

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTHS						W-20			
07/01/04											
03/01/06											

NOTE:  
1. USE MODERATELY STIFF MIX OF NON-SHINK CEMENT, SAND AND 1/2" AND LESS DIAMETER GRAVEL WITH 28 DAYS STRENGTH AT 3000 PSI.  
2. MIX IS TO BE FORCED INTO ALL GROOVES AND UNDER FLANGE OF FRAME AND LEFT AT OR ABOVE TOP OF JOINT.  
3. MAX OF 4 BRICK OR CONCRETE BLOCKS TO BE USED FOR GRADE CONTROL.  
4. DO NOT BACKFILL AROUND FRAME AND COVER FOR 48 HOURS AFTER CON. IS PLACED. THE USE OF HIGH STRENGTH CONCRETE WOULD REDUCE TIME TO (24HRS).  
5. RESTRICT TRAFFIC LOAD FOR MIN. 24 HOURS.

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		THRUST BLOCK CONSTRUCTION						W-19			
07/01/04											
03/01/06											

NOTE:  
1. FOR VERT. BEND DOWN IN EXCESS OF 1 1/4" BEND, ANCHORAGE SHALL BE DESIGNED BY ENGINEER.  
2. FOR VERT. BEND UPWARD, BLOCKING TO BE SIMILAR TO THAT FOR HORIZ. BEND.  
3. GLANDS & BOLTS SHALL BE PROTECTED FROM CONC. BY PLASTIC SHEETING WHEN POURING THRUST BLOCKS.  
4. ALL THRUST BLOCK & SUPPORT CONC. SHALL BE 3000 PSI READY MIX CONC.  
5. THRUST BLOCKS WITH 1/2" DIMENSION GREATER THAN 30" SHALL HAVE THE RESTRAINED PIPE INSTALLED WITH A MINIMUM OF 4" OF COVER.  
6. IF UNDER 100 PSI WORKING PRESSURE, RESTRAINT JOINTS MUST BE USED. IF EQUAL OR GREATER THAN 100 PSI WORKING PRESSURE, BOTH BLOCK AND RESTRAINT JOINTS ARE REQUIRED.

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		WATER VAULT						W-26			
07/01/04											
03/01/06											

NOTE:  
1. FOR 6" FIRE LINE, EXTERIOR VAULT DIMENSIONS SHALL BE 6' X 6'.  
2. FOR 8" FIRE LINE, EXTERIOR VAULT DIMENSIONS SHALL BE 11' X 7'.  
3. VAULT TO BE FURNISHED AND INSTALLED BY VVWA AT OWNER/DEVELOPERS EXPENSE.

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		WATER LINE VALVE INSTALLATION						W-08			
07/01/04											
03/01/06											

NOTE:  
1. BEDDING, HAUNCHING AND INITIAL BACKFILL CONSTRUCTION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.  
2. ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #68 STONE.  
3. IN ROANOKE COUNTY, THE CONTRACTOR SHALL REPLACE THE OPEN CUT WITH A MINIMUM TOP COURSE OF 1" (MINIMUM) VDOT #68-8A, BASE COURSE OF 2" VDOT #68-8A, AND SUBBASE OF 3" VDOT #218, OR AS REQUIRED BY VDOT. IN ROANOKE CITY, CONTRACTOR SHALL REPLACE PAVEMENT AS REQUIRED BY CITY OF ROANOKE RIGHT OF WAY EXCAVATION AND RESTORATION STANDARD.  
4. ALL CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE AS SPECIFIED BY VDOT OR APPLICABLE LOCALITY.  
5. PRIOR TO CONSTRUCTION, CONTRACTOR IS RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS FROM VDOT AND/OR APPLICABLE LOCALITY.  
6. IN AREAS SUBJECTED TO VEHICULAR TRAFFIC, BEDDING STONE AND FILL SHALL BE PLACED IN 8" LIFTS AND SHALL BE COMPACTED TO AT LEAST 98% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 1557.  
7. BEDDING REQUIREMENTS FOR DUCTILE IRON WATER LINE ARE DEPENDENT ON MANUFACTURER'S BEDDING CRITERIA.  
8. BEDDING CRITERIA FOR EACH SIDE OF PAVEMENT: CITY OF ROANOKE EQUALS 12" VDOT RIGHT-OF-WAY EQUALS 8".  
9. ALL EXCAVATIONS SHALL COMPLY WITH OSHA TECHNICAL MANUAL, CHAPTER 2, TITLED "EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING."

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		INSTALLATION DETAIL FOR ALL FRAMES AND COVERS						W-16			
07/01/04											
03/01/06											

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		MANHOLE FRAME AND COVER						W-17			
07/01/04											
03/01/06											

WESTERN VIRGINIA WATER AUTHORITY -- CONSTRUCTION STANDARDS											
REVISION DATE		BEDDING AND BACKFILL OUTSIDE OF PAVED AREAS						W-24			
07/01/04											
03/01/06											

NOTE:  
1. BEDDING, HAUNCHING AND INITIAL BACKFILL CONSTRUCTION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.  
2. ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #68 STONE.  
3. IN AREAS NOT SUBJECTED TO VEHICULAR TRAFFIC, BEDDING STONE AND FILL SHALL BE PLACED IN 8" LIFTS FROM BOTTOM OF TRENCH TO 1" ABOVE THE PIPE AND THE REMAINING SHALL BE PLACED IN 10" LIFTS AND SHALL BE COMPACTED TO AT LEAST 98% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 1557.  
4. BEDDING REQUIREMENTS FOR DUCTILE IRON WATER LINE ARE DEPENDENT ON MANUFACTURER'S BEDDING CRITERIA.  
5. ALL EXCAVATIONS SHALL COMPLY WITH OSHA TECHNICAL MANUAL, CHAPTER 2, TITLED "EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING."

APPROVED

**LUMSDEN ASSOCIATES, P.C.**  
ENGINEERS-SURVEYORS-PLANNERS  
ROANOKE, VIRGINIA

PHONE: (540) 774-4411  
FAX: (540) 772-9445  
P.O. BOX 20669  
ROANOKE, VIRGINIA 24018  
E-MAIL: MAIL@LUMSDENPC.COM

**WATER AND SANITARY SEWER DETAILS**

**CAMPING WORLD**  
AT THE OPIDAN RETAIL CENTER  
PREPARED FOR  
**OPIDAN INVESTMENT COMPANY**  
HOLLIS MAGISTERIAL DISTRICT  
ROANOKE COUNTY, VIRGINIA

REVISIONS	
NO.	DESCRIPTION
1	
2	
3	
4	
5	

DATE: **FEBRUARY 29, 2008**  
SCALE: **NO SCALE**  
COMMISSION NO.: **2006-224C**  
SHEET **10** OF **12**