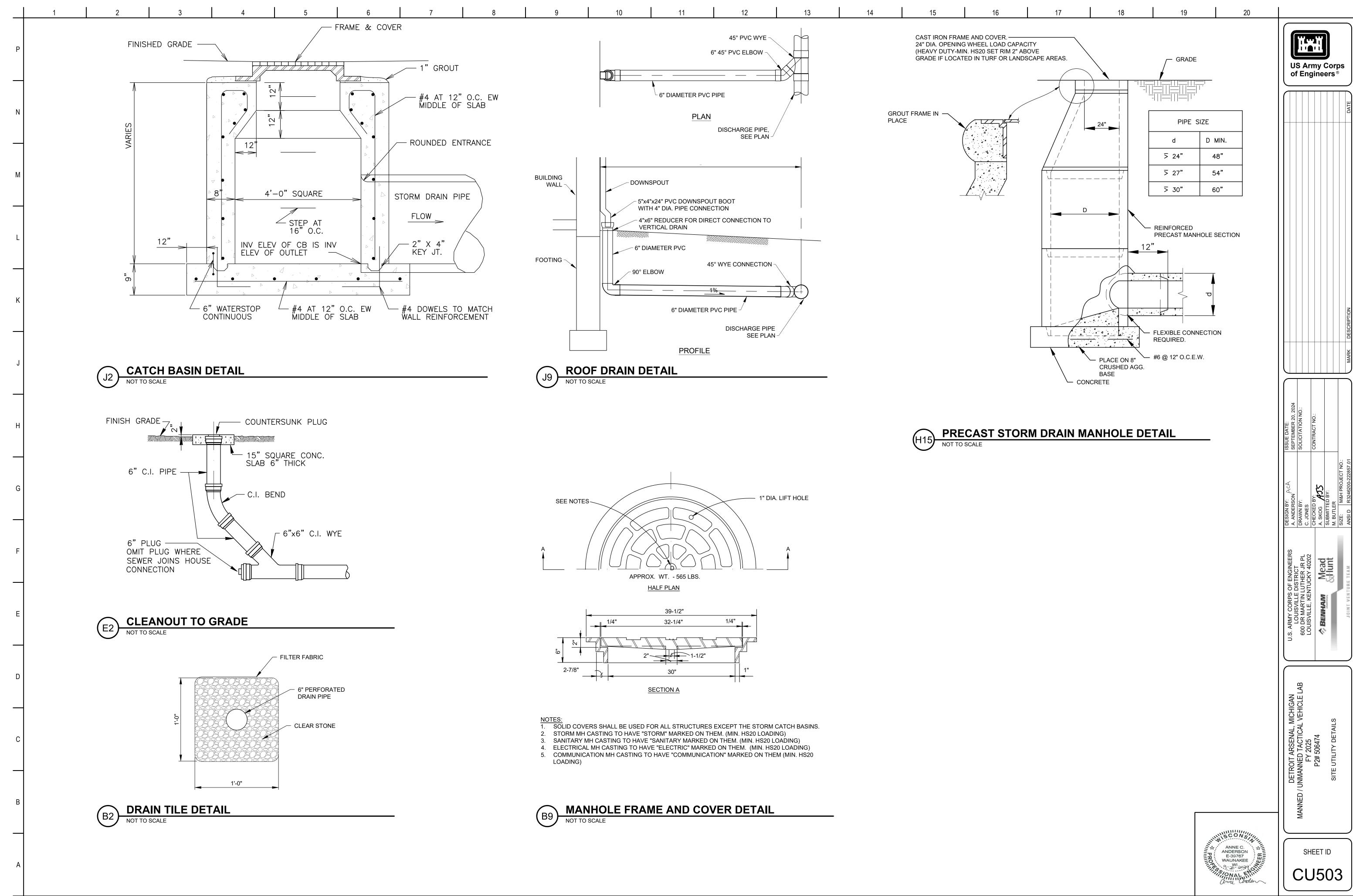
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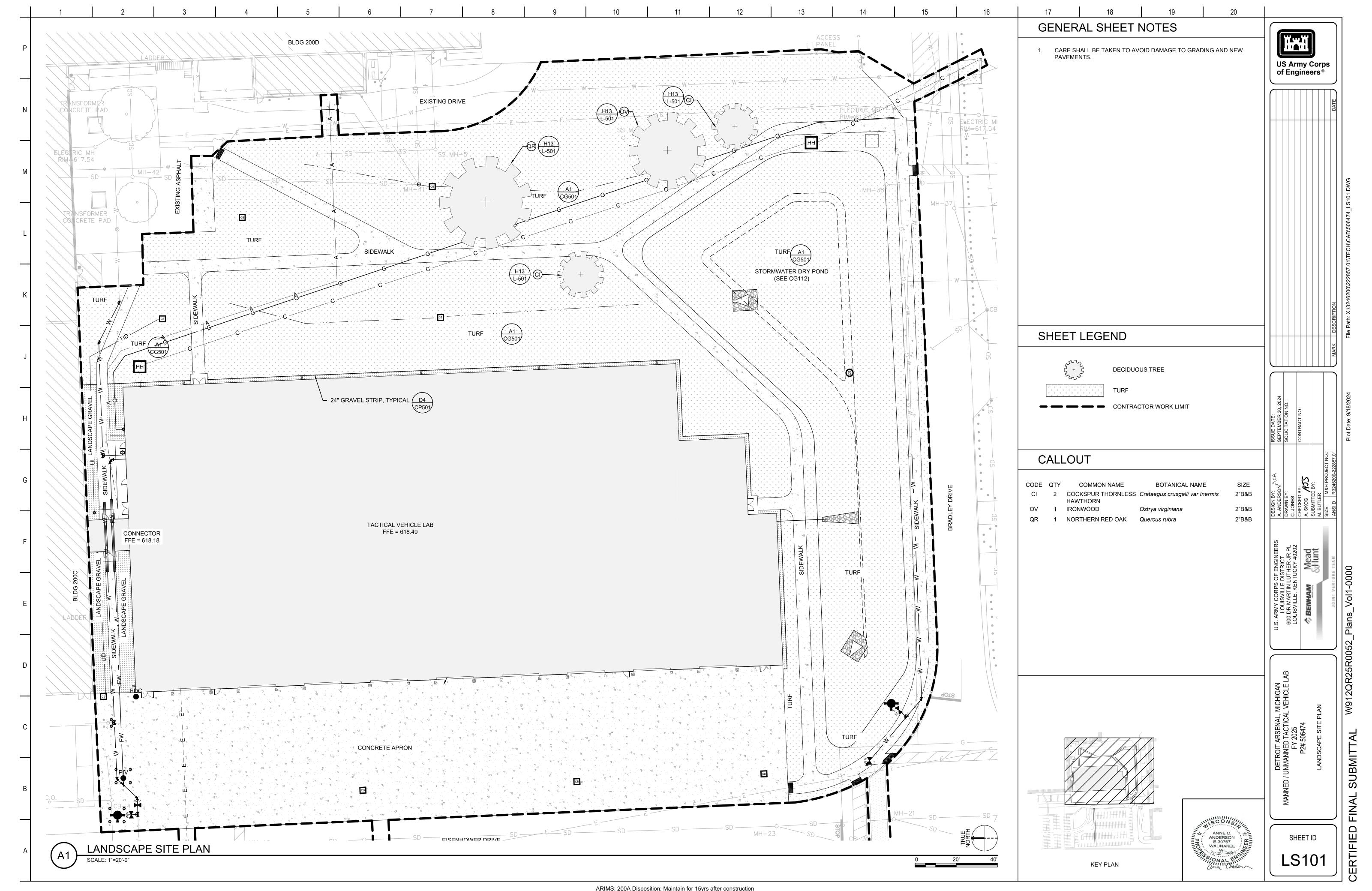
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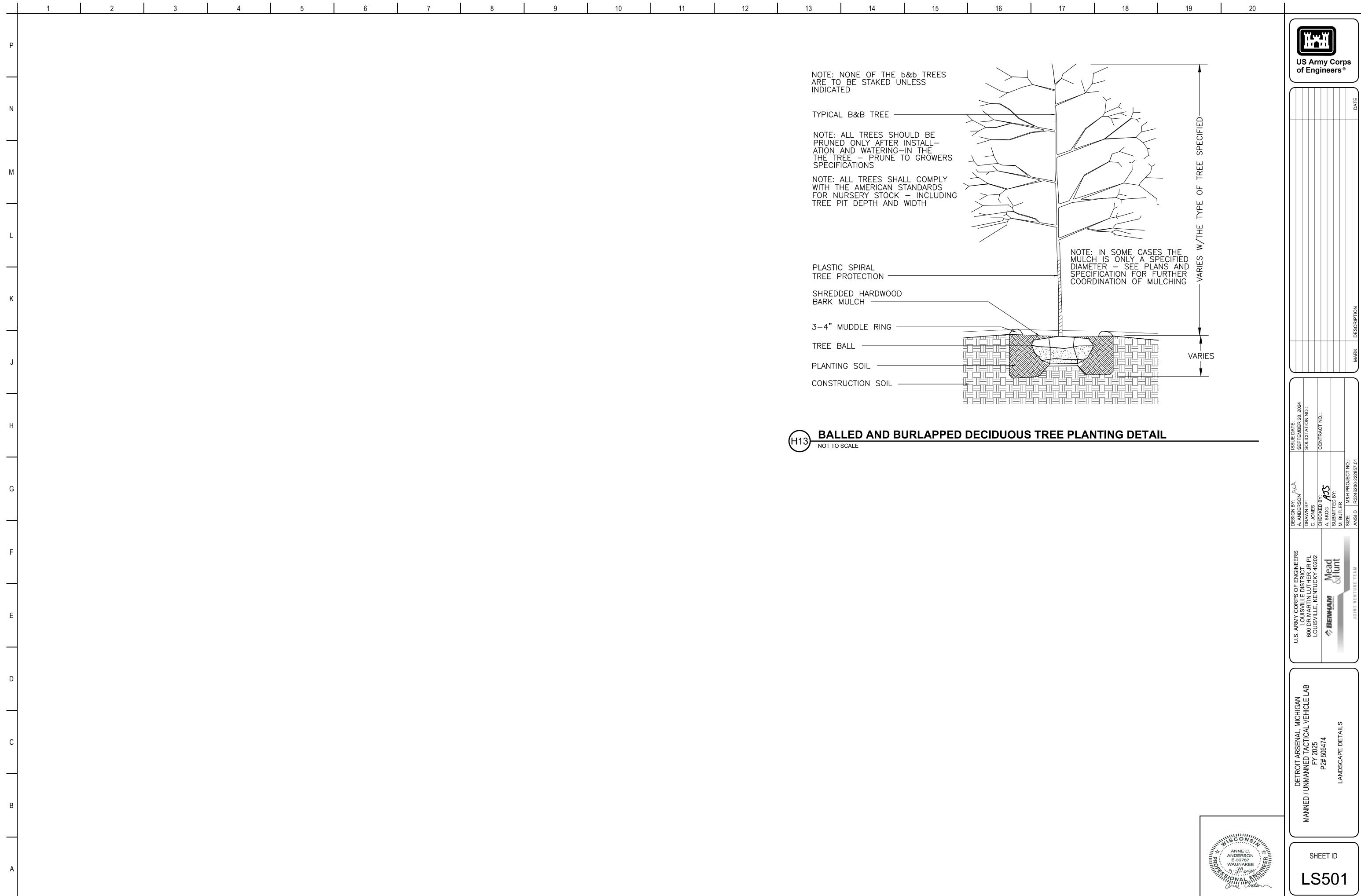
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DES A. A. DRA C. JC CHE A. SI SUB SIZE SIZE











ARIMS: 200A Disposition: Maintain for 15yrs after construction

US Army Corps of Engineers®

FINAL SUBMITTAL

CERTIFIED

SHEET ID LS501