THIS DRAWING AS PREPARED BY CainRashWest Architects
SHALL BE USED FOR THE SPECIFIC IDENTIFIED PROJECT ONLY.
THIS DRAWING IS THE PROPERTY OF CainRashWest Architects
AND SHALL BE RETURNED PER THEIR REQUEST

Minimum Required Sprinkler Calculation Sheet

	1	
Flow test Data	0	
Static Pressure:	140	psi
Residual Pressure:	60	psi
Flow (GPM) :	500	gpm
Date taken:	---	
Time:	---	
Test taken by:	---	
Elevation of Hydrant:	NA	
Location		

GPM Demand of BLDG.

Most remote area or highest demand (Room Name)	Upper Level	
Design Density (NFPA 13 or supplied by Insurance Co.)	0.1	
Design Area (Square footage)	1500	sq. ft.
Overage Factor (1.15 typ.)	1.2	
Remote area GPM demand(Density x Area x Overage)	180	gpm
Standpipe GPM demand (If required)(500 gpm for the first, 250 after)	0	gpm
Hose GPM demand Inside (0, 100 Light, 250 ordinary, 500 extra hazard)	100	gpm
Hose GPM demand Outside (0, 100 Light, 250 ordinary, 500 extra hazard)	0	gpm
Total GPM Outdside (Remote Area + Standpipe + Hose)	180	gpm
Total GPM Inside (Remote Area + Standpipe + Hose)	280	gpm

Available Pressure

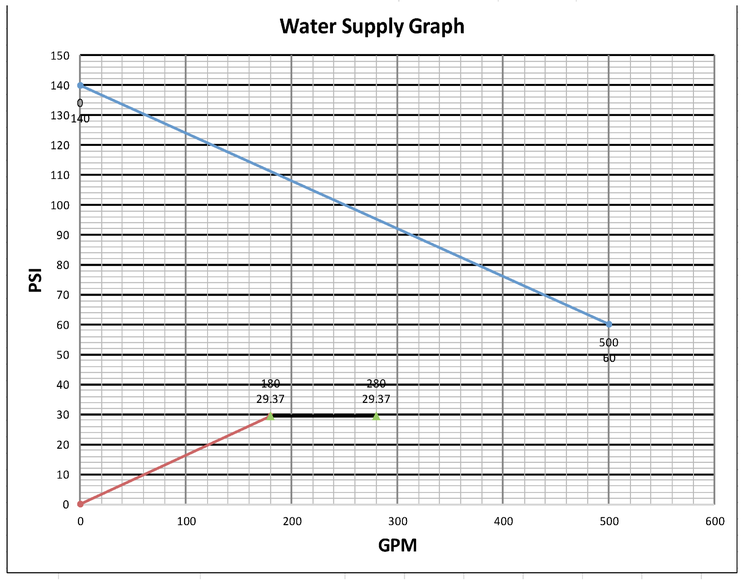
Pressure charted from water flow N1.85 Graph	104	
Density	0.1	
Max Sprinkler Head coverage (As per NPFA 13 table 8.6.2.2.1)	130	sq. ft.
Square footage spacing x Density = GPM sprinkler head (Q)	13	gpm
K-Factor of Sprinkler head (K)	5.8	(K)
Equation: Pressure required at head=(Q / K)2	5.023781213	psi
Elevation difference from test hydrant to base of riser x .433	1.5	ft
Elevation difference from base of riser to remote area x .433	25	ft
Backflow Preventer pressure drop	7	psi
Safety Factor (5 psi min.) (SF)	5	psi
Fixed Pressure drop =	28.49828121	psi

Estimated Friction Drop Thru Fire Line

Length of run from test hydrant to riser (HR)	148	Lin. Ft.
Pipe C Factor (Ductile Iron C-100)	100	
Nominal Pipe Inside Diameter (8", 6", 4")	6	
	67203.6048	
	30874262.29	
Friction loss in pipe (psi/ft) (Based on Hazen William Equation)(HW1)	0.002176687	psi/ft
HR x 1.30 x HW1 =	0.418794575	Estimated psi
Length of run from riser to last sprinkler head (estimated.) (RS)	100	Lin. Ft.
Base of Riser to farthest sprinkler	25	
Pipe C Factor (Black Steel C-120)	120	
Nominal Pipe Inside Diameter (6", 4")	6	
	152188.1342	
	43259539.75	
Friction loss in pipe (psi/ft) (Based on Hazen William Equation)(HW2)	0.003518025	psi/ft
RS x 1.30 x HW2 =	0.457343226	Estimated psi

Estimated Required Flow Data for Building

Required GPM	280	gpm
Required psi	29.37	psi



SEISMIC BRACING DETAILS

1- ALL BRACING SHALL BE INSTALLED IN ACCORDANCE WITH NFPA # 13

3- GENERAL SPACING REQUIREMENTS:
- ALL PIPING 2 1/2" AND LARGER SHALL BE BRACED IN ACCORDANCE WITH NFPA # 13
- LONGITUDINAL BRACING REQUIRED WITHIN 40 FT. OF DEAD END MAINS
- LONGITUDINAL BRACING MAXIMUM SPACING 80 FT.
- LATERAL BRACING IS REQUIRED WITHIN 20 FT. OF END OF DEAD END MAINS.
- LATERAL BRACING MAXIMUM SPACING 40'-0"
- LATERAL BRACING WITHIN 24" OF THE INTERSECTION OF TWO MAINS MAY ACT AS LONGITUDINAL BRACING.
- LONGITUDUDINAL BRACING WITHIN 24" OF THE INTERSECTION OF TWO MAINS MAY ACT AS LATERAL BRACING.
- SPRIG-UPS IN EXCESS OF FOUR FEET SHALL HAVE LATERAL BRACING

SEISMIC FLEXIBLE COUPLING LOCATIONS FOR PIPE 2\" & LARGER
- WITHIN 24" OF TOP & BOTTOM OF ALL RISERS. RISERS LESS THAN 3' IN LENGTH FLEXIBLE COUPLINGS ARE PERMITTED TO BE OMITTED. RISERS 3' TO 7' IN LENGTH, ONE FLEXIBLE COUPLING IS ADEQUATE.
- WITHIN 12" ABOVE & 24" BELOW FLOOR IN MULTISTORY BUILDINGS. WHEN THE FLEXIBLE COUPLING BELOW FLOOR IS ABOVE TIE-IN MAIN SUPPLING THAT FLOOR , A FLEXIBLE COUPLING SHALL BE PROVIDED ON THE VERTICAL PORTION OF PIPING.
- ON BOTH SIDES OF CONCRETE OR MASONARY WALLS WITHIN 1' OF WALL SURFACE. EXCEPT WHEN CLEARANCE AROUND PIPE IS PROVIDED PER N.F.P.A. 13 SECTION 6-4.4 FLEXIBLE COUPLINGS ARE NOT REQUIRED.
- WITHIN 24" OF TOP OF DROP EXCEEDING 15 FT. IN LENGTH TO PORTIONS OF SYSTEMS SUPPLYING MORE THAN ONE SPRINKLER REGARDLESS OF PIPE SIZE.
- WITHIN 24" OF TOP & BOTTOM OF DROP TO HOSE LINES, RACK SPRINKLERS & MEZZANINES REGARDLESS OF PIPE SIZE.
- ABOVE & BELOW ANY INTERMEDIATE POINT OF SUPPORT FOR A RISER OR OTHER VERTICAL PIPE.

NOTE:

THE INTENT OF THIS WORK IS A NEW SPRINKLER SYSTEM.

A. THE WORK REQUIRED UNDER THIS SPECIFICATION CONSISTS OF THE AUTOMATIC SPRINKLER SYSTEM. THE SYSTEM SHALL BE A "WET/DRY" TYPE COMPLETE WITH DOUBLE DETECTOR CHECK VALVE OR BALANCED PRESSURE BACK FLOW PREVENTER AS REQUIRED BY THE LOCAL AUTHORITY. THE ENTIRE BUILDING INCLUDING THE STORE FRONT CANOPY, SHALL HAVE A SPRINKLER SYSTEM.

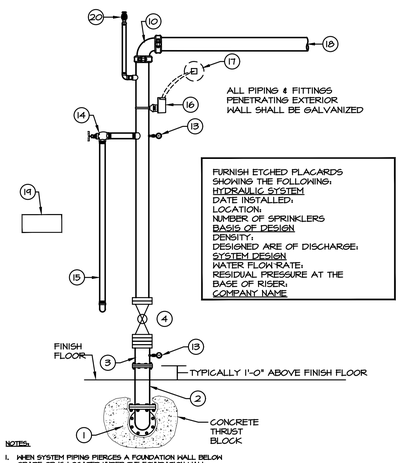
B. THE SPRINKLER CONTRACTOR SHALL CONNECT TO THE WATER MAIN AS SHOWN ON THE PLOT PLAN, AND EXTEND SAME TO SERVE THE BUILDING AS SHOWN.

C. THE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS, HOWEVER, NO REQUIREMENTS OF THE STATE INSURANCE OFFICE, OR NFPA PAMPHLETS NO. 13 AND 24 SHALL BE VIOLATED. ALL MATERIALS AND LABOR NECESSARY TO FULLY COMPLY WITH DRAWINGS AND SPECIFICATIONS, AND WITH RULES, REGULATIONS, AND ORDINANCES SHALL BE FURNISHED BY THE CONTRACTOR.

D. SPRINKLER HEAD COVERAGE: SYSTEM PIPING SHALL BE SIZED FOR ORDINARY HAZARD OCCUPANCY GROUP 2.

GENERAL SPRINKLER NOTES:

1. THE SPRINKLER HEADS SHOWN ARE GENERAL IN NUMBER AND LOCATION. THE EXACT NUMBERS AND LOCATIONS SHALL BE DETERMINED BY THE SUCCESSFUL SPRINKLER INSTALLER AND SHALL BE SHOWN ON HIS SHOP DRAWINGS. THE SPRINKLER SYSTEM SHALL BE IN ACCORDANCE WITH SECTION 15510 OF THE SPECIFICATIONS AND NFPA 13 and NFPA 24.
2. PROVIDE A HYDRAULICALLY DESIGNED FULL COVERAGE SPRINKLER SYSTEM.
3. THE SPRINKLER CONTRACTOR SHALL COORDINATE LOCATIONS OF SPRINKLER HEADS AND ASSOCIATED PIPING WITH ALL OTHER TRADES.
4. PROVIDE DRY PENDANT TYPE HEADS IN AREAS THAT ARE SUBJECT TO FREEZING FOR FREEZE PROTECTION.
5. ALL SPRINKLER HEADS LOCATED IN TILES SHALL BE CENTERED.
6. ALL SPRINKLER SYSTEM GAUGES AND VALVES MUST BE ACCESSIBLE FOR INSPECTION AND MAINTENANCE.
7. ALL FLOW TEST DATA REQUIRED SHALL BE TAKEN WITHIN THE LAST 6 MONTHS. CONTRACTOR IS RESPONSIBLE FOR UPDATING FLOW TEST DATA.
8. CONTRACTOR TO FIELD LOCATE EXISTING FLOW TEST HYDRANT AND DETERMINE THE EXACT DISTANCE FROM BUILDING.
9. DESIGN DENSITY SHALL BE: LIGHT HAZARD, 0.10 GPM/SQ. FT. DENSITY FOR THE MOST REMOTE 1,500 SQ. FT.
9. ALL PIPING FROM THE "POINT OF SERVICE" INCLUDING UNDERGROUND USED FOR SPRINKLER OR STANDPIPE SYSTEM MUST BE INSTALLED BY A REGISTERED SPRINKLER CONTRACTOR.
10. DEPTH OF BURY SHALL BE A MINIMUM OF 3'-0" BELOW GRADE.



NOTES:
1. WHEN SYSTEM PIPING PIERCES A FOUNDATION WALL BELOW GRADE OR IS LOCATED UNDER THE FOUNDATION WALL, CLEARANCE SHALL BE PROVIDED TO PREVENT BREAKAGE OF THE THE PIPING DUE TO BUILDING SETTLEMENT.
2. WHERE THE SYSTEM RISER IS CLOSE TO AN OUTSIDE WALL, UNDERGROUND FITTINGS OF PROPER LENGTH SHOULD BE USED IN ORDER TO AVOID PIPE JOINTS LOCATED IN OR UNDER THE WALL. CLEARANCE SHALL BE PROVIDED AROUND THE PIPE AND CLEAR SPACE FILLED WITH ASPHALT MASTIC OR SIMILAR FLEXIBLE WATERPROOFING MATERIAL.

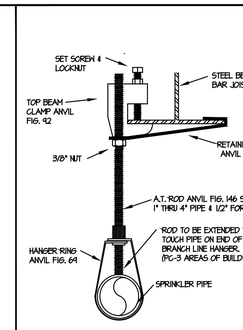
SPRINKLER RISER DETAIL

SCALE: NONE

EQUIPMENT NOMENCLATURE

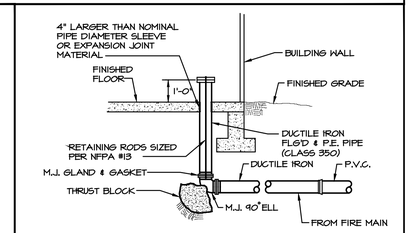
1. NEW UNDERGROUND SUPPLY
2. FLANGE & PLAIN END PIECE (BY OTHERS)
3. REDUCING FLANGE & SHORT SPOOL PIECE (IF NECESSARY)
4. OS &Y W/ BUILT IN TAMPER SWITCH
5. NOT USED.
6. NOT USED.
7. NOT USED.
8. NOT USED.
9. NOT USED.
10. NOT USED.
11. NOT USED.
12. NOT USED.
13. SYSTEM PRESSURE GAUGE
14. ANGLE VALVE FOR MAIN DRAIN
15. MAIN DRAIN LINE PIPE TO OUTSIDE (SPILL ON SPLASH BLOCK)
16. WATER FLOW SWITCH
17. ALARM BELL (ALL WIRING BY OTHERS) ELECTRICIAN SHALL PROVIDE AND INSTALL BACK BOX.
18. TO SPRINKLER SYSTEM
19. SPARE SPRINKLER HEAD CABINET (W/ HEADS & WRENCH)
20. SPRINKLER HEAD TO PROTECT VALVE ROOM

SEE SHEET FP-10 FOR FIRE VAULT WITH BACKFLOW PREVENTER and FDC DETECTOR CHECK.



HANGER DETAIL #1

NO SCALE



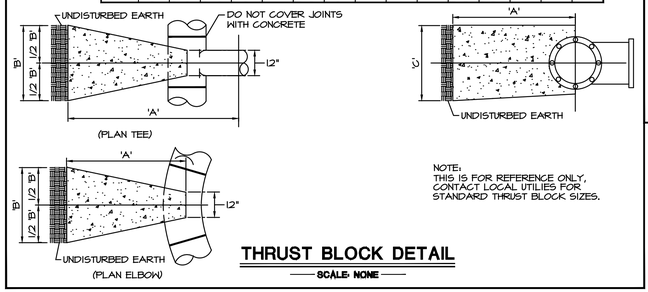
NOTE:
WHERE CLEARANCE IS PROVIDED BY A PIPE SLEEVE, A NOMINAL DIAMETER 2 IN. LARGER THAN THE NOMINAL DIAMETER OF THE PIPE SHALL BE ACCEPTABLE FOR PIPE SIZES 1 IN. THROUGH 3 1/2 IN. AND THE CLEARANCE PROVIDED BY A PIPE SLEEVE OF NOMINAL DIAMETER 4 IN. LARGER THAN THE NOMINAL DIAMETER OF THE PIPE SHALL BE ACCEPTABLE FOR PIPE SIZES 4 IN. AND LARGER.

TYPICAL LEAD-IN DETAIL

SCALE: NONE

THRUST BLOCK SCHEDULE (TYPICAL)

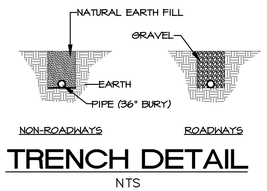
PIPE DIA.	90° BEND A	90° BEND B	90° BEND C	45° BEND A	45° BEND B	45° BEND C	22 1/2° BEND A	22 1/2° BEND B	22 1/2° BEND C	11 1/4° BEND A	11 1/4° BEND B	11 1/4° BEND C	TEE & PLUG A	TEE & PLUG B	TEE & PLUG C
DIA.	1'-0"	2'-6"	1'-6"	1'-0"	2'-0"	1'-0"	1'-0"	1'-6"	1'-0"	1'-0"	1'-6"	1'-0"	1'-0"	2'-4"	1'-3"
DIA.	1'-0"	2'-9"	2'-0"	1'-0"	2'-6"	1'-3"	1'-0"	1'-6"	1'-0"	1'-0"	1'-6"	1'-0"	1'-0"	2'-6"	1'-6"
DIA.	1'-0"	4'-0"	2'-0"	1'-0"	3'-0"	1'-6"	1'-0"	2'-0"	1'-6"	1'-0"	1'-6"	1'-0"	1'-0"	3'-0"	1'-9"
DIA.	1'-0"	5'-6"	3'-0"	1'-0"	3'-9"	2'-0"	1'-0"	2'-9"	1'-6"	1'-0"	2'-0"	1'-6"	1'-0"	4'-0"	2'-6"



NOTE:
THIS IS FOR REFERENCE ONLY. CONTACT LOCAL UTILIES FOR STANDARD THRUST BLOCK SIZES.

THRUST BLOCK DETAIL

SCALE: NONE



TRENCH DETAIL

NTS

NOT FOR CONSTRUCTION
INFORMATION ONLY

THE DESIGN PROFESSIONAL WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR PROBLEMS WHICH ARISE FROM OTHER'S FAILURE TO OBTAIN AND/OR FOLLOW THE DESIGN PROFESSIONAL'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES, AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC IN NATURE. THIS DRAWING AND ITS CONTENTS AND DESIGNS ARE THE PROPERTY OF KELSO-REGEN ASSOCIATES, INC. CONSULTING ENGINEERS, KNOXVILLE, TN. NOTICE IS HEREBY GIVEN THAT UNLESS AN ORIGINAL STATE SEAL AND ORIGINAL SIGNATURE AND DATE ARE AFFIXED TO THIS DRAWING, THIS DRAWING SHALL BE DEEMED NOT FOR CONSTRUCTION, INFORMATION ONLY. ONLY WHEN AN ORIGINAL STATE SEAL AND ORIGINAL SIGNATURE AND DATE ARE AFFIXED WILL THIS DRAWING BE FOR CONSTRUCTION.

KRA NO: 19052
COA No. 100494440
DRAWN BY: DG APPROVED BY: JGC

KELSO-REGEN ASSOCIATES, INC.
Consulting Engineers
Engineering Analysis
Energy Management
201 Sherlake Lane, Suite 101
Knoxville, Tn. 37922
www.kelso-regen.com
P:865-588-5348 F:865-247-0293

no.	date	revision	by

Building Renovations for:

Bonnie Kate Theatre

Elizabethton, Tennessee

Architectural Services
Cain Rash West Architects
130 Regional Park Dr.
Kingsport, TN 37660
Phn (423) 349-7760
Fax (423) 349-7413
www.grcinc.com

JOSEPH G. CAIN
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 100009
STATE OF TENNESSEE
7/31/2019

issued	00-00-00
checked	JGC
approved	JGC
drawn	DG
project no.	00-00
drawing name	SPRINKLER SCHEDULES and DETAILS

FP-21

plotted: 7/31/2019 7:50:46 AM file:19052_SPRINKLER.DWG