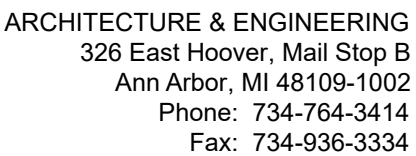


U of M Project Number: P000xxxxx
Building Number: 3010030

DESIGNED BY:



THIS TOOL KIT IS INTENDED TO INDICATE DETAILS THAT WERE SUCCESSFUL IN PAST PROJECTS AND TO INDICATE LEVEL OF DETAIL REQUIRED IN THE BID DOCUMENTS. THESE DETAILS ARE NOT 'CUT AND PASTE' FOR ALL PROJECTS.

EACH SUPPORT SHOULD HAVE A CONSTRUCTION REFERENCE NOTE REFERRING TO A SECTION DETAIL. SUPPORTS THAT ARE IDENTICAL MAY USE THE SAME NOTE AND SECTION DETAIL (AS IN CONSTRUCTION REFERENCE NOTES 5 AND 6). NOT ALL SUPPORTS HAVE BEEN DETAILED FOR THIS EXAMPLE.

TUNNEL PROJECTS DESIGN REQUIREMENTS

REFER TO:
UM DESIGN GUIDELINES SECTION - "SPECIAL BUILDING AREAS - H TUNNELS"
LOCATED:
<https://umac.umich.edu/for-vendors/design-guidelines/5-0-special-building-areas/>
AND
UM DESIGN GUIDELINES SECTION - 4.6 "UTILITIES FOR UNIVERSITY BUILDINGS"
LOCATED:
<https://umac.umich.edu/designuide/4-0-SID/SID4.6.pdf>

CONTRACTOR TO CONSULT WITH A STRUCTURAL ENGINEER TO DESIGN ALL TEMPORARY PIPING SUPPORTS. SUBMIT DETAILS FOR OWNER REVIEW AND APPROVAL.

TUNNEL PROJECT SPECIFICATIONS ARE LOCATED:
[HTTPS://UMAEC.UMICH.EDU/FOR-VENDORS/DESIGN-GUIDELINES/7-0-MASTER-SPECIFICATIONS/](https://umaec.umich.edu/for-vendors/design-guidelines/7-0-master-specifications/)

DIVISION 03 CONCRETE
SECTION 037300 TUNNEL CONCRETE RESTORATION (INCLUDE FOR INTERIOR TUNNEL REPAIRS)

DIVISION 07 THERMAL AND MOISTURE PROTECTION
SECTION 071025 UTILITY TUNNEL WATERPROOFING (INCLUDE FOR EXTERIOR TUNNEL WATERPROOFING)

DIVISION 33 UTILITIES
SECTION 336200 PROJECT QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) FOR TUNNEL PROJECTS
(INCLUDE WITH SECTION 336313 AND/OR SECTION 336330 WORK)

SECTION 336313 - UNDERGROUND STEAM AND CONDENSATE DISTRIBUTION PIPING

SECTION 336320 - UTILITY TUNNELS DOMESTIC HOT WATER DISTRIBUTION SYSTEMS

SECTION 336340 - UTILITY TUNNELS - COMPRESSED AIR DISTRIBUTION SYSTEMS (IN DEVELOPMENT -
USE DIVISION 22 AND 23 FOR COMPRESSED AIR PIPING, VALVES AND SPECIALTIES)

SEE WEBSITE FOR TUNNEL ACCESS PROCEDURES AND REQUIREMENTS. SIGNED FORMS SHALL BE PROVIDED TO U-M UTILITIES TUNNEL SYSTEM MANAGER PRIOR TO REQUESTING ACCESS.

SPECIFIC WELDER QUALIFICATIONS, WELD PROCEDURES, AND ASSOCIATED SUBMITTALS ARE AS DESCRIBED IN THE CUSTOM PIPING SPECIFICATION, OBTAINED FROM UTILITIES.

 NEW ITEM
 EXISTING ITEM
 NEW ITEM, HIDDEN
 EXISTING ITEM, HIDDEN
 EXISTING ITEM TO BE REMOVED
 NEW CONNECTION TO EXISTING WORK
 NORTH ARROW
 SECTION SYMBOL (DIRECTION OF CUT VIEW;
TOP-UNIQUE SEQUENTIAL LETTER TITLE;
BOTTOM-LOCATION OF SECTION DRAWING)
 SECTION TITLE (TOP-CORRESPONDING LETTER
TITLE; BOTTOM-REFERENCE DRAWING LOCATION)
 MATCH LINE INDICATOR

1. ALL EXISTING PIPING AND EQUIPMENT LOCATIONS SHOWN ON THE DRAWINGS ARE GENERALLY ACCURATE, BUT CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL LOCATE ALL EXISTING PIPING AND TIE-IN POINTS PRIOR TO DEMOLITION AND PROJECT EXECUTION.
2. DUE DILIGENCE AND CARE SHALL BE TAKEN TO AVOID DAMAGE TO EXISTING PLANT SYSTEMS AND EQUIPMENT THAT WILL REMAIN IN OPERATION THROUGHOUT THE PROJECT. CONTRACTOR SHALL PROTECT ALL EXISTING FACILITIES THAT COULD BE DAMAGED BY ACTIVITIES LOCATED IN OR ADJACENT TO THE WORK AREAS. ANY INADVERTENT DAMAGE TO EXISTING FACILITIES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL MAINTAIN THE SATISFACTION OF THE OWNER'S REQUIREMENTS. DOCUMENT PRE-CONSTRUCTION CONDITIONS WITH PHOTOS.
3. THE CONTRACTOR SHALL PROVIDE IMMEDIATE CLEAN-UP OF ALL CONSTRUCTION DEBRIS, EXCESS MATERIAL, OIL, GREASE, AND SLURRIES, CLEAN, NEAT, AND ORDERLY. CONTROL AND CONTAIN DUST WITH BARRIERS. FINAL CLEAN-UP REMOVAL OF ALL CONSTRUCTION-GENERATED DEBRIS, EXCESS MATERIAL, OIL, GREASE, AND SLURRIES, AND FLOOR; WASH DOWN AND REMOVAL OF CONCRETE ACTIVITY SPILLS.

UM UTIL. SERV. MANAGER	MIKE SWANSON	734-763-3011
UM TUNNEL SYSTEM MANAGER	MIKE RHODES	734-xxx-yyyy
UM PROJECT MANAGER	TBD	734-yyy-xxxx
UM CPP I&C	TBD	734-xxx-yyyy

HPS - ASME B11.1 POWER PIPING	
LPS - ASME B31.9 BUILDING SERVICES PIPING	
MICHIGAN BUILDING CODE	XXXX
MICHIGAN MECHANICAL CODE	XXXX
MICHIGAN PLUMBING CODE	XXXX
MICHIGAN ELECTRICAL CODE	XXXX
NATIONAL FIRE PROTECTION ASSOCIATION 101	XXXX

CONSULTANT TO VERIFY CURRENT CODE VERSION ADOPTED BY U-M AT TIME OF PROJECT

CONSULTANT IS RESPONSIBLE TO IDENTIFY ALL BUILDINGS IMPACTED BY UTILITY OUTAGES NECESSARY TO PERFORM THE WORK. EACH IMPACTED BLDG REPRESENTATIVE SHALL BE CONTACTED TO ARRANGE FOR, AND DEFINE WHEN, AND FOR HOW LONG AN OUTAGE WILL BE ALLOWED. THE DETAILED OUTAGE WORK PLAN SHALL ADDRESS ALLOWABLE DATES, START AND COMPLETION TIMES, AND BLDG REP EMERGENCY CONTACT INFORMATION. OBTAIN PREVIOUS PROJECT EXAMPLE FROM UTILITIES.

- 1) TOOL KIT PLANS ARE INTENDED TO CONVEY THE LEVEL OF DETAILS EXPECTED IN THE CONSTRUCTION DOCUMENTS FOR TUNNEL PROJECTS.
- 2) ALL SUPPORTS PRESENTED IN THE BID PACKAGE DRAWING SET SHALL BE NUMBERED. SUPPORTS WILL BE TAGGED/LABELLED IN FIELD BY OWNER.
- 3) PROVIDE TYPICAL TUNNEL SECTION IN EACH PLAN SHEET.
- 4) ALWAYS LOCATE WATER LINES (VICTAULIC COUPLING) ON THE AISLE. PROVIDE ALUMINUM JACKET, IF SUBJECT TO DAMAGE.
- 5) PROVIDE A SCHEDULE FOR VALVES AND EXPANSION JOINTS. OBTAIN TAG NUMBER FROM OWNER. REPLACEMENT VALVES AND JOINTS SHALL NOT EXISTING TAG NUMBER. VALVES AND JOINTS WILL BE TAGGED/LABELLED IN FIELD BY OWNER. CONTACT UTILITIES REFER TO CONTACTS IN THIS SHEET.
- 6) IN NEW TUNNELS PROVIDE ADEQUATE AISLE WIDTH FOR EASY TRANSPORTATION OF THE LARGEST EXPANSION JOINT. IN EXISTING TUNNELS, MAKE SURE EXPANSION JOINT CAN BE TRANSPORTED. IF AISLE SPACE IS NOT ADEQUATE, ADDRESS THE PROBLEM AND PROVIDE A METHOD OF TRANSPORTATION OR A NEW HATCH.
- 7) FOR ADDITIONAL KEY DESIGN CONSIDERATIONS FOR TUNNEL PROJECTS, REFER TO UDM DESIGN GUIDELINES SECTION "SPECIAL BUILDING AREAS - H TUNNELS" (<http://www.planetx.bt.umich.edu/desguide/sbsa.html>)
- 8) PRIMARY GUIDE AND SECONDARY GUIDE SPACING SHALL BE PER EXPANSION JOINT MANUFACTURERS RECOMMENDATIONS. GUIDE IS INTEGRAL TO EXPANSION JOINTS, IF ANY, SHALL NOT BE CONSIDERED AS PRIMARY GUIDE.
- 9) PIPE SUPPORT SPACING REQUIREMENTS ARE INDICATED IN PIPE HANGER SUPPORT SCHEDULE, THIS SHEET.
- 10) THE INSULATION FOR CALCIUM SILICATE INSERT AT ALL SUPPORTS, ANCHORS, GUIDES, ROLLERS, SLIDES AND HANGERS MATCH MATCH INSULATION FOR ALL DEVICES.
- 11) SURVEY PROPOSED SLIP JOINT LOCATION FOR INTERFERENCE BETWEEN PACKING PORTS AND ADJACENT PIPES. CUSTOMIZE PORT LOCATIONS IF JOINT CAN NOT BE RE-POSITIONED.
- 12) CONSULT TUNNEL MAP TO IDENTIFY CONDENSATE TIE-IN LOCATION AS PUMPED OR GRAVITY DRAIN; VERIFY EXISTING HEADER SLOPE IS CORRECT OR ADD CORRECTIONS TO PROJECT WORK SCOPE.
- 13) PROJECT IN CITY AND OR MDDT RIGHT-OF-WAY. ALL REQUIRE CLOSE COORDINATION. LONG TERM TIE-IN CONDITIONS AND/OR TIE-IN CORRESPONDENCE SHALL BE THROUGH UoM.
- 14) COORDINATION WITH CITY AND UoM EVENTS, REQUIRED PROJECT SHUTDOWNS SHALL BE CLEARLY IDENTIFIED.

DHWS	DOMESTIC HOT WATER SUPPLY
DHWR	DOMESTIC HOT WATER RETURN
HPA	HIGH PRESSURE AIR (15#)
LPS	LOW PRESSURE STEAM (15#)
LPC	LOW PRESSURE CONDENSATE (15#)
HPS	HIGH PRESSURE STEAM (60#)
HPC	HIGH PRESSURE CONDENSATE (60#)
PC	PUMPED CONDENSATE
	FLOW DIRECTION
	VALVE
	STEAM TRAP
	FLEXIBLE CONNECTION
	ROLLER
	EXPANSION JOINT
	ANCHOR
	GUIDE
	PIPE CLAMP
	LINE STOP
	SLIDE
	REDUCER

P	P	C W		P P		C PP		C PP		P C
		P	P	P	P	P	P	P	P	
		F		F		F		F		
THRU 1"	$\frac{3}{8}$ "	8'-0"		9'-0"		5'-0"		5'-0"		4'-0"
1 1/4" - 2"	$\frac{3}{8}$ "	10'-0"		11'-0"		7'-0"		7'-0"		5'-0"
2 1/2" - 3"	$\frac{1}{2}$ "	10'-0"		15'-0"		10'-0"		10'-0"		6'-0"
4"	$\frac{5}{8}$ "	16'-0"		17'-0"		10'-0"		12'-0"		6'-0"
5" - 6"	$\frac{3}{4}$ "	16'-0"		20'-0"		12'-0"		13'-0"		6'-0"
8" - 12"	$\frac{1}{2}$ "	20'-0"		21'-0"		---		---		8'-0"
14" - 16"	1"	20'-0"	*	21'-0"	*	---		---		---

* LIMIT HANGER SPACING TO 12'-0" FOR STEEL PIPE WHERE POSSIBLE. USE MAXIMUM SPACING VALUES ONLY WHERE LIMITED BY BUILDING STRUCTURAL ELEMENTS OR RESTRICTIONS.

** GROOVED PIPING MAY REQUIRE CLOSER SPACING BASED ON PIPE SIZE AND LENGTH. REFER TO MANUFACTURER'S TECHNICAL INSTALLATION DATA.

Sheet	Sheet Title	Page
TK-CVRSHT	Cover Sheet	
TK-01	Typical Tunnel Construction Plan	
TK-02	Anchorages & Guides - Typical Supports, Sections & Details	
TK-03	Steel Supports - Typical Sections & Details	
TK-04	Pipe Bends & Branch Anchors - Typical Supports, Sections & Details	
TK-05	Rollers, Slides & Clamps - Typical Sections & Details New Construction	
TK-06	Steam System Equipment, Accessories & Typical Details	
TK-07	Existing Pipe Support Repair & Concrete Restoration - Typical Details	
TK-08	Access Hatch and Accessories - Details & Sections	
TK-09	NOT USED	
TK-10	Steam & Condensate Metering - Typical Details - NOT POSTED ON WEB	
TK-11	Tunnel Ventilation details - NOT POST ON WEB (Previous Tunnel Ventilation Projects Available Upon Request)	
TK-12	PROTOCOL - Tunnel Protection & Temporary Shoring Details	

[illegible]