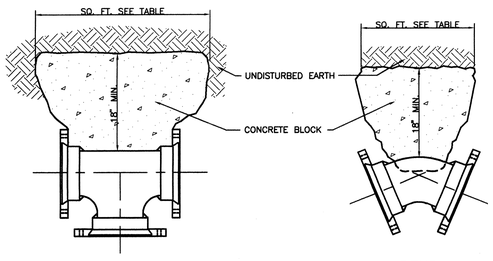
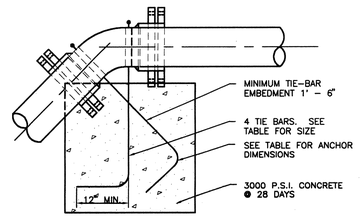


TEE BEND

AREAS IN SQUARE FEET					
PIPE SIZE	TEE	90°	45°	22 1/2°	11 1/4°
2"	0.8	1.1	0.6	0.3	0.2
3"	1.8	2.5	1.4	0.7	0.4
4"	3.1	4.4	2.4	1.2	0.6
6"	7.1	10.0	5.4	2.8	1.4
8"	12.6	17.8	9.6	4.9	2.5
10"	19.6	27.8	15.0	7.7	3.9
12"	28.3	40.0	21.6	11.0	5.5
14"	38.5	54.4	29.4	15.0	7.5

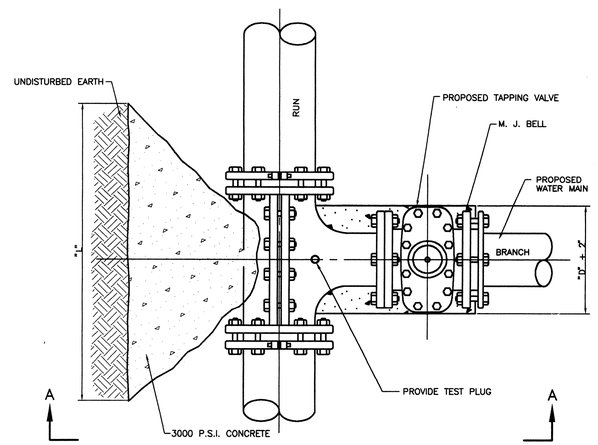
THRUST BLOCKS TYPICAL
S-W005 N.T.S.



PIPE SIZE	ANCHOR SIZE[1]	TIE BAR DIAMETER
2"	2' x 2' x 2'	0.25"
3"	2.6' x 2.6' x 2.6'	0.25"
4"	3.1' x 3.1' x 3.1'	0.25"
6"	4' x 4' x 4'	0.375"
8"	4.8' x 4.8' x 4.8'	0.50"
10"	5.6' x 5.6' x 5.6'	0.50"
12"	6.3' x 6.3' x 6.3'	0.625"

NOTES: 1. ANCHOR BLOCK SIZES DIFFERENT THAN THOSE SHOWN MUST BE APPROVED BY THE ENGINEER.
2. SEE THRUST BLOCK GENERAL NOTES FOR MORE INFORMATION.

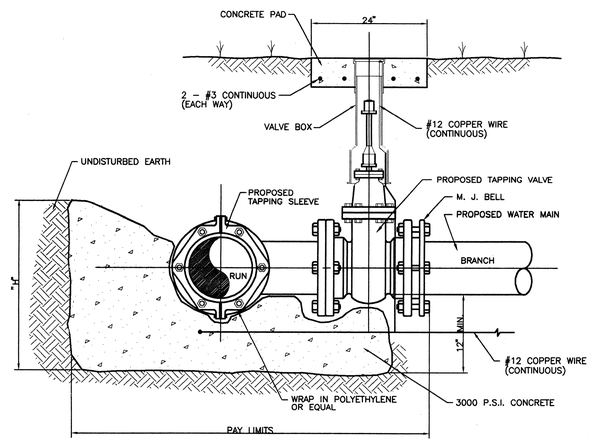
ANCHOR BLOCK 45° /22 1/2° BEND VERTICAL
S-W004 N.T.S.



PLAN

NOTES:
1. STEEL WILL BE USED AS REQUIRED BY THE ENGINEER.
2. NO CUT SHALL BE MADE BEFORE:
   (A) A TEST OF 150 P.S.I. FOR 120 MINUTES IS MADE AND,
   (B) THE CONCRETE BLOCK HAS CURED FOR 48 HOURS.
3. #12 COPPER WIRE TO RUN FROM TAPPING VALVE TO FIRE HYDRANT AT END OF RUN.

TAPPING SLEEVE & VALVE BLOCKING DETAIL
S-W013 N.T.S.



SECTION A–A

RUN	BRANCH											
	4"		6"		8"		10"		12"		16"	
	L	H	L	H	L	H	L	H	L	H	L	H
4"	15	20										
6"	15	20	23	30								
8"	15	20	23	30	31	39						
10"	15	20	23	30	31	39	40	48				
12"	15	20	23	30	31	39	40	48	48	57		
16"	15	20	23	30	31	39	40	48	48	57	62	78
18"	15	20	23	30	31	39	40	48	48	57	62	78
20"	15	20	23	30	31	39	40	48	48	57	62	78
24"	15	20	23	30	31	39	40	48	48	57	62	78
30"	15	20	23	30	31	39	40	48	48	57	62	78

NOTE: "L" & "H" DIMENSIONS ARE IN INCHES

THE FOLLOWING TABLES SHOULD BE USED TO DETERMINE THE LENGTH OF PIPE IN FEET FROM EACH BEND, TEE, REDUCER,VALVE,DEAD END OR FITTING THAT SHALL BE RESTRAINED. CALCULATIONS ARE BASED ON PROCEDURES SET FORTH IN THE "PVC PIPE THRUST RESTRAINT DESIGN HANDBOOK", PUBLISHED BY EBBA IRON, INC. THE DESIGN CRITERIA FOR THESE CALCULATIONS ARE AS FOLLOWS:

TRENCH CONDITION (ANSI/AWWA C150/A21.50)	4
SOIL CLASSIFICATION (ASTM STANDARD D2487)	SM
DEPTH OF COVER (FT.)	3
DESIGN PRESSURE (PSI)	150
SAFETY FACTOR	2
TYPICAL PIPE LENGTH (FT.)	20

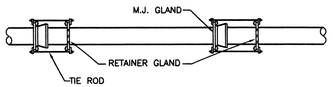
NOTES: 1. VERTICAL OFFSET CALCULATIONS ASSUME 3FT. OF COVER ON BOTH THE UPPER & LOWER SIDES OF VERTICAL OFFSET.
2. CALCULATIONS FOR REDUCERS ASSUME SMALLEST AVAILABLE PIPE SIZE FOR THE SMALL SIDE. THE GIVEN DIAMETER REPRESENTS THE LARGE SIDE OF THE REDUCER. IF THE STRAIGHT RUN OF PIPE ON THE SMALL SIDE OF THE REDUCER EXCEEDS THE VALUE SHOWN IN THE TABLES, THEN ONLY ONE FULL LENGTH OF PIPE NEEDS TO BE RESTRAINED.
3. CALCULATIONS FOR TEES ASSUME THE BRANCH SIZE IS EQUAL TO THE RUN SIZE. WHEN TEE BRANCH SIZE IS LARGER THAN THE RUN SIZE REFER TO EBBA IRON, INC. CALCULATIONS FOR ADDITIONAL RESTRAINT REQUIRED UNLESS INDICATED.
4. RESTRAIN ONE FULL LENGTH(20') OF PIPE ON EACH SIDE OF ALL FITTINGS REGARDLESS OF THE VALUES INDICATED IN THESE TABLES.
5. THE ASSUMED LENGTH BETWEEN FIRST JOINTS ON EITHER SIDE OF TEE = 20'.

NOMINAL DIAMETER (IN.)	RESTRAINED LENGTH IN FEET				
	HORIZONTAL BEND				IN-LINE VALVE OR DEAD END
	90°	45°	22 1/2°	11 1/4°	
4	20	20	20	20	61
6	28	20	20	20	86
8	37	20	20	20	113
10	44	20	20	20	136
12	51	21	20	20	160

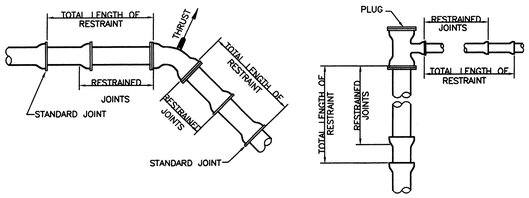
NOMINAL DIAMETER (IN.)	RESTRAINED LENGTH IN FEET					
	VERTICAL BEND / OFFSET					
	45°		22 1/2°		11 1/4°	
	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
4	25	20	20	20	20	20
6	36	20	20	20	20	20
8	47	20	23	20	20	20
10	56	20	27	20	20	20
12	66	21	32	20	20	20

NOMINAL DIAMETER (IN.)	TEE BRANCH	RESTRAINED LENGTH IN FEET
4	4	61
6	4	61
6	6	86
8	4	61
8	6	86
8	8	113
10	4	61
10	6	86
10	8	113
10	10	136
12	4	61
12	6	86
12	8	113
12	10	136
12	12	160

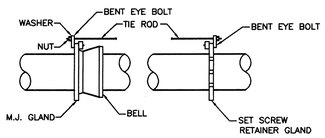
REDUCER		RESTRAINED LENGTH IN FEET	
LARGE	SMALL	LARGE	SMALL
6	4	45	85
8	4	81	204
8	6	47	82
10	4	110	348
10	6	83	180
10	8	46	74
12	4	139	525
12	6	116	301
12	8	85	165
12	10	79	73



METHOD OF RESTRAINING PUSH–ON JOINT PIPE
N.T.S.

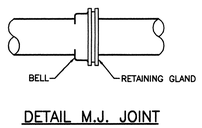


RESTRAINED JOINTS STANDARD
N.T.S.



NOTE: TIE RODS TO BE FIELD COATED WITH BITUMINOUS COATING.

DETAIL PUSH–ON JOINT
N.T.S.



DETAIL M.J. JOINT
N.T.S.

RESTRAINED JOINT TABLES FOR PVC PIPES
S-W029

THRUST BLOCKS, ANCHOR BLOCKS AND JOINT RESTRAINING:

1. THE CONTRACTOR SHALL PROVIDE ALL THRUST BLOCKING AND JOINT RESTRAINING AS REQUIRED. SEE THRUST BLOCK AND RESTRAINED JOINT DETAILS.
2. AREAS AND DIMENSIONS OF THRUST BLOCKS SHALL BE AS SHOWN IN DETAILS UNLESS DIRECTED BY THE ENGINEER ACCORDING TO ACTUAL FIELD CONDITIONS.
3. DESIGN CRITERIA: 150 P.S.I. TEST PRESSURE TIMES 1.67 SAFETY FACTOR (250 P.S.I.) FOR WATER HAMMER WITH ASSUMED SOIL BEARING CAPACITY OF 1000 LBS. PER SQUARE FOOT.
4. COMPLETELY COAT EXPOSED TIE–BARS OR OTHER UNCOATED STEEL AFTER INSTALLATION WITH TWO COATS OF PORTER TARSET MAXI–BUILD #7080 AT 8 MILS D.F.T. EACH (COAT) USED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
5. WRAP ALL FITTINGS IN POLYETHYLENE PRIOR TO PLACING CONCRETE AGAINST PIPE OR FITTINGS.
6. ALL CONCRETE BLOCKING SHALL BE 3000 P.S.I. AT 28 DAYS MINIMUM.
7. BLOCK FOR TEE SHALL BE CONSTRUCTED IN SIZE FOR BRANCH DIAMETER.
8. MECHANICAL RESTRAINED JOINTS SHALL BE INSTALLED TO MEET MANUFACTURERS RECOMMENDED MINIMUM RESTRAINED DISTANCES FROM FITTING IN ACCORDANCE WITH RECOMMENDED INSTALLATION CRITERIA.
9. THRUST & ANCHOR BLOCK ARE TO BE USED ONLY AT CONNECTION POINTS TO EXISTING SYSTEMS.
10. THREADED ROD ON RESTRAINED JOINTS SHALL BE STAINLESS STEEL.

SERVICE DETAILS:

1. ALL METER BOXES HAVE BEEN CALCULATED FOR LOCATION AND SHALL BE STAKED ACCORDINGLY IN THE FIELD. BOXES FOUND NOT CONSTRUCTED TO THE PROPOSED LOCATION SHALL BE REMOVED AND RELOCATED BY THE CONTRACTOR AT NO ADDITIONAL CHARGE. THOSE BOXES SHOWN IN CLUSTERS SHALL BE PLACED IN A NEAT ROW AND AGAINST EACH OTHER.
2. ALL EXISTING AND PROPOSED VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADES AS ESTABLISHED IN THE FIELD. NO ADDITIONAL COMPENSATION SHALL BE MADE BY THE OWNER.
3. FIRE HYDRANTS SHALL BE CONSTRUCTED WITH "GROUND LINE" SET TO FINISHED GRADES AS ESTABLISHED IN THE FIELD. NORMAL BURY IS 3 FEET OF COVER FOR WATER LINES. IF EXTENSIONS ARE REQUIRED, THE COST SHALL BE INCLUDED IN THE PRICE BID.
4. AIR RELEASE TAPS SHALL BE INSTALLED IN WATER MAINS AT HIGH POINTS WHERE REQUIRED. THESE LOCATIONS SHALL BE LOCATED ON THE RECORD DRAWINGS.
5. ALL SERVICES SHALL INCLUDE THE SERVICE SADDLE, CORPORATION STOP, VARIABLE LENGTH SCHEDULE 40 PVC SERVICE PIPE, CURB STOP AND METER BOX OF THE SIZE FOR METER INDICATED.
6. VERTICAL CLEARANCE BETWEEN WATER AND STORM/ WASTEWATER LINES SHALL BE 18 INCHES MINIMUM.
7. A "W" OR "V" SHALL BE STAMPED INTO CURB WHERE WATER SERVICE OR WATER VALVE IS LOCATED IN ACCORDANCE WITH COUNTY CODE. A MEASUREMENT FROM EDGE OF CURB TAKEN BY THE CONTRACTOR, SHALL BE SHOWN ON THE RECORD PLANS FOR REFERENCE IN LOCATING THE SERVICE OR THE VALVE.

WATER DISTRIBUTION GENERAL:

THE FOLLOWING NOTES ARE INTENDED AS A SUPPLEMENT TO THE PROJECT SPECIFICATIONS AND ARE NOT INTENDED TO SUPERSEDE THE PROJECT SPECIFICATIONS.

1. THE CONTRACTOR SHALL INVESTIGATE AND VERIFY OR HAVE VERIFIED THE LOCATION OF UTILITIES BEFORE STARTING WORK. HE SHALL BE LIABLE FOR ANY EXPENSE RESULTING FROM DAMAGE TO SAME. ANY CONFLICTS WITH EXISTING UTILITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AS SOON AS POSSIBLE.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE TOWN OF LONGBOAT KEY, UTILITY COMPANIES AND THE ENGINEER 48 HOURS PRIOR TO ANY WORK AT SITE. WATER MAIN TIE–INS REQUIRING WATER SERVICE TO BE SHUT OFF SHALL BE MADE WHEN REQUIRED BY THE TOWN OF LONGBOAT KEY UTILITIES.
3. WATER MAIN INSTALLATION SHALL BE CONSTRUCTED WITH A MINIMUM OF 3 FEET OF COVER BELOW PROPOSED GRADE OR TO THE ELEVATIONS AND DEPTHS AS INDICATED ON THE PLANS WITHIN 0.25 FT. COST TO RELAY MAIN, IF NECESSARY, SHALL BE BORNE BY THE CONTRACTOR.
4. ALL DISTURBED AREAS IN EXISTING LAWNS SHALL BE REPLACED WITH SOD EQUAL TO OR BETTER THAN EXISTING AND OF THE SAME TYPE. SWALE SLOPES AND BOTTOM SHALL BE SODDED TO ELIMINATE EROSION. RESTORATION DUE TO EROSION OCCURRING PRIOR TO GRASS ROOTING, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL WATER AS NECESSARY ALL SODDED AREAS UNTIL GRASS ROOTS.
5. DUE TO THE PROXIMITY OF EXISTING DRAINAGE STRUCTURES, ROADWAY PAVEMENT, PATHS, CURBS, CULVERTS, RESIDENTIAL STRUCTURES, MAIL BOXES, ETC., THE CONTRACTOR SHALL USE EXCAVATING METHODS WHICH SHALL PREVENT ANY DAMAGE TO SAME UNLESS REMOVAL IS REQUIRED. THE COST OF ANY DAMAGE AND THE REPLACEMENT OF ALL PRIVATE PROPERTY DAMAGED BY THE CONTRACTORS OPERATIONS SHALL BE BORNE BY THE CONTRACTOR.
6. ALL EXISTING SALVAGEABLE PIPE FITTINGS, ETC. SHALL REMAIN THE PROPERTY OF THE OWNER AND BE STORED ON SITE AT THE DIRECTION OF THE ENGINEER.
7. ALL PVC WATER MAINS SHALL BE BLUE IN COLOR. COLOR CODED PLASTIC COATED METAL TAPE 3" WIDE WITH THE WORD "WATER MAIN" SHALL BE PLACED 18 INCHES BELOW FINISHED GROUND AND ABOVE D.I.P. AND P.V.C. WATER MAIN. THE COST FOR COLOR TAPE SHALL BE INCLUDED IN THE WATER MAIN UNIT PRICES.
8. THE CONTRACTOR SHALL COORDINATE HOLDING OF POLES WITH UTILITY COMPANIES IN ADVANCE SO UNNECESSARY DELAYS OF PROJECT SHALL NOT BE INCURRED. THE COST FOR THE HOLDING OF THE POWER POLES SHALL BE INCLUDED IN THE WATER MAIN UNIT COST ITEMS CONTAINED IN THE PROPOSAL.
9. ALL CONSTRUCTION SHALL MEET THE MINIMUM REQUIREMENTS OF THE TOWN OF LONGBOAT KEY CODE OF ORDINANCES, LATEST REVISION, AND EXCEED THE REQUIREMENTS OF THAT ORDINANCE WHERE INDICATED ON THESE CONSTRUCTION DRAWINGS OR IN THE PROJECT SPECIFICATIONS.
10. UNLESS OTHERWISE NOTED PROPOSED WATER MAINS TO GO UNDER EXISTING CULVERTS, STRUCTURES AND OTHER APPURTENANCES, IF NECESSARY, TO MAINTAIN 3' MINIMUM COVER. EXCEPT SEWER MAINS SHALL BE CROSSED OVER.
11. RESTORATION OF ALL EXISTING ROADWAYS TO FDOT STANDARDS AND THE REPLACEMENT OF EXISTING CULVERTS AND DRIVEWAYS ETC., SHALL BE INCLUDED IN THE UNIT BID PRICE OF THE WATER MAIN ITEMS.
12. CONNECTIONS TO EXISTING WATER LINES WILL NOT BE PERMITTED UNTIL ALL NEW WATER LINES HAVE SUCCESSFULLY COMPLETED ALL PRESSURE AND BACTERIOLOGICAL TESTING.
13. THE CONTRACTOR SHALL NOTIFY THE TOWN OF LONGBOAT KEY UTILITIES DEPARTMENT REGARDING THE DISPOSITION OF ANY FITTINGS, ETC., THAT ARE TO BE REMOVED.
14. ALL IRON PIPES AND FITTINGS FOR WATER AND WASTE WATER SHALL BE WRAPPED IN BLACK 8 MIL. PLASTIC FOR CORROSION PROTECTION.

TRENCH DETAILS:

1. WHERE WATER AND SEWER MAINS CROSS WITH LESS THAT EIGHTEEN INCHES (18") VERTICAL CLEARANCE, THE SEWER SHALL BE A MINIMUM OF TWENTY FEET (20') OF DUCTILE IRON PIPE, CENTERED ON THE POINT OF CROSSING. WHEN A WATER MAIN PARALLELS A WASTEWATER MAIN, HORIZONTALLY, A SEPARATION OF AT LEAST TEN FEET (10') SHOULD BE MAINTAINED. BOTH WATER AND SEWER LINES SHALL BE DUCTILE IRON PIPE WHEN SEPARATED BY LESS THAN TEN FEET (10') HORIZONTALLY. THE HORIZONTAL SEPARATION FROM A REUSE MAIN IS FIVE FEET (5').
2. TRENCH SHALL BE BRACED OR SHORED AS REQUIRED.
3. WIDTH OF TRENCH SHALL BE OUTSIDE DIAMETER OF PIPE SOCKET PLUS TWELVE INCHES (12") MAXIMUM.

AS–BUILTS:

1. THE CONTRACTOR SHALL LOCATE VALVES, SERVICES, HYDRANTS, AIR RELEASE VALVES, ETC. BY USING A TWO (2) POINT SWING MEASUREMENT FROM PERMANENT PHYSICAL FEATURES THAT CAN READILY BE FOUND ON THE DRAWING AND IN THE FIELD. THESE MEASUREMENTS SHALL BE SHOWN ON THE "AS–BUILT" DRAWING BY THE CONTRACTOR AND PRESENTED TO THE ENGINEER AT EACH PAY ESTIMATE REQUEST FOR PERMANENT RECORDING.
2. THE CONTRACTOR SHALL FURNISH "AS–BUILT" TOP OF PIPE ELEVATIONS OF ALL WATER MAINS EVERY 50', ALL FITTINGS AND ALL CHANGES IN GRADE.

PRINTED
DEC 6 2000
WilsonMiller, Inc.

REV NO.	REVISION	DATE	DRAWN BY / EMP. NO.	CHECKED BY / EMP. NO.

ACTIVITY	INITIALS/EMP. NO.	DATE
DESIGNED BY:	KAW/1200	4/00
DRAWN BY:	MAK/1292	4/00
CHECKED BY:		
CONTRACT ADMIN. BY:		
WM APPROVED BY:		

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CLIENT: LAURELTON MERRICK CORPORATION

PROJECT: EN PROVENCE

DATE: 4/00
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: AS SHOWN
SEC: 17 TWP: 36S RGE: 17E

TITLE: WATER DISTRIBUTION CONSTRUCTION DETAILS

ALLARD J. YODER, JR.
FLORIDA CERTIFICATE NO. 23765

INDEX NUMBER: D–03317–000–000028
CROSS REFERENCE FILE NO.:
PROJECT NUMBER: 03317–000–000–FLFCP
SHEET NUMBER: 9 OF 12

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