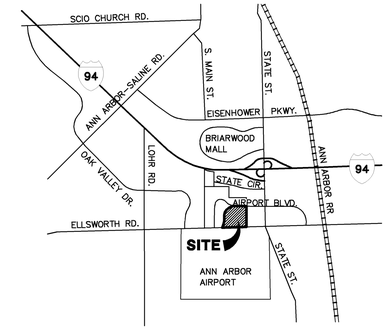
COSTCO

TAX ID: L-12-08-475-005

ADDRESS: 661 AIRPORT BOULEVARD

SECTION 8, T3S, R6E, PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

FINAL SITE PLAN



VICINITY MAP
NOT TO SCALE

SURVEYOR/ENGINEER
MIDWESTERN CONSULTING LLC
3815 PLAZA DR.
ANN ARBOR, MI 48108
TEL: (734) 995-0200
CONTACT: EARL OPHOFF

DEVELOPER
COSTCO WHOLESALE
C/O TJ DESIGN STRATEGIES, LTD
2311 W. 22nd ST.,
SUITE 208
OAK BROOK, IL 60523
TEL: (630) 368-0840
CONTACT: TED JOHNSON

FUTURE OWNER
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

RECORDED PROPERTY OWNER
AIRPORT BOULEVARD ASSOCIATES
3784 PLAZA DRIVE
SUITE 1
ANN ARBOR, MI 48104
TEL: (734) 769-6781

ARCHITECT
MULVANNY G2
1110 112th AVE.,
SUITE 500
BELLEVUE, WA 98004
TEL: (425) 463-2000
CONTACT: RISA YUKI

LANDSCAPE ARCHITECT
JJR
110 MILLER
ANN ARBOR, MI 48104
TEL: (734) 662-4457
CONTACT: CAROL SCHULTE

UTILITY CONTACTS:

PLANNING & ZONING
PITTSFIELD CHARTER TOWNSHIP
PLANNING, ENGINEERING & CODE ENFORCEMENT
3201 W. MICHIGAN AVE.
ANN ARBOR, MI 48108
PHONE: 734.822.3130
FAX: 734.844.1103
CONTACT: PAUL MONTAGNO, SENIOR PLANNER

FIRE DEPARTMENT
PITTSFIELD CHARTER TOWNSHIP
DEPARTMENT OF PUBLIC SAFETY
3201 W. MICHIGAN AVE.
ANN ARBOR, MI 48108
PHONE: 734.822.3130
FAX: 734.844.1103
CONTACT: MATT HARSHBERGER,
DIRECTOR OF PUBLIC SAFETY

WATER & SANITARY SEWER
PITTSFIELD CHARTER TOWNSHIP
UTILITY DEPARTMENT
3201 W. MICHIGAN AVE.
ANN ARBOR, MI 48108
PHONE: 734.822.2110
FAX: 734.844.1103
CONTACT: CRAIG LYON
DIRECTOR OF UTILITIES AND
MUNICIPAL SERVICES

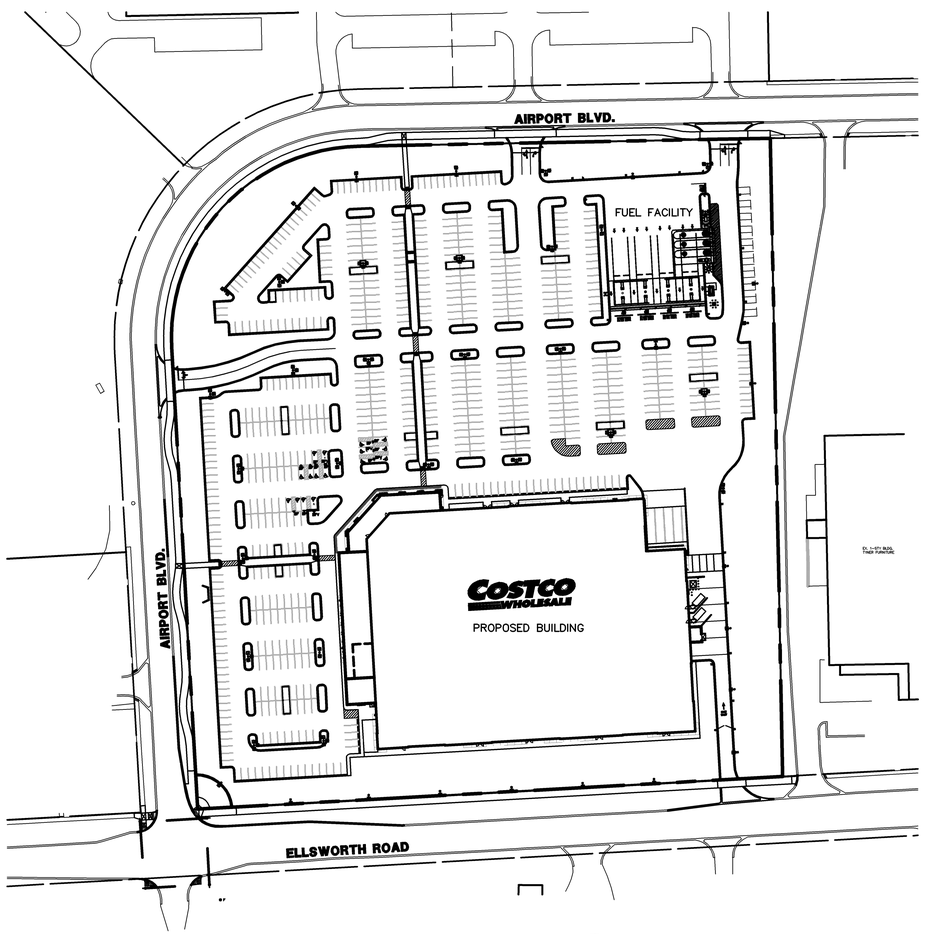
STORMWATER MANAGEMENT
PITTSFIELD CHARTER TOWNSHIP
ENGINEERING
3201 W. MICHIGAN AVE.
ANN ARBOR, MI 48108
PHONE: 734.822.3109
FAX: 734.844.1103
CONTACT: DAMIEN WETZEL,
TOWNSHIP ENGINEER

ELECTRIC SERVICE
DTE ENERGY
WESTERN WAYNE (SOUTHWEST REGION)
8001 HAGGERTY ROAD
BELLEVILLE, MI 48111
PHONE: 734.397.4321
FAX: 734.397.4143
CONTACT: SERVICE PLANNER

GAS SERVICE
DTE ENERGY
8001 HAGGERTY ROAD
BELLEVILLE, MI 48111
PHONE: 734.397.4321
FAX: 734.397.4143
CONTACT: SERVICE PLANNER

TELEPHONE SERVICE
AT&T
PHONE: 1.800.944.0447

CABLE SERVICE
COMCAST
PHONE: 1.800.266.2278



OVERALL SITE
SCALE: 1"=100'

DEVELOPMENT SUMMARY

	REQUIRED/PERMITTED	PROPOSED
GROSS/NET LOT AREA	NO MINIMUM	17.08 AC/743,915 SF
MINIMUM LOT WIDTH		
ZONING	BP	PUD
PROPOSED USE		Costco Wholesale
GROUND FLOOR AREA		148,831 SF
BLDG. LOT COVERAGE (NET)	25%	20.0%
TOTAL FLOOR AREA		150,306 SF
FLOOR AREA RATIO-FAR	35%	20.2%
BUILDING HEIGHT	NO REGULATIONS	34' MAXIMUM
PERVIOUS AREA *		221,187 SF/29.7%
IMPERVIOUS AREA**		373,897 SF/50.3%
TOTAL LOT COVERAGE (NET)***	60% (C2)	522,728 SF/70.3%
SETBACKS		
FRONT (N, S, and W)	50'	35'
REAR (EAST)	20'	109'
PARKING		
10' WIDE SPACES		601
9' WIDE SPACES ****		100
BARRIER FREE SPACES		16
TOTAL PARKING ****		717 SPACES
		4.82/1,000 SF

* PERVIOUS CONCRETE SIDEWALK = 7,781 SF
NORTH UNDERGROUND DETENTION INFILTRATION SYSTEM = 21,412 SF
LAWN/LANDSCAPE = 191,994 SF
** DRIVES AND WALKS, NOT INCLUDING PERVIOUS CONCRETE OR U.G.
*** GROUND FLOOR AREA PLUS IMPERVIOUS PAVING
**** INCLUDES 20 DEFERRED

Parking Calculations

Costco Wholesale does not fit neatly into any of the parking requirement categories described in the ordinance.
If the warehouse space is considered to be retail:
142 x 5 spaces per 1,000 sf = 710 spaces would be required.
If this space is considered to be warehouse:
142 x 1 space per 1,000 sf=142 spaces would be required.
Parking required for the gas station would be one space.
Parking required for the tire center is 4 bays x 5 spaces per bay= 20 spaces.
Parking spaces for food service would be 48 seats x 1 space per two seats, plus 4 employees at 1 space per two employees= 26 spaces.
Total parking required is between 198 and 756 spaces.
The proposed number of spaces is based on the applicant's experience in all other Costco Wholesale locations.

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5 TREE INDEX AND STRUCTURE SCHEDULES
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COSTCO

JOB No. **10046**

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11
PER WCRC REVIEW	2-07-12

DATE: 6-23-11
SHEET 1 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH: WAJ
FINAL\10046CV1
FB#:

1

MIDWESTERN CONSULTING

Civil, Environmental and Transportation Engineers
Planners, Surveyors
Landscape Architects

3815 Plaza Drive
Ann Arbor, Michigan 48108
Phone: 734.995.0200
Fax 734.995.0599

RELEASED FOR:	DATE
FINAL SITE PLAN APPROVAL	6-23-11

JAMES A. FISHER
P.E. #24260

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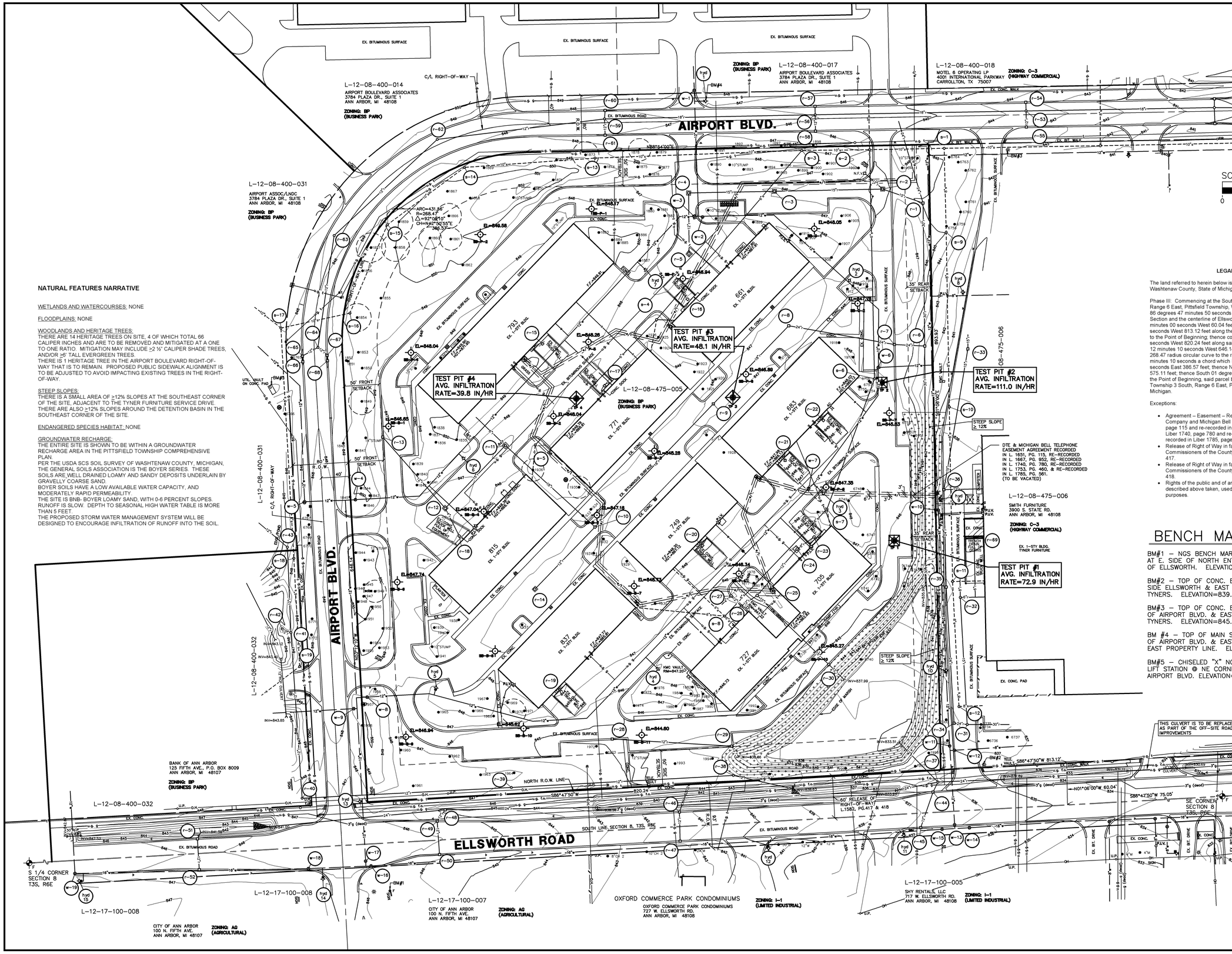
COSTCO CSPA # 11 - 07



NATURAL FEATURES NARRATIVE

WETLANDS AND WATERCOURSES: NONE

FLOODPLAINS: NONE

WOODLANDS AND HERITAGE TREES:
THERE ARE 14 HERITAGE TREES ON SITE, 4 OF WHICH TOTAL 66 CALIPER INCHES AND ARE TO BE REMOVED AND MITIGATED AT A ONE TO ONE RATIO. MITIGATION MAY INCLUDE >2 ½" CALIPER SHADE TREES, AND/OR >6' TALL EVERGREEN TREES.
THERE IS 1 HERITAGE TREE IN THE AIRPORT BOULEVARD RIGHT-OF-WAY THAT IS TO REMAIN. PROPOSED PUBLIC SIDEWALK ALIGNMENT IS TO BE ADJUSTED TO AVOID IMPACTING EXISTING TREES IN THE RIGHT-OF-WAY.

STEEP SLOPES:
THERE IS A SMALL AREA OF ≥12% SLOPES AT THE SOUTHEAST CORNER OF THE SITE, ADJACENT TO THE TYNER FURNITURE SERVICE DRIVE.
THERE ARE ALSO ≥12% SLOPES AROUND THE DETENTION BASIN IN THE SOUTHEAST CORNER OF THE SITE.

ENDANGERED SPECIES HABITAT: NONE

GROUNDWATER RECHARGE:
THE ENTIRE SITE IS SHOWN TO BE WITHIN A GROUNDWATER RECHARGE AREA IN THE PITTSFIELD TOWNSHIP COMPREHENSIVE PLAN.
PER THE USDA SCS SOIL SURVEY OF WASHTENAW COUNTY, MICHIGAN, THE GENERAL SOILS ASSOCIATION IS THE BOYER SERIES. THESE SOILS ARE WELL DRAINED LOAMY AND SANDY DEPOSITS UNDERLAIN BY GRAVELLY COARSE SAND.
BOYER SOILS HAVE A LOW AVAILABLE WATER CAPACITY, AND MODERATELY RAPID PERMEABILITY.
THE SITE IS BNB- BOYER LOAMY SAND, WITH 0-6 PERCENT SLOPES. RUNOFF IS SLOW. DEPTH TO SEASONAL HIGH WATER TABLE IS MORE THAN 5 FEET.
THE PROPOSED STORM WATER MANAGEMENT SYSTEM WILL BE DESIGNED TO ENCOURAGE INFILTRATION OF RUNOFF INTO THE SOIL.

LEGAL DESCRIPTION

The land referred to herein below is situated in the Township of Pittsfield, Washtenaw County, State of Michigan, and is described as follows:

Phase III: Commencing at the Southeast corner of Section 8, Town 3 South, Range 6 East, Pittsfield Township, Washtenaw County, Michigan; thence South 86 degrees 47 minutes 50 seconds West 75.05 feet along the South line of said Section and the centerline of Ellsworth Road; thence North 01 degrees 06 minutes 00 seconds West 60.04 feet; thence South 86 degrees 47 minutes 50 seconds West 813.12 feet along the Northerly right of way line of Ellsworth Road to the Point of Beginning; thence continuing South 86 degrees 47 minutes 50 seconds West 820.24 feet along said right of way line; thence North 03 degrees 12 minutes 10 seconds West 646.14 feet; thence 431.56 feet along the arc of a 268.47 radius circular curve to the right, through a central angle of 92 degrees 06 minutes 10 seconds a chord which bears North 42 degrees 50 minutes 55 seconds East 386.57 feet; thence North 88 degrees 54 minutes 00 seconds East 575.11 feet; thence South 01 degrees 06 minutes 00 seconds East 893.93 feet to the Point of Beginning, said parcel being a part of the Southeast 1/4 of Section 8, Township 3 South, Range 6 East, Pittsfield Township, Washtenaw County, Michigan.

Exceptions:

- Agreement – Easement – Restrictions in favor of The Detroit Edison Company and Michigan Bell Telephone Company recorded in Liber 1651, page 115 and re-recorded in Liber 1667, page 952 and re-recorded in Liber 1740, page 780 and re-recorded in Liber 1753, page 460 and re-recorded in Liber 1785, page 561.
- Release of Right of Way in favor of the Board of County Road Commissioners of the County of Washtenaw recorded in Liber 1582, page 417.
- Release of Right of Way in favor of the Board of County Road Commissioners of the County of Washtenaw recorded in Liber 1582, page 418.
- Rights of the public and of any governmental unit in any part of the land described above taken, used or deeded for street, road or highway purposes.

BENCH MARKS:

BM#1 – NGS BENCH MARK "NE1040" PIN IN MON. BOX AT E. SIDE OF NORTH ENTRANCE TO AIRPORT, S. SIDE OF ELLSWORTH. ELEVATION=846.09 NAVD 88.

BM#2 – TOP OF CONC. BASE TO LIGHT POLE @ NORTH SIDE ELLSWORTH & EAST SIDE OF WEST ENTRANCE TO TYNERS. ELEVATION=839.32 NAVD 88.

BM#3 – TOP OF CONC. BASE TO LIGHT POLE @ SOUTH SIDE OF AIRPORT BLVD. & EAST SIDE OF WESTERLY ENTRANCE TO TYNERS. ELEVATION=845.94 NAVD 88.

BM #4 – TOP OF MAIN STEAMER TO HYDRANT @ NORTH SIDE OF AIRPORT BLVD. & EAST SIDE OF 2ND ENTRANCE WEST OF EAST PROPERTY LINE. ELEVATION=848.89 NAVD 88.

BM#5 – CHISELED "X" NORTH MOST CORNER , TOP OF CONC. LIFT STATION @ NE CORNER OF POND ON WEST SIDE OF AIRPORT BLVD. ELEVATION=848.20 NAVD 88.

Know what's below. Call before you dig.

MIDWESTERN CONSULTING
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Planners, Surveyors
Landscape Architects
3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200
Fax: 734.995.0599

CLIENT
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
OVERALL EXISTING CONDITIONS & NATURAL FEATURES PLAN

2

DATE: 6-23-11
SHEET 2 OF 64
CADD: WJJ
ENG: JAF
PM: DMB
QC: DMB
FINAL 10046EX1
FB#7007

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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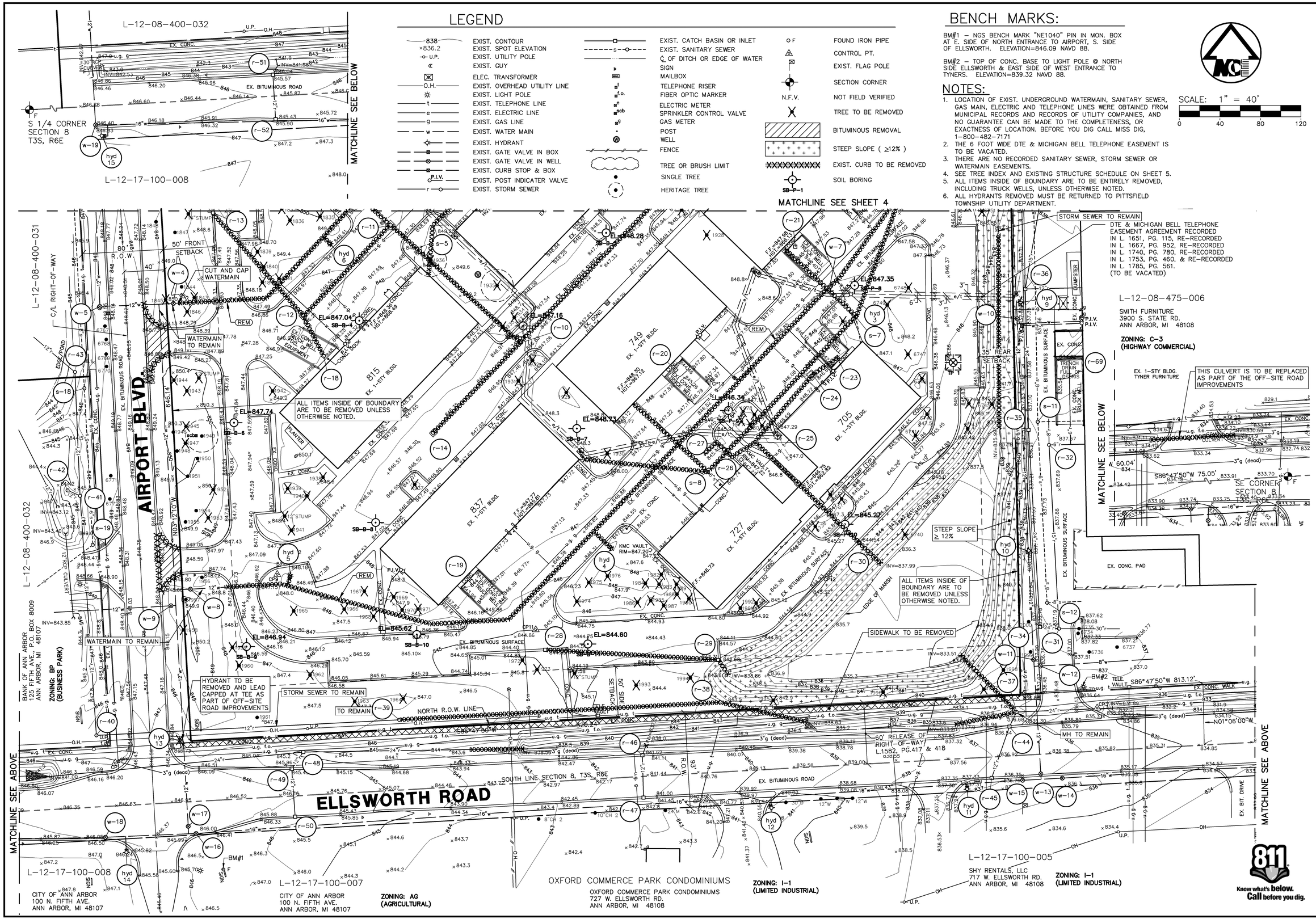

LEGEND

838	EXIST. CONTOUR		EXIST. CATCH BASIN OR INLET
×836.2	EXIST. SPOT ELEVATION		EXIST. SANITARY SEWER
U.P.	EXIST. UTILITY POLE		℄ OF DITCH OR EDGE OF WATER
	EXIST. GUY		SIGN
	ELEC. TRANSFORMER		MAILBOX
O.H.	EXIST. OVERHEAD UTILITY LINE		TELEPHONE RISER
	EXIST. LIGHT POLE		FIBER OPTIC MARKER
t	EXIST. TELEPHONE LINE		ELECTRIC METER
e	EXIST. ELECTRIC LINE		SPRINKLER CONTROL VALVE
g	EXIST. GAS LINE		GAS METER
w	EXIST. WATER MAIN		POST
	EXIST. HYDRANT		WELL
	EXIST. GATE VALVE IN BOX		FENCE
	EXIST. GATE VALVE IN WELL		TREE OR BRUSH LIMIT
	EXIST. CURB STOP & BOX		SINGLE TREE
P.I.V.	EXIST. POST INDICATER VALVE		HERITAGE TREE
r	EXIST. STORM SEWER		

O F	FOUND IRON PIPE
	CONTROL PT.
	EXIST. FLAG POLE
	SECTION CORNER
N.F.V.	NOT FIELD VERIFIED
	TREE TO BE REMOVED
	BITUMINOUS REMOVAL
	STEEP SLOPE (≥12%)
	EXIST. CURB TO BE REMOVED
SB-P-1	SOIL BORING

BENCH MARKS:

BM#1 – NGS BENCH MARK "NE1040" PIN IN MON. BOX AT E. SIDE OF NORTH ENTRANCE TO AIRPORT, S. SIDE OF ELLSWORTH. ELEVATION=846.09 NAVD 88.

BM#2 – TOP OF CONC. BASE TO LIGHT POLE @ NORTH SIDE ELLSWORTH & EAST SIDE OF WEST ENTRANCE TO TYNERS. ELEVATION=839.32 NAVD 88.

NOTES:

1. LOCATION OF EXIST. UNDERGROUND WATERMAIN, SANITARY SEWER, GAS MAIN, ELECTRIC AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION. BEFORE YOU DIG CALL MISS DIG, 1-800-482-7171
2. THE 6 FOOT WIDE DTE & MICHIGAN BELL TELEPHONE EASEMENT IS TO BE VACATED.
3. THERE ARE NO RECORDED SANITARY SEWER, STORM SEWER OR WATERMAIN EASEMENTS.
4. SEE TREE INDEX AND EXISTING STRUCTURE SCHEDULE ON SHEET 5.
5. ALL ITEMS INSIDE OF BOUNDARY ARE TO BE ENTIRELY REMOVED, INCLUDING TRUCK WELLS, UNLESS OTHERWISE NOTED.
6. ALL HYDRANTS REMOVED MUST BE RETURNED TO PITTSFIELD TOWNSHIP UTILITY DEPARTMENT.

SCALE: 1" = 40'

0 40 80 120

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COSTCO

FINAL SITE PLAN
EXISTING CONDITIONS, NATURAL FEATURES AND REMOVAL PLAN – SOUTH

3

DATE: 6-23-11
SHEET 3 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FINAL 100046EX1
FB#7007

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
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PER WCRC REVIEW	2-07-12

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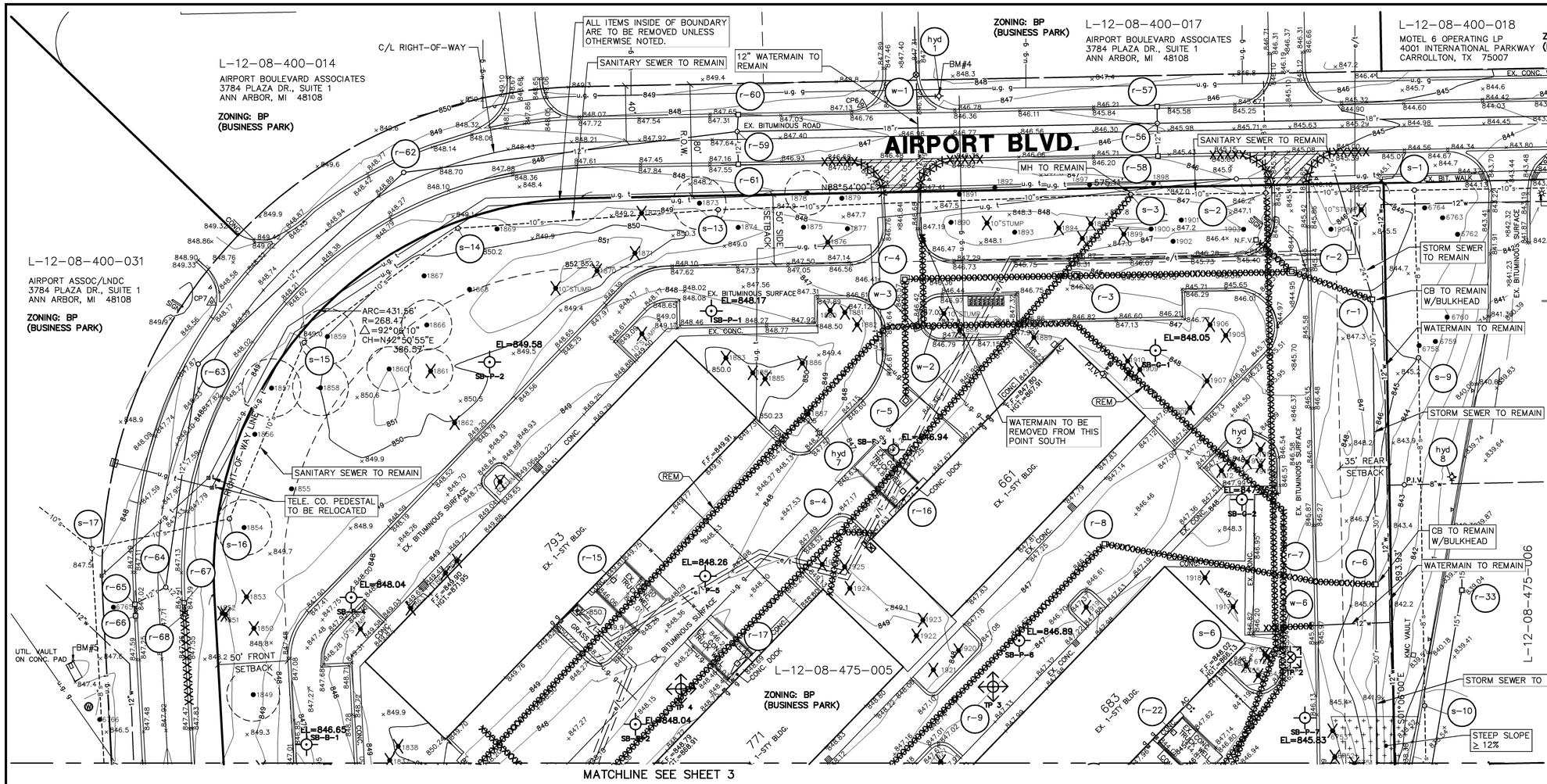

SCALE: 1" = 40'

0 40 80 120

LEGEND

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×836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
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f.o.	FIBER OPTIC MARKER
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	CONTROL PT.
	EXIST. FLAG POLE
	SECTION CORNER
N.F.V.	NOT FIELD VERIFIED
	TREE TO BE REMOVED
	BITUMINOUS REMOVAL
	STEEP SLOPE (≥12%)
	EXIST. CURB TO BE REMOVED
SB-P-1	SOIL BORING

DEMOLITION NOTES

1. DISCONNECT, ABANDON OR REMOVE EXISTING UTILITIES AS SHOWN IN ACCORDANCE WITH UTILITY COMPANY OR UTILITY AGENCY REQUIREMENTS. EXISTING AERIAL ELECTRIC AND/OR TELEPHONE UTILITIES AND POLES ARE TO BE REMOVED AND RELOCATED BY THE UTILITY COMPANY(IES). CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH THE UTILITY COMPANY(IES).
2. EXISTING FEATURES TO BE REMOVED ARE SHOWN BOLD. ESTIMATED EXISTING ASPHALT PAVEMENT SECTION: 4–INCH THICK ASPHALT ON 6–INCH THICK STONE BASE – FIELD VERIFY. ESTIMATED EXISTING CONCRETE PAVEMENT SECTION: 6–INCH THICK PLAIN CONCRETE ON 6–INCH THICK STONE BASE – FIELD VERIFY. EXISTING LANDSCAPE PLANTINGS ARE TO BE REMOVED UNLESS INDICATED OTHERWISE.
3. CONTRACTOR SHALL MAINTAIN VEHICLE AND PEDESTRIAN ACCESS ON ADJACENT ROADWAYS AND DRIVES TO THE MAXIMUM EXTENT FEASIBLE THROUGHOUT THE DURATION OF THE PROJECT – COORDINATE WITH NEIGHBORING BUSINESSES AND WITH PUBLIC STREET AUTHORITIES HAVING JURISDICTION. PROVIDE TEMPORARY TRAFFIC CONTROL MEASURES TO MAINTAIN WORK SITE SAFETY AND TO PROTECT THE TRAVELING PUBLIC IN ACCORDANCE WITH APPLICABLE PROVISIONS OF THE CURRENT EDITION OF MICHIGAN MUTCD, MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.
4. ALL EXISTING ABOVE AND BELOW GROUND STRUCTURES WITHIN THE LIMITS OF CONSTRUCTION SHALL BE REMOVED UNLESS NOTED OTHERWISE WITHIN THIS CONSTRUCTION SET AND/OR PROJECT SPECIFICATIONS. THIS INCLUDES FOUNDATIONS, SLABS, WALLS AND FOOTINGS. CAVITIES LEFT BY STRUCTURE REMOVAL SHALL BE BACKFILLED WITH SATISFACTORY MATERIALS AND COMPACTED IN ACCORDANCE WITH INDICATED REQUIREMENTS.
5. CLEARING LIMITS SHALL BE PHYSICALLY MARKED IN THE FIELD BY THE CONTRACTOR.
6. ALL DEMOLITION WASTE AND CONSTRUCTION DEBRIS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED AND SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE IN AN APPROVED WASTE SITE AND IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
7. ALL UTILITY DISCONNECTION, REMOVAL, RELOCATION, CUTTING, CAPPING AND/OR ABANDONMENT SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANY / AGENCY.
8. THE BURNING OF CLEARED MATERIAL AND DEBRIS SHALL NOT BE ALLOWED UNLESS CONTRACTOR OBTAINS PRIOR WRITTEN AUTHORIZATION FROM THE LOCAL AUTHORITIES.
9. EROSION AND SEDIMENTATION CONTROL MEASURES AROUND AREAS OF DEMOLITION SHALL BE PROPERLY INSTALLED AND SHALL FUNCTION PROPERLY PRIOR TO INITIALIZATION OF DEMOLITION ACTIVITIES.
10. ASBESTOS OR HAZARDOUS MATERIALS ARE NOT EXPECTED, IF FOUND ON SITE, SUCH MATERIALS SHALL BE REMOVED BY A LICENSED HAZARDOUS MATERIALS CONTRACTOR. CONTRACTOR SHALL NOTIFY OWNER IMMEDIATELY IF HAZARDOUS MATERIALS ARE ENCOUNTERED.
11. CONTRACTOR SHALL ADHERE TO ALL LOCAL, STATE, FEDERAL AND OSHA REGULATIONS DURING ALL DEMOLITION ACTIVITIES.
12. CONTRACTOR SHALL PROTECT ALL CORNER PINS, MONUMENTS, PROPERTY CORNERS AND BENCHMARKS DURING DEMOLITION ACTIVITIES. IF DISTURBED, CONTRACTOR SHALL HAVE DISTURBED ITEMS RESET BY A LICENSED SURVEYOR AT NO ADDITIONAL COST TO THE OWNER.
13. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES, STRUCTURES, AND FEATURES TO REMAIN. ANY ITEMS TO REMAIN THAT HAVE BEEN DISTURBED OR DAMAGED AS A RESULT OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT CONTRACTOR'S EXPENSE.
14. CONTRACTOR SHALL PROVIDE AND MAINTAIN TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH STATE DEPARTMENT OF TRANSPORTATION REGULATIONS AND AS REQUIRED BY LOCAL AGENCIES WHEN WORKING IN AND/OR ALONG STREETS, ROADS, HIGHWAYS, ETC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN APPROVAL AND COORDINATE WITH LOCAL AND/OR STATE AGENCIES REGARDING THE NEED, EXTENT AND LIMITATIONS ASSOCIATED WITH INSTALLING AND MAINTAINING TRAFFIC CONTROL MEASURES.
15. PROVIDE NEAT, STRAIGHT, FULL DEPTH, SAW CUTS OF EXISTING PAVEMENT WHERE INDICATED ALONG LIMITS OF PAVEMENT DEMOLITION.
16. ALL UTILITY AND STRUCTURE REMOVAL, RELOCATION, CUTTING, CAPPING AND/OR ABANDONMENT SHALL BE COORDINATED AND PROPERLY DOCUMENTED BY A CERTIFIED PROFESSIONAL, WHEN APPLICABLE, WITH THE APPROPRIATE UTILITY COMPANY, MUNICIPALITY AND/OR AGENCY. DEMOLITION OF REGULATED ITEMS MAY INCLUDE, BUT ARE NOT LIMITED TO: WELLS, ASBESTOS, UNDER GROUND STORAGE TANKS, SEPTIC TANKS AND ELECTRIC TRANSFORMERS. DEMOLITION CONTRACTOR SHALL REFER TO ANY ENVIRONMENTAL STUDIES FOR DEMOLITION RECOMMENDATIONS AND GUIDANCE. AVAILABLE ENVIRONMENTAL STUDIES MAY INCLUDE, BUT ARE NOT LIMITED TO: PHASE I ESA, PHASE II, WETLAND AND STREAM DELINEATION AND ASBESTOS SURVEY. ALL APPLICABLE ENVIRONMENTAL STUDIES SHALL BE MADE AVAILABLE UPON REQUEST.
17. NO TREES SHALL BE REMOVED, NOR VEGETATION DISTURBED BEYOND THE LIMITS OF CONSTRUCTION WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.
18. DO NOT OPERATE OR STORE EQUIPMENT, NOR HANDLE OR STORE MATERIALS WITHIN THE DRIP LINES OF EXISTING TREES SHOWN TO REMAIN.
19. ALL PAVEMENT, BASE COURSES, SIDEWALKS, CURBS, BUILDINGS, FOUNDATIONS, ETC., WITHIN THE AREA TO BE DEMOLISHED SHALL BE REMOVED TO FULL DEPTH. EXISTING BASE COURSE MATERIALS MAY BE WORKED INTO THE NEW PAVEMENT OR BUILDING SUBGRADE PROVIDED THAT THE GRADATION, CONSISTENCY, COMPACTION, SUBGRADE CONDITION, ETC., ARE IN ACCORDANCE WITH THE SPECIFICATIONS AND RECOMMENDATIONS OF THE REPORT OF GEOTECHNICAL INVESTIGATION. BASE COURSE MATERIALS SHALL NOT BE WORKED INTO THE SUBGRADE AREAS TO RECEIVE LANDSCAPING.
20. THE CONTRACTOR SHALL USE SUITABLE METHODS TO CONTROL DUST AND DIRT CAUSED BY THE DEMOLITION ACTIVITIES.

NOTES:

1. LOCATION OF EXIST. UNDERGROUND WATERMAIN, SANITARY SEWER, GAS MAIN, ELECTRIC AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION. BEFORE YOU DIG CALL MISS DIG, 1–800–482–7171
2. THE 6 FOOT WIDE DTE & MICHIGAN BELL TELEPHONE EASEMENT IS TO BE VACATED.
3. THERE ARE NO RECORDED SANITARY SEWER, STORM SEWER OR WATERMAIN EASEMENTS.
4. SEE TREE INDEX AND EXISTING STRUCTURE SCHEDULE ON SHEET 5.
5. ALL ITEMS INSIDE OF BOUNDARY ARE TO BE ENTIRELY REMOVED, INCLUDING TRUCK WELLS, UNLESS OTHERWISE NOTED.
6. ALL HYDRANTS REMOVED MUST BE RETURNED TO THE PITTSFIELD TOWNSHIP UTILITY DEPARTMENT.

BENCH MARKS:

BM#3 – TOP OF CONC. BASE TO LIGHT POLE @ SOUTH SIDE OF AIRPORT BLVD. & EAST SIDE OF WESTERLY ENTRANCE TO TYNERS. ELEVATION=845.94 NAVD 88.

BM #4 – TOP OF MAIN STEAMER TO HYDRANT @ NORTH SIDE OF AIRPORT BLVD. & EAST SIDE OF 2ND ENTRANCE WEST OF EAST PROPERTY LINE. ELEVATION=848.89 NAVD 88.

BM#5 – CHISELED "X" NORTH MOST CORNER , TOP OF CONC. LIFT STATION @ NE CORNER OF POND ON WEST SIDE OF AIRPORT BLVD. ELEVATION=848.20 NAVD 88.

Know what's below. Call before you dig.

MIDWESTERN CONSULTING
Civil, Environmental and Transportation Engineers
Landscape Architects
3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200
Fax: 734.995.0599

CLIENT
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO

FINAL SITE PLAN
EXISTING CONDITIONS, NATURAL FEATURES AND REMOVAL PLAN – NORTH

4

DATE: 6-23-11
SHEET 4 OF 64
CADD: WJJ
ENG: JAF
PM: DMB
FINAL\10046EX1
FB#7007

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

R:\10046\ACAD\FINAL\10046EX1.dwg, 04, 2/6/2012 4:32:52 PM, agf, D1-Size-KIP.pc3

EXISTING TREE LIST

TAG#		DIA	STEMS	COMMON NAME	GENUS/SPECIES	HEALTH
1835	R	13"		Honey Locust	Gleditsia triacanthos	
1836	R	8"		Red Pine	Pinus resinosa	
1837	R	6"		Red Pine	Pinus resinosa	
1838	R	6"		Red Pine	Pinus resinosa	
1839	R	12"		Honey Locust	Gleditsia triacanthos	
1840	R	10"		Red Pine	Pinus resinosa	
1841	R	12"		Red Pine	Pinus resinosa	
1842	R	12"		Red Pine	Pinus resinosa	
1843	R	9"		Red Pine	Pinus resinosa	40% alive
1844		10"		Red Pine	Pinus resinosa	
1845	R	9"		Red Pine	Pinus resinosa	60% alive
1846	R	13"		Black Walnut	Juglans nigra	60% alive
1847		16"		Black Walnut	Juglans nigra	
1848		13"		Honey Locust	Gleditsia triacanthos	
1849		H 19"		Honey Locust	Gleditsia triacanthos	
1850	R	11"		Pear	Pyrus	
1851	R	15"		Black Walnut	Juglans nigra	
1852	R	11"		Black Walnut	Juglans nigra	
1853	R	7"	twin	Pear	Pyrus	
1854		H 20"		Black Walnut	Juglans nigra	
1855		17"		Sycamore	Platanus occidentalis	
1856		12"		Sycamore	Platanus occidentalis	
1857		H 21"		Sycamore	Platanus occidentalis	
1858		H 20"		Sycamore	Platanus occidentalis	
1859		H 20"		Sycamore	Platanus occidentalis	
1860		H 16"		Norway Maple	Acer platanoides	
1861	R	H 16"		Norway Maple	Acer platanoides	
1862	R	14"		Honey Locust	Gleditsia triacanthos	
1863	R	6"	twin	Hawthorn	Crataegus	
1864	R	6"	twin	Hawthorn	Crataegus	
1865	R	6"	twin	Hawthorn	Crataegus	
1866		H 18"		Sycamore	Platanus occidentalis	
1867		17"		Sycamore	Platanus occidentalis	
1868		12"		Sycamore	Platanus occidentalis	
1869		H 19"		Sycamore	Platanus occidentalis	
1870	R	8"		Black Pine	Pinus nigra	60% alive
1871		11"		Sugar Maple	Acer saccharum	
1872	R	9"		Sugar Maple	Acer saccharum	60% alive
1873		H 19"		Sycamore	Platanus occidentalis	
1874		17"		Sycamore	Platanus occidentalis	
1875		14"		Sycamore	Platanus occidentalis	
1876		14"		Red Pine	Pinus resinosa	
1877		16"		Red Pine	Pinus resinosa	
1878		H 16"		Norway Maple	Acer platanoides	
1879		14"		Norway Maple	Acer platanoides	
1880	R	8"		White Pine	Pinus strobus	40% alive
1881	R	9"		White Pine	Pinus strobus	40% alive
1882	R	9"		White Pine	Pinus strobus	
1883	R	15"		Honey Locust	Gleditsia triacanthos	
1884	R	6"		Red Pine	Pinus resinosa	
1885	R	6"		Red Pine	Pinus resinosa	
1886	R	14"		Honey Locust	Gleditsia triacanthos	
1887	R	11"		Honey Locust	Gleditsia triacanthos	
1888	R	10"		Honey Locust	Gleditsia triacanthos	
1889	R	13"		Honey Locust	Gleditsia triacanthos	
1890		16"		Sycamore	Platanus occidentalis	
1891		9"		Sugar Maple	Acer saccharum	
1892		11"		Sugar Maple	Acer saccharum	
1893		13"		Norway Maple	Acer platanoides	
1894	R	16"		Black Pine	Pinus nigra	dead
1895	R	11"		Black Pine	Pinus nigra	
1896	R	12"		Black Pine	Pinus nigra	60% alive
1897		17"		Sycamore	Platanus occidentalis	
1898		17"		Sycamore	Platanus occidentalis	
1899	R	11"		Sycamore	Platanus occidentalis	
1900		15"		Black Pine	Pinus nigra	
1901		13"		Black Pine	Pinus nigra	
1902		14"		Norway Maple	Acer platanoides	
1903		11"		Red Pine	Pinus resinosa	
1904		9"		Norway Maple	Acer platanoides	
1905	R	11"		Red Pine	Pinus resinosa	
1906	R	10"		Red Pine	Pinus resinosa	
1907	R	13"		Honey Locust	Gleditsia triacanthos	
1908	R	15"		Honey Locust	Gleditsia triacanthos	
1909	R	8"		Red Pine	Pinus resinosa	
1910	R	8"		Red Pine	Pinus resinosa	
1911	R	8"		Red Pine	Pinus resinosa	
1912	R	14"		Black Pine	Pinus nigra	
1913	R	12"		Black Pine	Pinus nigra	
1914	R	12"		Black Pine	Pinus nigra	
1915	R	8"		Black Pine	Pinus nigra	dead
1916	R	10"		Black Pine	Pinus nigra	dead
1917	R	9"		Norway Maple	Acer platanoides	
1918	R	11"		Norway Maple	Acer platanoides	
1919	R	8"		Linden	Tilia americana	
1920	R	9"		White Pine	Pinus strobus	dead
1921	R	10"		White Pine	Pinus strobus	
1922	R	6"		White Pine	Pinus strobus	
1923	R	14"		Honey Locust	Gleditsia triacanthos	
1924	R	12"		Honey Locust	Gleditsia triacanthos	
1925	R	7"		Red Pine	Pinus resinosa	
1926	R	8"		Red Pine	Pinus resinosa	
1927	R	6"		Red Maple	Acer rubrum	
1928	R	12"		Norway Maple	Acer platanoides	
1929	R	15"		Sycamore	Platanus occidentalis	
1930	R	12"		Norway Maple	Acer platanoides	
1931	R	14"		Black Pine	Pinus nigra	
1932	R	12"		Black Pine	Pinus nigra	
1933	R	10"		White Pine	Pinus strobus	40% alive
1934	R	8"		White Pine	Pinus strobus	40% alive
1935	R	H 16"		Honey Locust	Gleditsia triacanthos	
1936	R	H 16"		Honey Locust	Gleditsia triacanthos	
1937	R	7"		Norway Maple	Acer platanoides	
1938	R	11"		Honey Locust	Gleditsia triacanthos	
1939	R	12"		Honey Locust	Gleditsia triacanthos	
1940	R	14"		Black Pine	Pinus nigra	dead

TAG#		DIA	STEMS	COMMON NAME	GENUS/SPECIES	HEALTH
1941	R	15"		Black Pine	Pinus nigra	dead
1942	R	12"		Honey Locust	Gleditsia triacanthos	
1943	R	8"		Red Pine	Pinus resinosa	
1944	R	11"		Red Pine	Pinus resinosa	
1945	R	10"		White Pine	Pinus strobus	
1946		13"		White Pine	Pinus strobus	
1947	R	9"		White Pine	Pinus strobus	
1948		10"		White Pine	Pinus strobus	
1949		H 16"		Honey Locust	Gleditsia triacanthos	
1950		13"		Black Walnut	Juglans nigra	
1951		14"		Black Walnut	Juglans nigra	
1952	R	15"		Honey Locust	Gleditsia triacanthos	
1953	R	8"		White Pine	Pinus strobus	
1954		13"		White Pine	Pinus strobus	
1955		14"		White Pine	Pinus strobus	
1956		13"		Black Walnut	Juglans nigra	
1957		16"		Black Pine	Pinus nigra	
1958	R	4"	multiple	Crab Apple	Malus coronaria	
1959	R	15"		Blue Spruce	Picea pungens	
1960	R	16"		Blue Spruce	Picea pungens	
1961		11"		Norway Maple	Acer platanoides	
1962	R	14"		Norway Maple	Acer platanoides	
1963	R	12"		Norway Maple	Acer platanoides	
1964	R	16"		Sycamore	Platanus occidentalis	
1965	R	13"		Norway Maple	Acer platanoides	
1966	R	10"		Red Maple	Acer rubrum	
1967	R	13"		Norway Maple	Acer platanoides	
1968	R	13"		Norway Maple	Acer platanoides	
1969	R	15"		Black Pine	Pinus nigra	
1970	R	H 18"		Black Pine	Pinus nigra	
1971	R	14"		Black Pine	Pinus nigra	
1972	R	15"		Black Pine	Pinus nigra	
1973	R	16"		Black Pine	Pinus nigra	
1974	R	14"		Norway Maple	Acer platanoides	
1975	R	13"		Norway Maple	Acer platanoides	
1976	R	7"		Red Maple	Acer rubrum	40% alive
1977	R	11"		Black Pine	Pinus nigra	
1978	R	6"	twin	Black Pine	Pinus nigra	
1979	R	14"		Black Pine	Pinus nigra	
1980	R	8"		Black Pine	Pinus nigra	
1981	R	10"		Douglas-fir	Pseudotsuga menziesii	
1982	R	8"		Blue Spruce	Picea pungens	
1983	R	12"		Blue Spruce	Picea pungens	
1984	R	15"		Blue Spruce	Picea pungens	
1985	R	11"		Blue Spruce	Picea pungens	
1986	R	14"		Blue Spruce	Picea pungens	
1987	R	11"		Blue Spruce	Picea pungens	
1988	R	9"		Blue Spruce	Picea pungens	
1989	R	9"		Blue Spruce	Picea pungens	
1990	R	13"		Blue Spruce	Picea pungens	
1991	R	7"		Linden	Tilia americana	
1992	R	9"		Linden	Tilia americana	
1993	R	11"		Norway Maple	Acer platanoides	
1994	R	11"		Sycamore	Platanus occidentalis	
1995	R	12"		Norway Maple	Acer platanoides	
1996	R	11"		Norway Maple	Acer platanoides	
1997	R	12"		Black Pine	Pinus nigra	
1998	R	15"		Black Pine	Pinus nigra	
1999		14"		Honey Locust	Gleditsia triacanthos	
2000		14"		Honey Locust	Gleditsia triacanthos	
6734		8"		Honey Locust	Gleditsia triacanthos	
6735		4"	quad	Honey Locust	Gleditsia triacanthos	
6736		6"	twin	Blue Spruce	Picea pungens	
6737		10"		Black Pine	Pinus nigra	
6738	R	11"		Blue Spruce	Picea pungens	
6739	R	11"		Blue Spruce	Picea pungens	
6740	R	10"		Norway Maple	Acer platanoides	
6741	R	10"		Linden	Tilia americana	
6742	R	8"		Linden	Tilia americana	
6743	R	10"		Blue Spruce	Picea pungens	
6744	R	6"		Norway Maple	Acer platanoides	
6745	R	9"		Norway Maple	Acer platanoides	
6746	R	10"		Norway Maple	Acer platanoides	
6747	R	11"		White Pine	Pinus strobus	
6748	R	16"		Black Pine	Pinus nigra	
6749	R	13"	twin	Black Pine	Pinus nigra	
6750	R	14"		Black Pine	Pinus nigra	
6751	R	16"		Black Pine	Pinus nigra	
6752	R	13"		Black Pine	Pinus nigra	
6753	R	9"		Black Pine	Pinus nigra	
6754	R	10"	twin	Black Pine	Pinus nigra	
6755	R	16"		Black Pine	Pinus nigra	
6756	R	16"		Black Pine	Pinus nigra	
6757	R	13"		Black Pine	Pinus nigra	
6758		9"		Black Pine	Pinus nigra	
6759		14"		Honey Locust	Gleditsia triacanthos	
6760		10"		Black Pine	Pinus nigra	
6761		7"		Black Pine	Pinus nigra	
6762		11"		Honey Locust	Gleditsia triacanthos	
6763		11"		Black Pine	Pinus nigra	
6764		10"		Black Pine	Pinus nigra	
6765		11"		Honey Locust	Gleditsia triacanthos	
6766		10"		Black Walnut	Juglans nigra	
6767		13"		Black Walnut	Juglans nigra	
6768		12"		Black Walnut	Juglans nigra	40% alive
6769		10"		Black Walnut	Juglans nigra	
6770		17"		Black Walnut	Juglans nigra	
6771		13"		Black Walnut	Juglans nigra	
6772		12"		Black Cherry	Prunus serotina	60% alive

H = HERITAGE TREE
R = REMOVE

MITIGATION NOTES:
4 HERITAGE TREES ARE TO BE REMOVED.
3 @ 16" AND 1 @ 18" = 66 CAL, INCHES REMOVED
MITIGATION REQUIRED = 66 CAL. INCHES

EXISTING STORM STRUCTURE SCHEDULE

STRUCTURE #		TYPE	RIM	INV.	INV.	INV.	INV.	NOTES
r-1		CB	844.81	30" S = 839.36	24" N = 839.44	15" NW = 839.65		
r-2	R	CB	844.54	15" SE = 840.43	15" W = 840.54	12" NW = 840.85		
r-3	R	CB	845.76	15" E = 841.48	15" W = 842.35			
r-4	R	CB	846.17	15" E = 842.89	12" S = 842.76			DEBRIS IN 15" E
r-5	R	CB	845.91	12" N = 843.00				
r-6		CB	843.02	30" S = 837.93	30" N = 837.94	24" W = 838.28		
r-7	R	CB	845.28	24" E = 838.11	24" W = 838.14			
r-8	R	CB	846.02	24" E = 839.01	18" SW = 840.24			
r-9	R	CB	846.46	18" SW = 841.09	18" NE = 841.13			
r-10	R	CB	846.44	18" NE = 842.05	18" NW = 842.09	12" SW = 842.11		
r-11	R	CB	846.73	18" E = 842.95	15" SW = 843.02	6" NW = 842.97		
r-12	R	CB	846.25	15" NE = 843.54	12" NW = 843.61	4" SE = 843.36		
r-13	R	CB	846.40	12" SE = 844.03				
r-14	R	CB	846.13	12" NE = 842.76				
r-15	R	CB	845.95	N/A				FULL OF DEBRIS
r-16	R	CB	843.74	N/A				FULL OF DEBRIS
r-17	R	CB	844.90	N/A				FULL OF DEBRIS
r-18	R		N/A	N/A				N.F.V. (EQUIP ON M/H)
r-19	R	CB	843.80	N/A				FULL OF DEBRIS
r-20	R	CB	844.39	N/A				FULL OF DEBRIS
r-21	R	CB	844.10	N/A				FULL OF DEBRIS
r-22	R	CB	844.01	N/A				FULL OF DEBRIS
r-23	R	CB	842.96	N/A				FULL OF DEBRIS
r-24	R	CB	845.91	12" S = 841.74	8" PVC NE = 841.96			
r-25	R	CB	846.41	15" SE = 840.82	12" NE = 840.99	12" SW = 841.16		
r-26	R	CB	846.24	12" NE = 841.49	12" NW = 842.12			
r-27	R	CB	845.24	12" SE = 842.39	4" PVC SW = 843.41			
r-28	R	CB	844.09	12" E = 841.02				
r-29	R	CB	843.20	12" SE = 839.04	12" W = 839.04			
r-30	R	CB	843.98	15"N = 838.93	15"S = 838.83			
r-31		MH	837.21	30" E = 829.81	24" W = 829.86	15" N = 829.76		
r-32		MH	837.23	15" S = 830.38	15" N = 830.43	6" CLAY E = 830.48		
r-33		CB	838.96	15" S = 835.01	15" N = 835.01			
r-34		CB	836.65	24" E = 829.82	24" N = 830.02			
r-35		CB	836.82	24" S = 831.73	24" N = 831.77			
r-36		CB	836.70	24" S = 833.15	15" N = 833.25	12" CLAY E = 833.28		
r-37	R	MH	837.15	24" E = 832.40	24" W = 832.45	12" SW = 832.53	12" NW = 833.27	
r-38	R	MH	843.50	12" ESE = 838.25	12" W = 838.79			
r-39		MH	846.61	12" E = 838.96	12" W = 839.06			
r-40		MH	847.67	12" N = 839.32	12" E = 839.42			
r-41		MH	846.80	12" S = 839.77	12" N = 839.77	12" NW = 840.45		
r-42		MH	846.99	12" SE = 841.65	1 - 2" HOLE = 843.04	2-2" HOLES = 844.69		OVERFLOW STRUCTURE
r-43		MH	846.08	12" S = 839.91	12" NW = 839.95			POND OUTLET
r-44		CB	836.19	12" NE = 832.64	12" SW = 832.69			
r-45		CB	836.66	12" NE = 832.78				
r-46		CB	841.09	12" S = 837.14	12" NE = 837.19			
r-47		CB	841.10	12" N = 837.47				
r-48		CB	844.59	24" E = 839.49	24" W = 839.49	12" SW = 839.54		
r-49		CB	845.40	12" NE = 839.65	12" S = 839.88			
r-50		CB	845.58	12" N = 840.22				
r-51		CB	845.45	12" NE = 841.55	12" S = 841.60			
r-52		CB	845.35	12" N = 842.05				
r-53		MH	843.59	18" E = 836.94	18" W = 837.09	12" S = 837.49	12" N = 837.54	
r-54		CB	843.12	12" S = 837.82				
r-55		CB	843.04	12" N = 838.09				
r-56		MH	845.96	18" E = 838.01	18" W = 838.16	12" S = 839.66	12" N = 839.76	
r-57		CB	845.48	12" S = 840.18				
r-58		CB	845.29	12" N = 840.64				
r-59		MH	847.48	18" E = 838.78	12" W = 838.96	12" S = 841.65	12" N = 841.75	
r-60		CB	846.96	12" S = 842.11				
r-61		CB	846.75	12" N = 842.00				
r-62		MH	848.53	12" N = 839.73	12" SW = 839.83			
r-63		MH	848.20	12" NE = 840.70	12" S = 840.60			
r-64		MH	847.61	12" NNE = 841.21	12" WSW = 841.91	12" SE = 842.26		
r-65		CB	846.91	12" ENE = 842.36	12" S = 842.48			
r-66		CB	846.96	12" N = 842.58				
r-67		CB	846.82	12" NW = 842.77	12" S = 842.91			
r-68		CB	846.88	12" N = 843.17				
r-69		TR-DRAIN	834.32	6" CLAY S = N/A				FULL OF DEBRIS

R=REMOVE

EXISTING SANITARY STRUCTURE SCHEDULE

STRUCTURE #		RIM	INV.	INV.	INV.	INV.	INV.	INV.
s-1		844.63	10" E = 829.04	10" W = 829.14	8" S = 829.17			
s-2		846.06	10" E = 829.76	10" W = 829.76	6" S = 830.11	8" S = 833.96	8" N = 830.16	8" N = 835.73
s-3		846.97	10" E = 830.12	10" W = 830.12	6" SW = 830.92	8" SW = 840.79		
s-4	R	848.51	6" NE = 842.56	6" SW = 842.61	6" SE = 842.97	6" E = 843.04		
s-5	R	848.95	6" NE = 843.79	4" SE = 844.12	4" SE = 844.15			
s-6	R	846.89	6" CLAY N = 836.24	6" CLAY SW = 836.33				
s-7	R	847.44	6" SW = 839.72	6" NE = 839.28	6" E = 839.28	6" NW = 840.10	6" SE = 841.21	
s-8	R	846.27	6" NE = 840.97	6" SE = 841.03	6" W = 841.20	6" SW = 841.27		
s-9		844.97	8" N = 829.85	8" S = 829.85	6" E = 830.18			
s-10		838.81	8" CLAY N = 830.54	8" CLAY S = 830.64	8" CLAY E =830.71			
s-11		837.17	8" CLAY N = 831.43	8" CLAY E = 831.67	8" CLAY S = 831.77			
s-12		837.29	8" CLAY N = 833.16	8" CLAY E = 833.21				
s-13		848.40	10" E = 834.25	10" W = 834.25				
s-14		849.15	10" E = 834.96	10" SW = 834.96				
s-15		849.34	10" NE = 835.38	10" SW = 835.38				
s-16		849.21	10" NE = 835.84	10" SW = 835.85				
s-17		848.11	10" CLAY E = 836.16	8" CLAY S = 836.21	8" CLAY NW = 836.28			
s-18		848.07	8" CLAY N = 838.17	6" PVC S = 838.24				
s-19		848.90	6" PVC N = 840.97	6" PVC SW = 840.88				

R=REMOVE

EXISTING WATER STRUCTURE SCHEDULE

STRUCTURE #		RIM	T/PIPE
w-1		847.35	12" N-S T/PIPE = 841.25
w-2	R	847.68	12" E-W T/PIPE = 841.34
w-3	R	846.57	12" E-W T/PIPE = 841.35
w-4	CLOSE	849.54	12" E-W T/PIPE = 843.10
w-5		849.31	12" E-W T/PIPE = 843.56
w-6	R	846.05	12" N-S T/PIPE = 838.63
w-7	R	846.94	12" E-W T/PIPE = 840.07
w-8		848.95	12" E-W T/PIPE = 842.83
w-9		849.17	12" E-W T/PIPE = 842.75
w-10		838.73	12" N-S T/PIPE = 832.23
w-11		837.35	12" N-S T/PIPE = 829.95
w-12		836.70	8" E-W T/PIPE = 829.95
w-13		836.12	12" N-S T/PIPE = 830.97
w-14		836.35	16" E-W T/PIPE = 831.20
w-15		836.83	16" E-W T/PIPE = 830.93
w-16		846.11	16" E-W T/PIPE = 841.56
w-17		846.35	12" N-S T/PIPE = 841.23
w-18		846.08	16" E-W T/PIPE = 841.18
w-19		846.43	12" N-S T/PIPE = 839.71
hyd-1			
hyd-2	R		
hyd-3	R		
hyd-4	R		
hyd-5	R		
hyd-6	R		
hyd-7	R		
hyd-8			
hyd-9			
hyd-10			
hyd-11			
hyd-12			
hyd-13	MOVE		
hyd-14			
hyd-15			

R=REMOVE

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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
TREE INDEX AND UTILITY STRUCTURE SCHEDULES

5

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

DATE: 6-23-11
SHEET 5 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH:
FINAL\10046EX1

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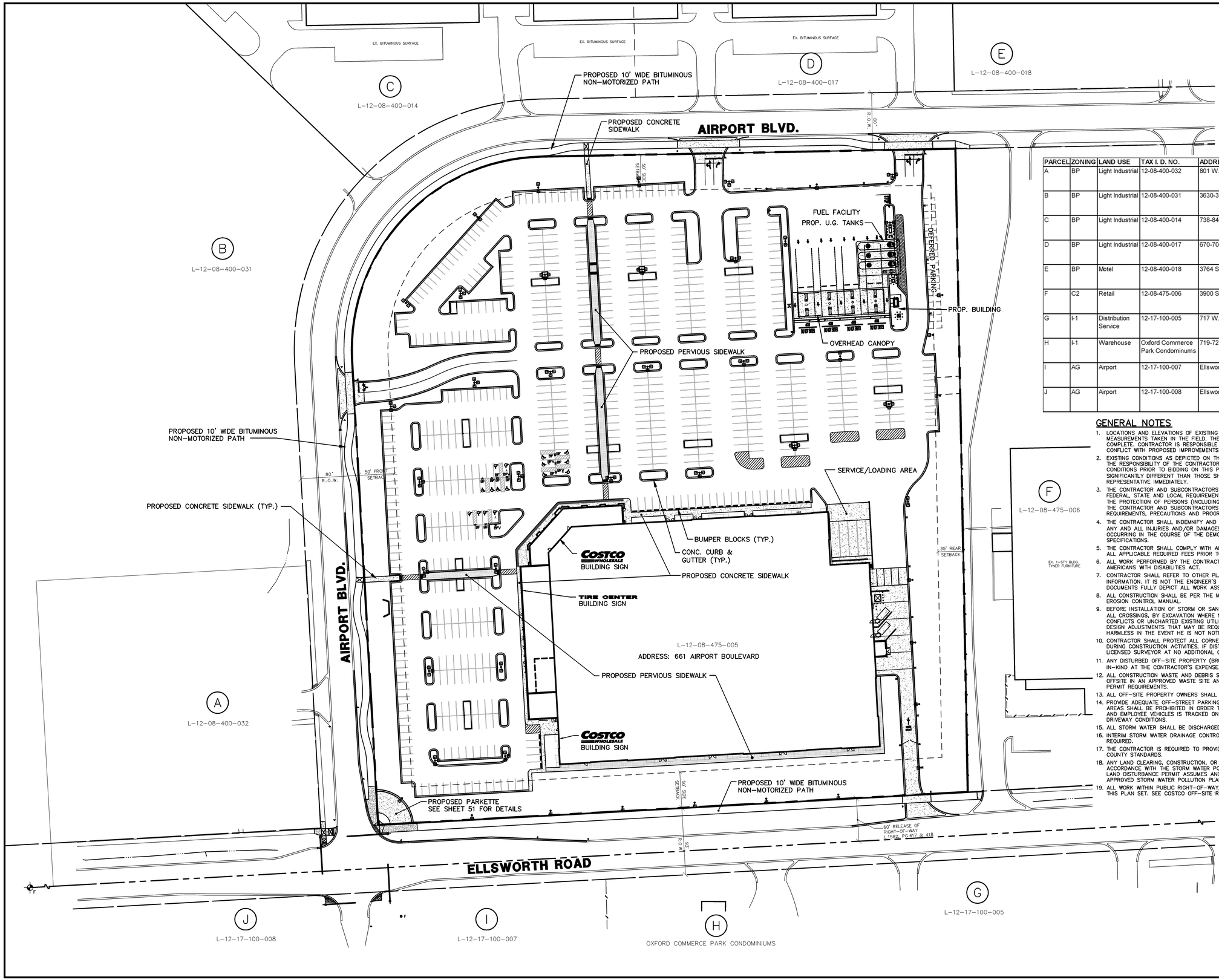

SCALE: 1" = 60'

0 60 120 180

PARCEL	ZONING	LAND USE	TAX I. D. NO.	ADDRESS	OWNER AND MAILING ADDRESS
A	BP	Light Industrial	12-08-400-032	801 W. Ellsworth Road	Bank of Ann Arbor 125 S. Fifth Ave., P.O. Box 8009 Ann Arbor, MI 48107
B	BP	Light Industrial	12-08-400-031	3630-3784 Plaza Drive	Airport Boulevard Associates 3784 Plaza Drive, Suite 1 Ann Arbor, MI 48108
C	BP	Light Industrial	12-08-400-014	738-840 Airport Plaza	Airport Boulevard Associates 3784 Plaza Drive, Suite 1 Ann Arbor, MI 48108
D	BP	Light Industrial	12-08-400-017	670-704 Airport Plaza	Airport Boulevard Associates 3784 Plaza Drive, Suite 1 Ann Arbor, MI 48108
E	BP	Motel	12-08-400-018	3764 S. State Street	Motel 6 Operating LP 4001 International Parkway Carrollton, TX 75007
F	C2	Retail	12-08-475-006	3900 S. State Street	Smith Furniture Co. of Ypsilanti 3900 S. State Street Ann Arbor, MI 48108
G	I-1	Distribution Service	12-17-100-005	717 W. Ellsworth Road	Shy Rentals, LLC 717 W. Ellsworth Road Ann Arbor, MI 48108
H	I-1	Warehouse	Oxford Commerce Park Condominiums	719-727 W. Ellsworth Road	Oxford Commerce Common 727 W. Ellsworth Road Ann Arbor, MI 48108
I	AG	Airport	12-17-100-007	Ellsworth Road	City of Ann Arbor 100 N. Fifth St. Ann Arbor, MI 48107
J	AG	Airport	12-17-100-008	Ellsworth Road	City of Ann Arbor 101 N. Fifth St. Ann Arbor, MI 48108

GENERAL NOTES

1. LOCATIONS AND ELEVATIONS OF EXISTING UTILITIES SHOWN ARE BASED ON UTILITY COMPANY RECORDS AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING ALL EXISTING UTILITIES WHICH MAY CONFLICT WITH PROPOSED IMPROVEMENTS.
2. EXISTING CONDITIONS AS DEPICTED ON THESE PLANS ARE GENERAL AND ILLUSTRATIVE IN NATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXAMINE THE SITE AND BE FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING ON THIS PROJECT. IF CONDITIONS ENCOUNTERED DURING EXAMINATION ARE SIGNIFICANTLY DIFFERENT THAN THOSE SHOWN, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY.
3. THE CONTRACTOR AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COMPLYING WITH APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTORS TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
4. THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND OWNER'S REPRESENTATIVE FOR ANY AND ALL INJURIES AND/OR DAMAGES TO PERSONNEL, EQUIPMENT AND/OR EXISTING FACILITIES OCCURRING IN THE COURSE OF THE DEMOLITION AND CONSTRUCTION DESCRIBED IN THE PLANS AND SPECIFICATIONS.
5. THE CONTRACTOR SHALL COMPLY WITH ALL LOCAL CODES, OBTAIN ALL APPLICABLE PERMITS, AND PAY ALL APPLICABLE REQUIRED FEES PRIOR TO BEGINNING WORK.
6. ALL WORK PERFORMED BY THE CONTRACTOR SHALL CONFORM TO THE LATEST REGULATIONS OF THE AMERICANS WITH DISABILITIES ACT.
7. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THIS SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THE PROJECT.
8. ALL CONSTRUCTION SHALL BE PER THE MOST CURRENT VERSION OF THE LOCAL COUNTY SEDIMENT & EROSION CONTROL MANUAL.
9. BEFORE INSTALLATION OF STORM OR SANITARY SEWER, OR OTHER UTILITY, THE CONTRACTOR SHALL VERIFY ALL CROSSINGS, BY EXCAVATION WHERE NECESSARY, AND INFORM THE OWNER'S REPRESENTATIVE OF ANY CONFLICTS OR UNCHARTED EXISTING UTILITIES ENCOUNTERED. SUBMIT NOTIFICATION SO AS TO ALLOW DESIGN ADJUSTMENTS THAT MAY BE REQUIRED TO AVOID CONFLICTS. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
10. CONTRACTOR SHALL PROTECT ALL CORNER PINS, MONUMENTS, PROPERTY CORNERS AND BENCHMARKS DURING CONSTRUCTION ACTIVITIES. IF DISTURBED, CONTRACTOR SHALL HAVE DISTURBED ITEMS RESET BY A LICENSED SURVEYOR AT NO ADDITIONAL COST TO THE OWNER.
11. ANY DISTURBED OFF-SITE PROPERTY (BRUSH, TREES, FENCES, MAILBOXES, ETC.) SHALL BE REPLACED IN-KIND AT THE CONTRACTOR'S EXPENSE.
12. ALL CONSTRUCTION WASTE AND DEBRIS SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE IN AN APPROVED WASTE SITE AND IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
13. ALL OFF-SITE PROPERTY OWNERS SHALL BE GIVEN NOTICE 48 HOURS IN ADVANCE OF ANY WORK.
14. PROVIDE ADEQUATE OFF-STREET PARKING FOR CONSTRUCTION EMPLOYEES. PARKING ON NON-SURFACED AREAS SHALL BE PROHIBITED IN ORDER TO ELIMINATE THE CONDITION WHEREBY MUD FROM CONSTRUCTION AND EMPLOYEE VEHICLES IS TRACKED ONTO THE PAVEMENT CAUSING HAZARDOUS ROADWAY AND DRIVEWAY CONDITIONS.
15. ALL STORM WATER SHALL BE DISCHARGED AT AN ADEQUATE NATURAL DISCHARGE POINT.
16. INTERIM STORM WATER DRAINAGE CONTROL IN THE FORM OF SILTATION CONTROL MEASURES ARE REQUIRED.
17. THE CONTRACTOR IS REQUIRED TO PROVIDE ADEQUATE STORM WATER SYSTEMS IN ACCORDANCE WITH COUNTY STANDARDS.
18. ANY LAND CLEARING, CONSTRUCTION, OR DEVELOPMENT INVOLVING THE MOVEMENT OF EARTH SHALL BE IN ACCORDANCE WITH THE STORM WATER POLLUTION PREVENTION PLAN, AND THE CONTRACTOR ISSUED A LAND DISTURBANCE PERMIT ASSUMES AND ACKNOWLEDGES RESPONSIBILITY FOR COMPLIANCE WITH THE APPROVED STORM WATER POLLUTION PLAN AT THE SITE OF THE PERMITTED ACTIVITY.
19. ALL WORK WITHIN PUBLIC RIGHT-OF-WAY, EXCEPT DRIVEWAYS WHICH LEAD INTO SITE, IS NOT INCLUDED IN THIS PLAN SET. SEE COSTCO OFF-SITE ROAD IMPROVEMENT PLANS.

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COSTCO
FINAL SITE PLAN
OVERALL SITE PLAN

6

DATE: 6-23-11
SHEET 6 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
PROJECT: FINAL\10046OP1
FB#

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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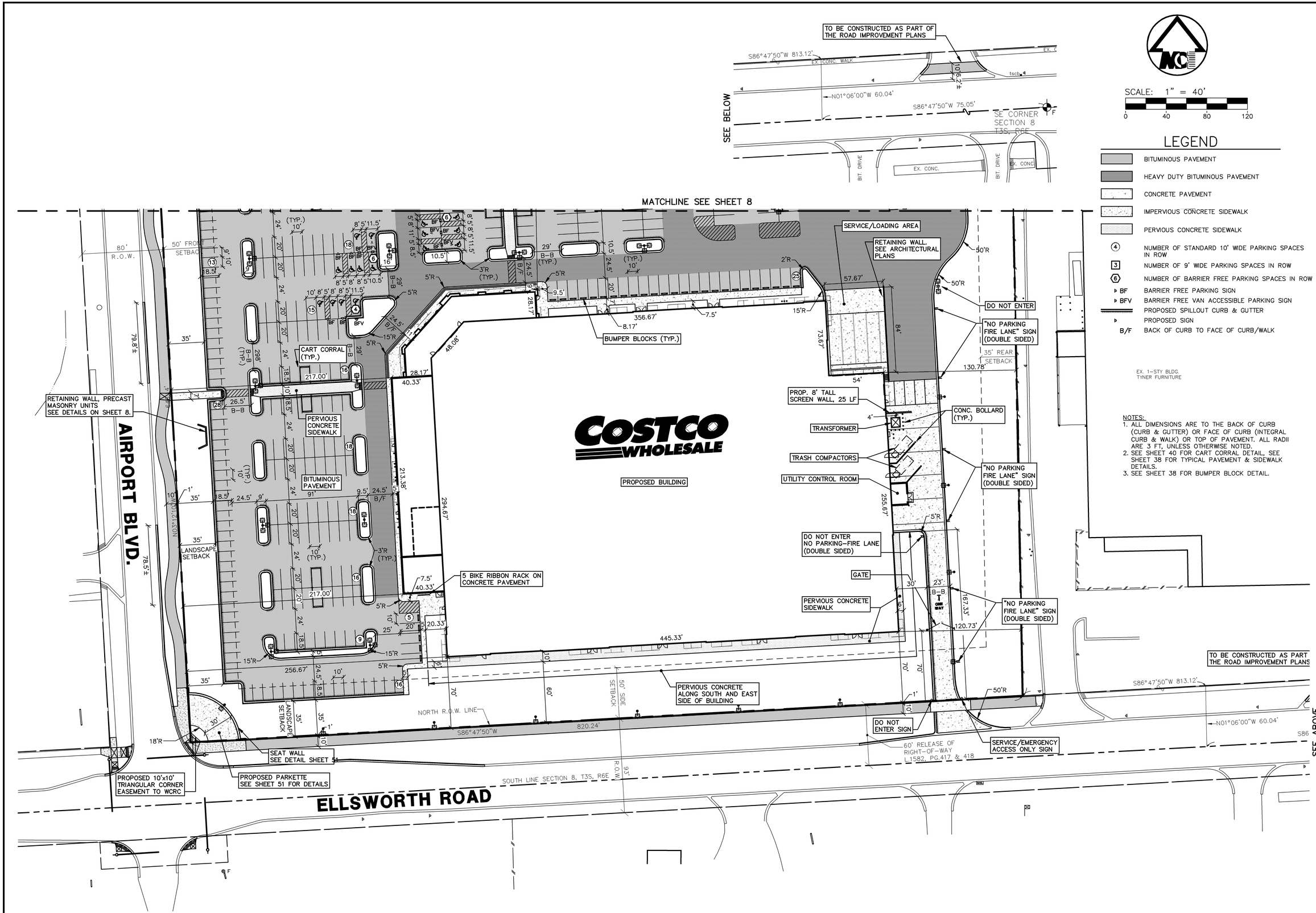

NOTES:
1. ALL DIMENSIONS ARE TO THE BACK OF CURB (CURB & GUTTER) OR FACE OF CURB (INTEGRAL CURB & WALK) OR TOP OF PAVEMENT. ALL RADII ARE 3 FT, UNLESS OTHERWISE NOTED.
2. SEE SHEET 40 FOR CART CORRAL DETAIL, SEE SHEET 38 FOR TYPICAL PAVEMENT & SIDEWALK DETAILS.
3. SEE SHEET 38 FOR BUMPER BLOCK DETAIL.

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COSTCO
FINAL SITE PLAN
DIMENSIONAL SITE PLAN –SOUTH

7

DATE: 6-23-11
SHEET 7 OF 64
CADD: WJJ
ENG: JAF
PM: DMB
PROJ. MGR: JAF
FINAL\10046SP1
FB#:

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-21-11
PER WCRC REVIEW	2-07-12

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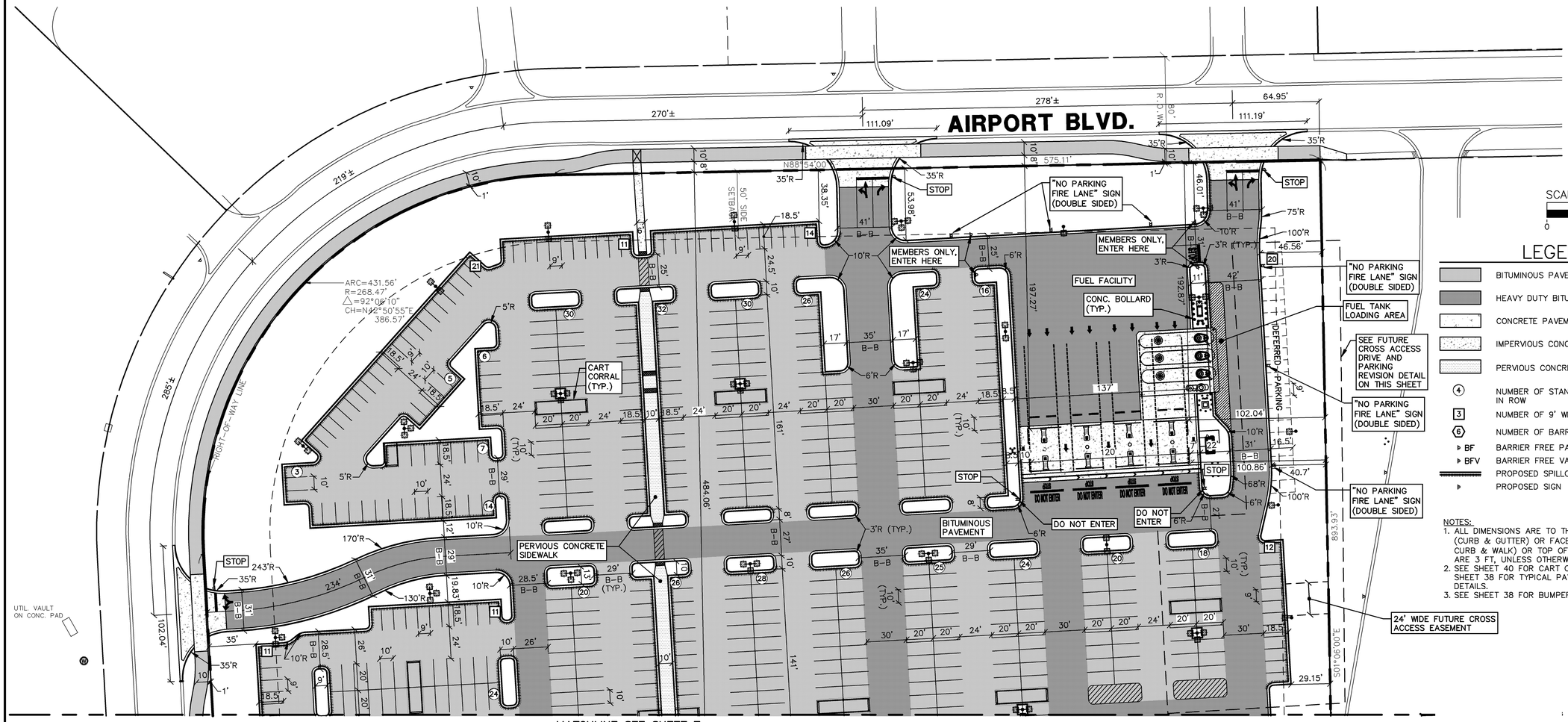


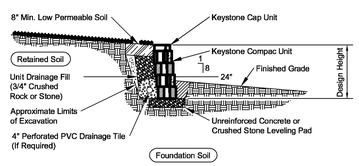
SCALE: 1" = 40'

0 40 80 120

LEGEND

- BITUMINOUS PAVEMENT
- HEAVY DUTY BITUMINOUS PAVEMENT
- CONCRETE PAVEMENT
- IMPERVIOUS CONCRETE SIDEWALK
- PERVIOUS CONCRETE SIDEWALK
- (4) NUMBER OF STANDARD 10' WIDE PARKING SPACES IN ROW
- (3) NUMBER OF 9' WIDE PARKING SPACES IN ROW
- (6) NUMBER OF BARRIER FREE PARKING SPACES IN ROW
- BF BARRIER FREE PARKING SIGN
- BFV BARRIER FREE VAN ACCESSIBLE PARKING SIGN
- PROPOSED SPILLOUT CURB & GUTTER
- PROPOSED SIGN

NOTES:
1. ALL DIMENSIONS ARE TO THE BACK OF CURB (CURB & GUTTER) OR FACE OF CURB (INTEGRAL CURB & WALK) OR TOP OF PAVEMENT. ALL RADII ARE 3 FT, UNLESS OTHERWISE NOTED.
2. SEE SHEET 40 FOR CART CORRAL DETAIL, SEE SHEET 38 FOR TYPICAL PAVEMENT & SIDEWALK DETAILS.
3. SEE SHEET 38 FOR BUMPER BLOCK DETAIL.



Typical Gravity Wall Section

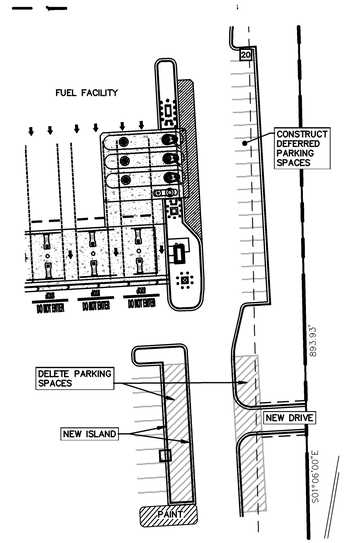
Compac Unit - 1" Setback

PRECAST BLOCK WALL DETAIL

NOT TO SCALE

SITE LAYOUT NOTES

1. ALL SITE WORK SHOWN HEREON SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT'S SPECIFICATIONS, THE CURRENT EDITION OF THE MICHIGAN DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIALS SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL BUILDING CODES AND ORDINANCES.
2. THE CONTRACTOR SHALL CHECK EXISTING GRADES, DIMENSIONS, AND INVERTS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
3. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES AND TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. RELOCATE EXISTING UTILITIES AS INDICATED, OR AS NECESSARY FOR CONSTRUCTION.
4. PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING PAVEMENT AND NEW PAVEMENT. FIELD ADJUSTMENT OF FINAL GRADES MAY BE NECESSARY. INSTALL ALL UTILITIES, INCLUDING IRRIGATION SLEEVES, PRIOR TO INSTALLATION OF PAVED SURFACES.
5. THE CONTRACTOR SHALL PROTECT ALL TREES TO REMAIN IN ACCORDANCE WITH REQUIREMENTS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.
6. ALL DAMAGE TO EXISTING PAVEMENT TO REMAIN WHICH RESULTS FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH LIKE MATERIALS AT THE CONTRACTOR'S EXPENSE.
7. SITE DIMENSIONS AND/OR COORDINATES SHOWN ARE TO THE BACK OF CURB, EDGE OF PAVEMENT, EXTERIOR BUILDING WALL, CENTER OF MANHOLE, CENTER AT FACE OF CURB FOR DRAIN INLETS AND CENTERLINE OF PIPE OR FITTING, UNLESS OTHERWISE NOTED. DISTANCES SHOWN ON PIPING ARE HORIZONTAL DISTANCES FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE, UNLESS OTHERWISE NOTED. ALL RADII ARE 3 FT, UNLESS OTHERWISE NOTED.
8. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND LOCATIONS OF UTILITY SERVICE ENTRANCES, BUILDING DRAINS, ROOF DRAINS, DOORS AND EXIT FEATURES.
9. CONTRACTOR SHALL MAINTAIN VEHICLE AND PEDESTRIAN ACCESS ON ADJACENT ROADWAYS AND DRIVES TO THE MAXIMUM EXTENT FEASIBLE THROUGHOUT THE DURATION OF THE PROJECT – COORDINATE WITH NEIGHBORING BUSINESSES AND WITH PUBLIC STREET AUTHORITIES HAVING JURISDICTION. PROVIDE TEMPORARY TRAFFIC CONTROL MEASURES TO MAINTAIN WORK SITE SAFETY AND TO PROTECT THE TRAVELING PUBLIC IN ACCORDANCE WITH APPLICABLE PROVISIONS OF THE CURRENT EDITION OF MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
10. ALL SIDEWALKS SHALL BE DESIGNED & CONSTRUCTED TO MEET CURRENT ADA STANDARDS.



FUTURE CROSS ACCESS DRIVE AND PARKING REVISION

SCALE: 1" = 50'

NET IMPACT – LOSE 10 PARKING SPACES

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FINAL SITE PLAN
DIMENSIONAL SITE PLAN – NORTH

8

DATE: 6-23-11
SHEET 8 OF 64

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-21-11
PER WCRC REVIEW	2-07-12

CADD: WJJ
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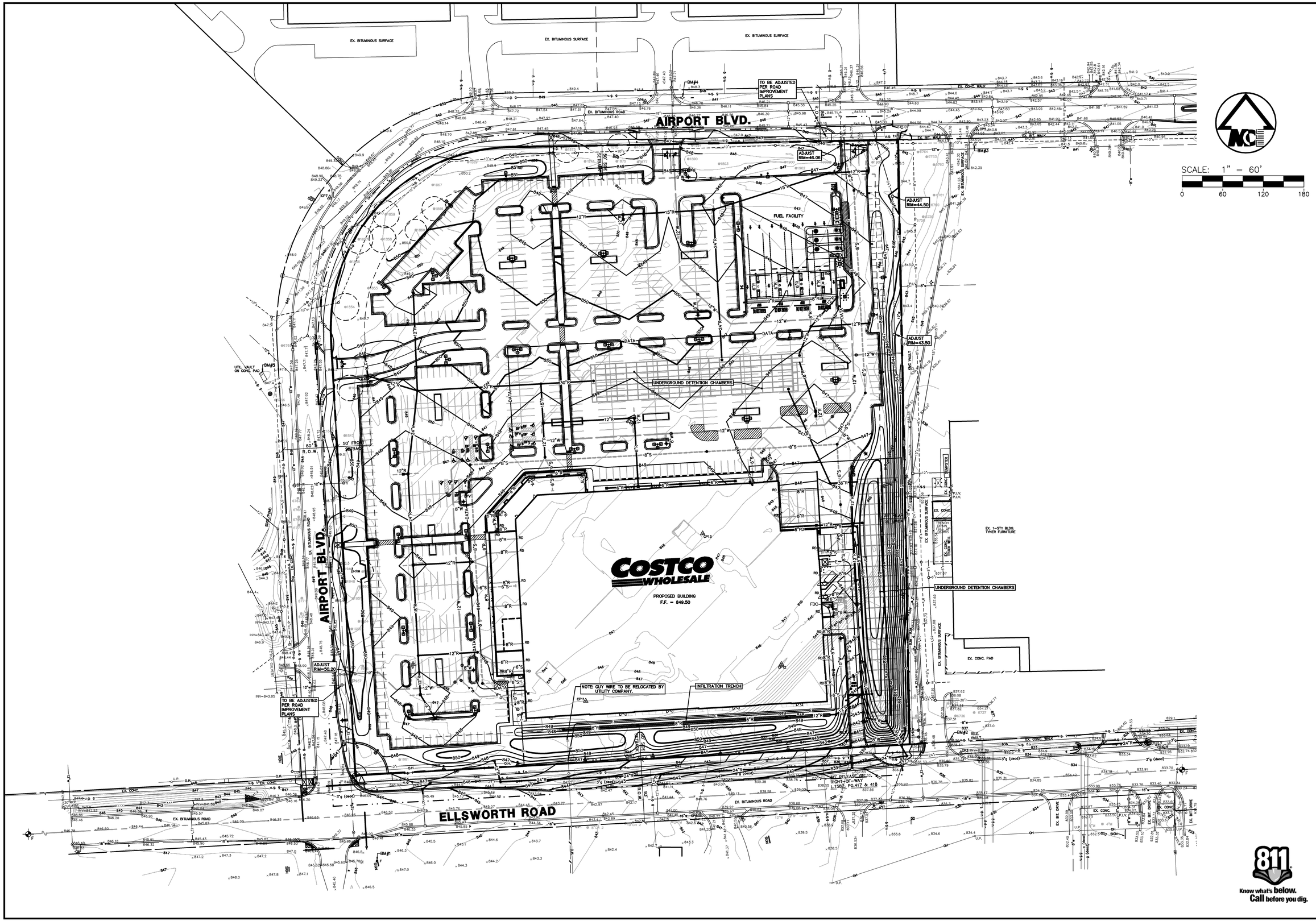

Know what's below. Call before you dig.

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COSTCO
FINAL SITE PLAN
OVERALL GRADING PLAN

9

DATE: 6-23-11
SHEET 9 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FILE: 10046GP1
FINAL\10046GP1

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-23-11
PER WCRC REVIEW	2-07-12

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LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
36.60	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
	CULVERT
S	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	℄ OF DITCH
	SIDEWALK RAMP
	DRAINAGE DIRECTION
T	ENCLOSED TRASH AREA
	SIGN
MAIL	MAILBOX
	TELEPHONE RISER
cotv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
g	GAS METER
•	POST
●	SINGLE TREE
	FENCE
T/W	TOP OF WALL

NOTES:

1. LOCATION OF EXIST. UNDERGROUND WATERMAIN, SANITARY SEWER, GAS MAIN, ELECTRIC AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.
   BEFORE YOU DIG
   CALL MISS DIG, 1-800-482-7171
2. ADD 800 TO ALL PROPOSED SPOT ELEVATIONS TO OBTAIN NAVD-88 DATUM.

SCALE: 1" = 40'

0 40 80 120

BENCH MARKS:

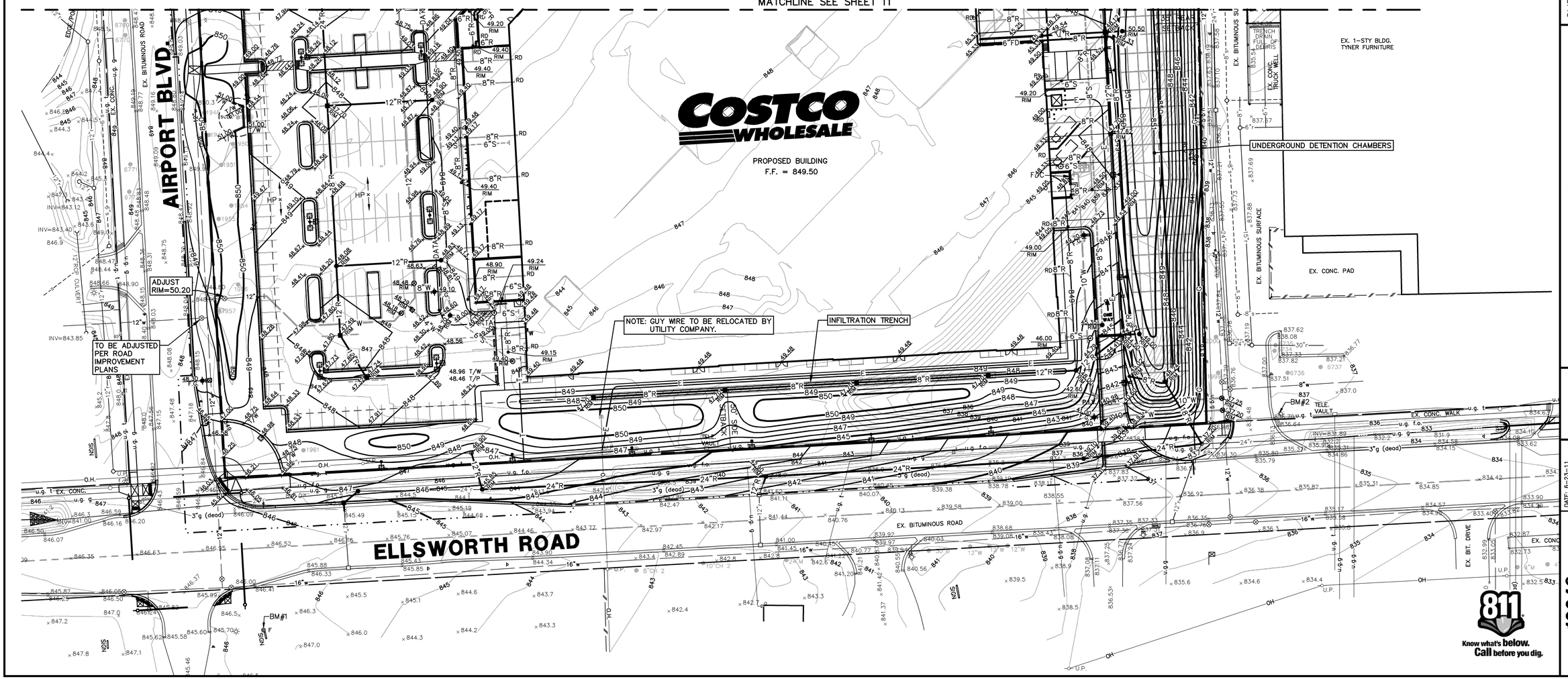
BM#1 – NGS BENCH MARK "NE1040" PIN IN MON. BOX AT E. SIDE OF NORTH ENTRANCE TO AIRPORT, S. SIDE OF ELLSWORTH. ELEVATION=846.09 NAVD 88.

BM#2 – TOP OF CONC. BASE TO LIGHT POLE @ NORTH SIDE ELLSWORTH & EAST SIDE OF WEST ENTRANCE TO TYNERS. ELEVATION=839.32 NAVD 88.

GRADING NOTES

1. ALL PROPOSED GRADES SHOWN ARE FINAL GRADES, TOP OF GROUND LEVEL, OR TOP OF PAVEMENT, OR GRATE ELEVATION AT THE DRAWDOWN POINT, UNLESS INDICATED OTHERWISE. FOR PROPOSED TOP OF CURB ELEVATION. SEE SITE PLAN FOR CURB TYPE AND DETAIL FOR DIMENSIONS.
2. WHERE NOT EXPLICITLY DEFINED BY A SPOT ELEVATION, PAVEMENT AND CURB ELEVATIONS SHALL PRODUCE THE PROPOSED SLOPES AS SHOWN AND PROVIDE POSITIVE DRAINAGE TO INLETS.
3. REFER TO AND FOLLOW THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT PREPARED FOR THIS PROJECT BY KLEINFELDER, DATED JULY 9, 2010.
4. ALL SITE WORK SHOWN HEREON SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT'S SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL BUILDING CODES AND ORDINANCES.
5. CONTRACTOR SHALL STRICTLY ADHERE TO THE EROSION CONTROL PLAN PREPARED FOR THIS PROJECT. ALL AREAS NOT PAVED SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PLAN, UNLESS NOTED OTHERWISE.
6. EARTHWORK SHALL INCLUDE, STRIPPING AND STOCKPILING AND/OR DISPOSING OF TOPSOIL AND/OR VEGETATED SURFACE SOILS, GRADING, EXCAVATION, FILLING, UNDERCUT AND REPLACEMENT, IF REQUIRED, AND COMPACTION.
7. CONTRACTOR TO REFILL UNDERCUT AREAS WITH SUITABLE MATERIAL AND COMPACTION AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
8. PLACE TOPSOIL OVER THE SUBGRADE OF UNPAVED, DISTURBED AREAS TO DEPTH(S) INDICATED ON THE LANDSCAPE DRAWINGS.
9. FINAL PAVEMENT SLOPES SHALL BE MINIMUM 1% AND MAXIMUM 2% UNLESS INDICATED OTHERWISE. FINAL PAVEMENT SLOPES ACROSS HANDICAP PARKING STALLS AND ADJOINING ACCESS AISLES SHALL BE MAXIMUM 2%.
10. ALL UNPAVED SURFACE SLOPES SHALL BE 3:1 (HORIZONTAL:VERTICAL) MAXIMUM UNLESS INDICATED OTHERWISE.
11. ALL EXCESS SOIL MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE INDICATED AND SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
12. SOFT OR OTHERWISE UNSUITABLE SOILS IN THE BOTTOMS AND BANKS OF ANY SEDIMENT BASINS OR TRAPS SHALL BE REMOVED, SPREAD OUT AND DRIED SUFFICIENTLY TO BE USED AS FILL, SUBJECT TO THE GEOTECHNICAL ENGINEER'S APPROVAL.
13. ALL WORK WITHIN PUBLIC RIGHT-OF-WAY, EXCEPT DRIVEWAYS WHICH LEAD INTO SITE, IS NOT INCLUDED IN THIS PLAN SET. SEE COSTCO OFF-SITE ROAD IMPROVEMENT PLANS.
14. ALL SIDEWALKS SHALL BE DESIGNED & CONSTRUCTED TO MEET CURRENT ADA STANDARDS.

MATCHLINE SEE SHEET 11



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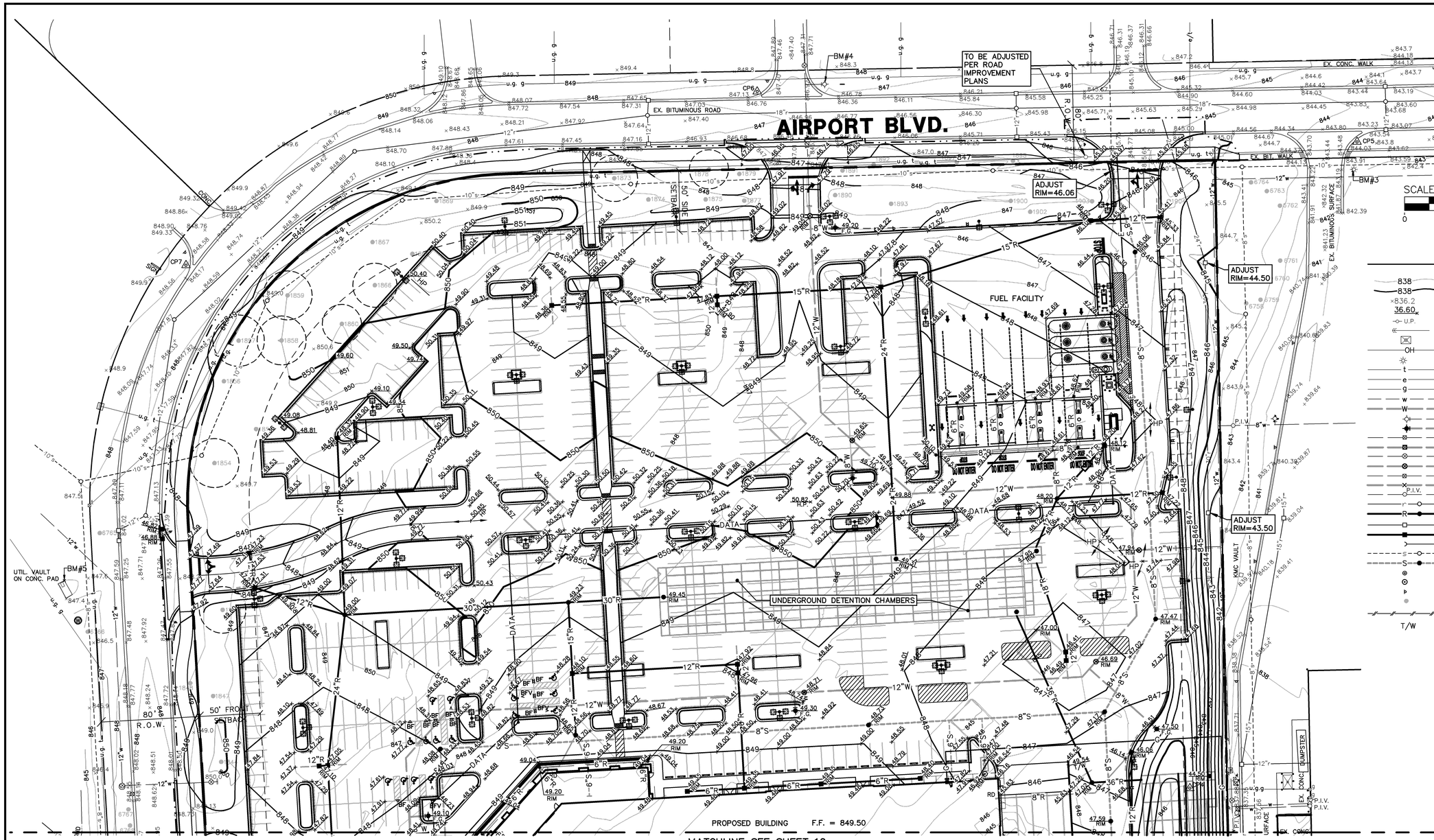
COSTCO
FINAL SITE PLAN
GRADING PLAN – SOUTH

10

DATE: 8-23-11
SHEET 10 OF 64
CADD: WALFDA
ENG: JAF
PM: DMB
PM: DMB
FINAL 10046GP1
FB#:

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	11-29-11
PER WCRC REVIEW	1-27-12



SCALE: 1" = 40'

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LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
36.60	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	SIGN
	SINGLE TREE
	FENCE
T/W	TOP OF WALL

NOTES:

1. LOCATION OF EXIST. UNDERGROUND WATERMAIN, SANITARY SEWER, GAS MAIN, ELECTRIC AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.
   BEFORE YOU DIG
   CALL MISS DIG, 1-800-482-7171
2. ADD 800 TO ALL PROPOSED SPOT ELEVATIONS TO OBTAIN NAVD-88 DATUM.

BENCH MARKS:

BM#3 – TOP OF CONC. BASE TO LIGHT POLE @ SOUTH SIDE OF AIRPORT BLVD. & EAST SIDE OF WESTERLY ENTRANCE TO TYNERS. ELEVATION=845.94 NAVD 88.

BM #4 – TOP OF MAIN STEAMER TO HYDRANT @ NORTH SIDE OF AIRPORT BLVD. & EAST SIDE OF 2ND ENTRANCE WEST OF EAST PROPERTY LINE. ELEVATION=848.89 NAVD 88.

BM#5 – CHISELED "X" NORTH MOST CORNER , TOP OF CONC. LIFT STATION @ NE CORNER OF POND ON WEST SIDE OF AIRPORT BLVD. ELEVATION=848.20 NAVD 88.

Know what's below. Call before you dig.

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COSTCO
FINAL SITE PLAN
GRADING PLAN – NORTH

11

DATE: 6-23-11
SHEET 11 OF 64
CADD: WAJ/FDA
ENG: JAF
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FILE: R:\10046ACAD\FINAL\10046GP1
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PER TWP. REVIEW	9-9-11

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EROSION & SEDIMENT CONTROL NOTES

1. LAND DISTURBING ACTIVITIES SHALL NOT COMMENCE UNTIL APPROVAL TO DO SO HAS BEEN RECEIVED BY GOVERNING AUTHORITIES.
2. THE CONTRACTOR SHALL STRICTLY ADHERE TO THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) DURING CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL MAINTAIN AN APPROVED SWPPP ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. NO LAND CLEARING OR GRADING SHALL BEGIN UNTIL ALL PERIMETER EROSION AND SEDIMENT CONTROL MEASURES HAVE BEEN INSTALLED. CONSTRUCTION SHALL BE SEQUENCED BY THE CONTRACTOR SO AS TO MINIMIZE EXPOSURE TIME OF CLEARED SURFACE AREAS.
4. ALL EXPOSED AREAS SHALL BE SEEDED AS SPECIFIED OR OTHERWISE STABILIZED WITHIN 5 CALENDAR DAYS OF FINAL GRADING. SHOULD SOIL DISTURBING ACTIVITIES CEASE IN AN AREA FOR 5 CALENDAR DAYS OR MORE, CONTRACTOR SHALL SEED THE AREA AS SPECIFIED OR IMPLEMENT OTHER BEST MANAGEMENT PRACTICES (BMP'S) TO ESTABLISH INTERIM STABILIZATION.
5. THIS PLAN SHALL NOT BE CONSIDERED ALL INCLUSIVE AS THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SOIL SEDIMENT FROM LEAVING THE SITE. THE LOCATION OF SOME OF THE EROSION CONTROL MEASURES MAY NEED TO BE ALTERED DUE TO CHANGING SITE CONDITIONS COMMENSURATE WITH PROGRESS OF THE WORK. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACCOMPLISH EROSION AND SEDIMENT CONTROL FOR ALL DRAINAGE PATTERNS CREATED AT VARIOUS STAGES OF CONSTRUCTION.
6. CONTRACTOR SHALL COMPLY WITH ALL STATE AND LOCAL ORDINANCES THAT APPLY. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED IF DEEMED NECESSARY BY ON SITE INSPECTION.
7. CONTRACTOR SHALL BE RESPONSIBLE TO TAKE WHATEVER MEANS NECESSARY TO ESTABLISH PERMANENT SOIL STABILIZATION. EROSION CONTROL DEVICES SHALL BE MAINTAINED UNTIL A PERMANENT GROUND COVER IS ESTABLISHED. SEEDED AREAS MUST HAVE A MINIMUM OF 70 PERCENT COVERAGE PRIOR TO REMOVAL OF THE TEMPORARY EROSION CONTROL DEVICES. FINAL SEEDING AND ESTABLISHMENT OF GROUNDCOVER SHALL BE APPLIED TO ANY AREA DISTURBED AS A RESULT OF THE REMOVAL OF THE EROSION CONTROL MEASURES.
8. APPLY TEMPORARY VEGETATIVE STABILIZATION UTILIZING SEEDING, FERTILIZER AND MULCH AS SPECIFIED, UNLESS INDICATED OTHERWISE. REFER TO LANDSCAPE DRAWINGS FOR PERMANENT SEEDING AND/OR SODDING VEGETATIVE STABILIZATION.
9. ALL PERMANENT SLOPES STEEPER THAN 4H:1V SHALL RECEIVE BLANKET MATTING, NORTH AMERICAN GREEN SC-150 OR APPROVED EQUAL, INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, UNLESS INDICATED OTHERWISE.
10. GROUND ADJACENT TO THE DEVELOPMENT SITE SHALL BE PROTECTED FROM ACCELERATED AND INCREASED SURFACE WATER RUNOFF, SILT FROM EROSION, AND ANY OTHER CONSEQUENCE OF EROSION. RUNOFF WATER FROM DEVELOPED AREAS (PARKING LOTS, PAVED SITES AND BUILDINGS) ABOVE THE AREA TO BE DEVELOPED SHALL BE DIRECTED TO DIVERSIONS, DETENTION BASINS, CONCRETE GUTTERS AND/OR UNDERGROUND OUTLET SYSTEMS.
11. SEE SHEET 29 FOR CONSTRUCTION SITE INSPECTION AND MAINTENANCE NOTES.
12. NO STEEL POST PERMITTED IN RIGHT OF WAY.

NOTES:

1. LOCATION OF EXIST. UNDERGROUND WATERMAIN, SANITARY SEWER, GAS MAIN, ELECTRIC AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.
   BEFORE YOU DIG
   CALL MISS DIG, 1-800-482-7171
2. ONLY HAND TOOLS SHALL BE ALLOWED FOR GRADING WITHIN TREE PROTECTION LIMITS.

SCALE: 1" = 40'

0 40 80 120

SOIL EROSION CONTROL MEASURES

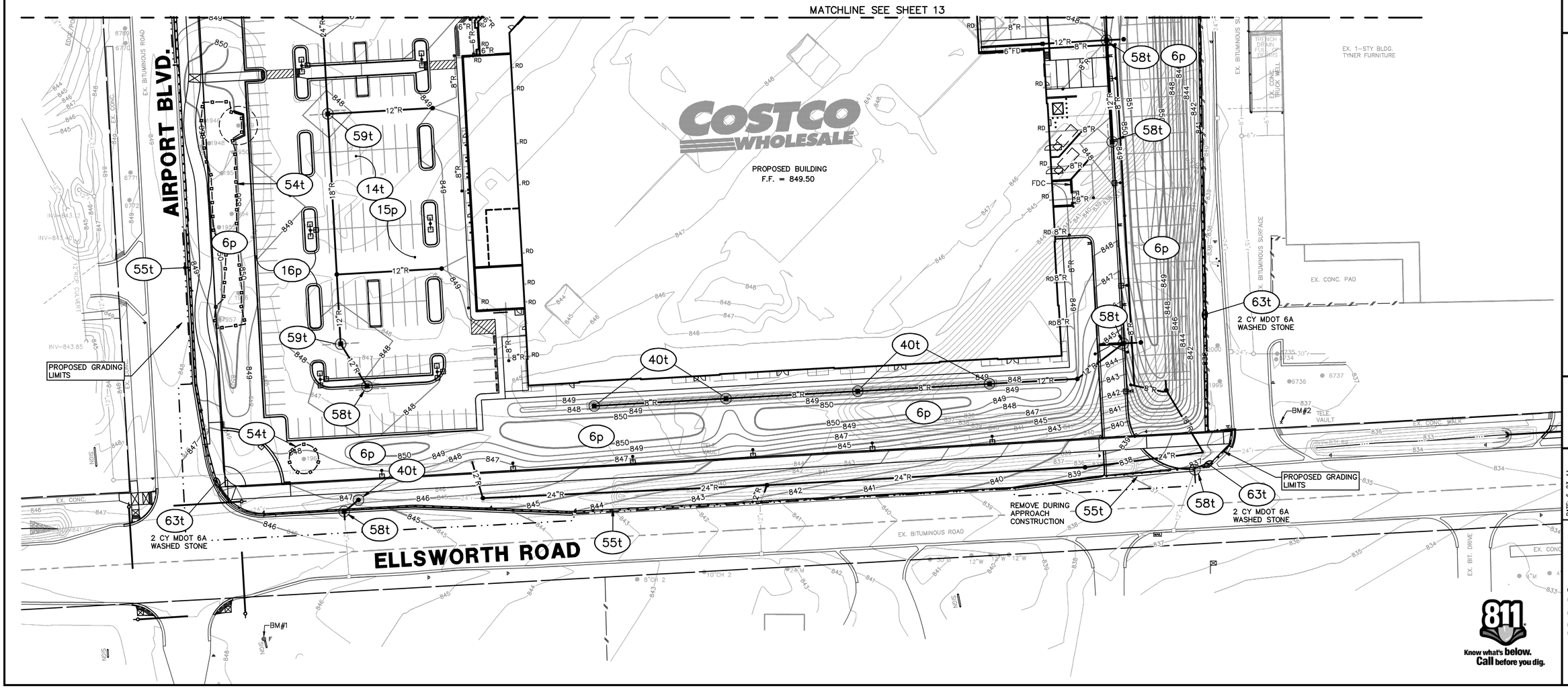
t = temporary p = permanent

6	SEEDING WITH MULCH AND/OR MATTING	40	INLET SEDIMENT TRAP	58	CURB INLET FILTER
14	AGGREGATE COVER	54	CONSTRUCTION FENCE OR SNOW FENCE	59	C.B./INLET FILTER
15	PAVING	55	GEOTEXTILE SILT FENCE	63	SILT FENCE WITH STONE FILTER
16	CURB & GUTTER				

LEGEND

- 838 EXIST. CONTOUR
- 838 PROP. CONTOUR
- EXIST. UTILITY POLE
- GUY WIRE
- ELEC. TRANSFORMER
- OH EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- R PROP. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- PROP. CATCH BASIN OR INLET
- END SECTION
- PROP. CLEANOUT
- ℄ OF DITCH
- SIGN
- MAILBOX
- POST
- SINGLE TREE
- FENCE
- 55t SOIL EROSION CONTROL MEASURE
- SILT FENCE
- TREE PROTECTION FENCE
- LIMITS OF DISTURBANCE

MATCHLINE SEE SHEET 13



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COSTCO
FINAL SITE PLAN
SOIL EROSION CONTROL PLAN – SOUTH

12

DATE: 6-23-11
SHEET 12 OF 64
CADD: FDA/WJ
ENG: JAF
PM: DMB
FILE: FINAL\10046SE1

JOB No. 10046

REVISIONS:	REV. DATE
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PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	2-21-12
PER WCRC REVIEW	2-07-12

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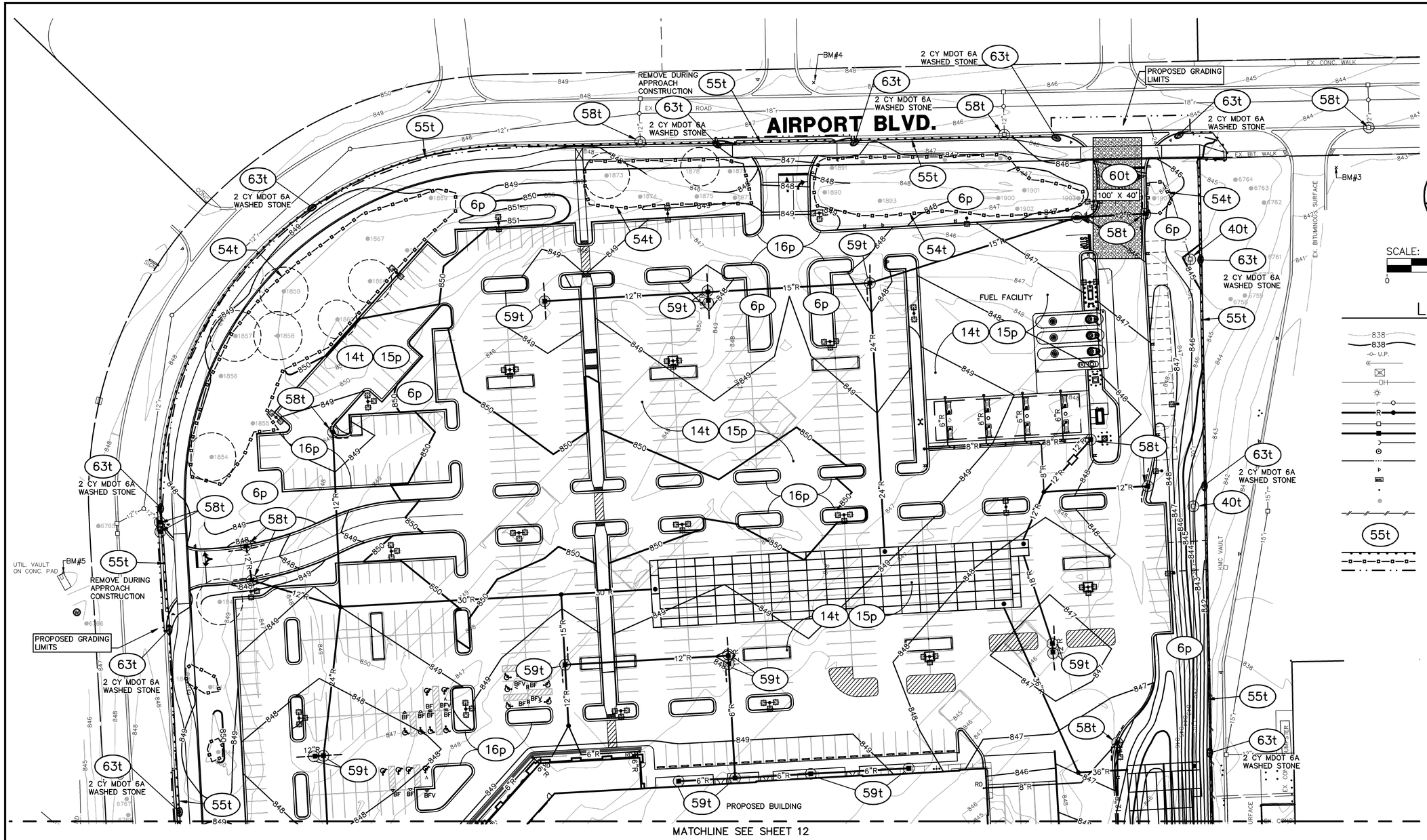

SCALE: 1" = 40'

0 40 80 120

LEGEND

- EXIST. CONTOUR
- PROP. CONTOUR
- EXIST. UTILITY POLE
- GUY WIRE
- ELEC. TRANSFORMER
- EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
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- POST
- SINGLE TREE
- FENCE
- 55t SOIL EROSION CONTROL MEASURE
- SILT FENCE
- TREE PROTECTION FENCE
- LIMITS OF DISTURBANCE

SEQUENCE OF CONSTRUCTION

UPON IMPLEMENTATION AND INSTALLATION OF THE FOLLOWING AREAS: TRAILER, PARKING, LAY DOWN, PORTA-POTTY, WHEEL WASH, CONCRETE WASHOUT, MASON'S AREA, FUEL AND MATERIAL STORAGE CONTAINERS, SOLID WASTE CONTAINERS, ETC., IMMEDIATELY DENOTE THEM ON THE SITE MAP AND NOTE ANY CHANGES IN LOCATION AS THEY OCCUR THROUGHOUT THE CONSTRUCTION PROCESS.

1. *INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT AND SWPPP ENTRANCE SIGN.*
2. *CONSTRUCT THE PERIMETER EROSION CONTROL MEASURES ON THE SITE.*
3. *TEMPORARILY AND PERMANENTLY SEED AS REQUIRED.*
4. CLEAR AND GRUB THE SITE, AND REMOVE TOPSOIL WITHIN THE AREAS OF PROPOSED GRADING ON-SITE.
5. *PREPARE TEMPORARY PARKING AND STORAGE AREA INCLUDING DESIGNATED LOCATIONS FOR DUMPSTERS, SANITARY WASTE UNITS, AND CONCRETE WASHOUT AREA AND MARK ON SITE MAP.*
6. START ROUGH GRADING AND CONSTRUCTION OF PARKING AREA AND BUILDING PAD.
7. *TEMPORARILY SEED AS REQUIRED.*
8. BEGIN FINAL GRADING OPERATIONS. *PERMANENTLY STABILIZE AREAS TO BE VEGETATED AS THEY ARE BROUGHT TO FINAL GRADE.*
9. INSTALL UTILITIES, UNDERDRAINS, STORM SEWERS, FINGER DRAINS AND CURBS.
10. *INSTALL INLET PROTECTION AROUND ALL STORM SEWER STRUCTURES AS THEY ARE INSTALLED AND RIP RAP AT OUTLETS STRUCTURES.*
11. PREPARE SITE FOR PAVING. REMOVE INLET PROTECTION NO MORE THAN 48 HOURS PRIOR TO PLACING STABILIZED BASE COURSE.
12. PAVE SITE.
13. *INSTALL APPROPRIATE INLET PROTECTION DEVICES AS PAVING IS COMPLETED.*
14. COMPLETE GRADING AND INSTALL PERMANENT SEEDING, SLOPE PROTECTION AND PLANTINGS. SEE LANDSCAPE PLAN FOR LOCATION OF PERMANENT SEEDING AND PLANTINGS. RESTORE PERIMETER AREAS TO MATCH EXISTING CONDITIONS. SEED AS REQUIRED TO STABILIZE DISTURBED AREAS
15. *REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES (ONLY IF SITE IS STABILIZED).*
16. *CONTINUE DAILY INSPECTION REPORTS UNTIL THE FINAL DAILY INSPECTION IS SIGNED OFF BY THE CONSTRUCTION MANAGER THAT THE SITE IS FULLY STABILIZED AND THE PERMIT MAY BE TERMINATED.*

NOTE: THE GENERAL CONTRACTOR MAY COMPLETE CONSTRUCTION-RELATED ACTIVITIES CONCURRENTLY ONLY IF ALL PRECEDING BMPS HAVE BEEN COMPLETELY INSTALLED. BMP-RELATED STEPS IN THE ABOVE SEQUENCE ARE *ITALICIZED* FOR CLARITY.

SOIL EROSION CONTROL MEASURES

t = temporary p = permanent

6	SEEDING WITH MULCH AND/OR MATTING	40	INLET SEDIMENT TRAP	59	C.B./INLET FILTER
14	AGGREGATE COVER	54	CONSTRUCTION FENCE OR SNOW FENCE	60	MUD TRACKING MAT
15	PAVING	55	GEOTEXTILE SILT FENCE	63	SILT FENCE WITH STONE FILTER
16	CURB & GUTTER	58	CURB INLET FILTER		

NOTES:

1. LOCATION OF EXIST. UNDERGROUND WATERMAIN, SANITARY SEWER, GAS MAIN, ELECTRIC AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.
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FINAL SITE PLAN
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PER TWP. REVIEW	9-9-11

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SANITARY SEWER FLOW MITIGATION CALCULATIONS

Project description:
The proposed project is a conversion of an existing developed site with multiple buildings to a Costco warehouse site.

Existing Flow:
The sanitary sewer flow produced by the existing buildings to be removed will be based on the City of Ann Arbor's sanitary sewer flow evaluation Table 'A'. The computed dry weather flow rate for the existing "General Industrial Use" buildings is

139,000 sf @ 0.04gpd/sf gross floor area =5,560 gpd

Design Flow:
Based on the City of Ann Arbor's sanitary sewer flow evaluation Table 'A', the proposed design dry weather flow rate will be:

142,000 sf retail/warehouse	@ 0.02 gpd/sf gross area	=	2,840 gpd
2,739 sf tire center	@ 0.03 gpd/sf gross area	=	82 gpd
48 seat restaurant	@ 30 gpd/seat	=	1,440 gpd

Design average flow = 2,840 + 82 + 1,440 = 4,362 gpd

Mitigation Flow:
Mitigation flow = Design average flow – Existing average flow
Mitigation flow = 4,362 gpd – 5,560 gpd = -1,198 gpd

Footing Drain Disconnect Summary:
Since the proposed flow is less than the existing flow, no mitigation will be required.

SANITARY SEWER QUANTITIES*

Item	Quantity	Unit
8-inch diam. SDR-26 PVC Pipe	1686	LF
6-inch diam. Sch. 40 PVC Pipe, includes 6" Riser pipe	423.8	LF
4-foot diam Manhole	8	Each
6-inch diam Clean-Out	5	Each
Sand-Water Separator Tank	1	Each
Grease-Water Separator Tank	2	Each

*All building leads are counted to 5 feet from building

WATER MAIN QUANTITIES*

Item	Quantity	Unit
12-inch diam. Class 54 Ductile Iron Pipe	1664	LF
10-inch diam. Class 54 Ductile Iron Pipe	297	LF
8-inch diam. Class 54 Ductile Iron Pipe	233	LF
4-inch diam. Class 54 Ductile Iron Pipe	104	Each
Hydrant Assembly (includes 6" pipe & valve)	8	Each
Relocated Hydrant Assembly w/ Extension	1	Each
12-inch Gate Valve in Well	7	Each
4-inch Gate Valve in Box	1	Each
10-inch Post Indicator Valve	1	Each
12"x8" Tapping Sleeve with 8" Gate Valve in Well	1	Each
12"x10" Tapping Sleeve with 10" Gate Valve in Well	1	Each
Connection to Existing WM w/ solid sleeve	3	Each

*All building leads are counted to 5 feet from building

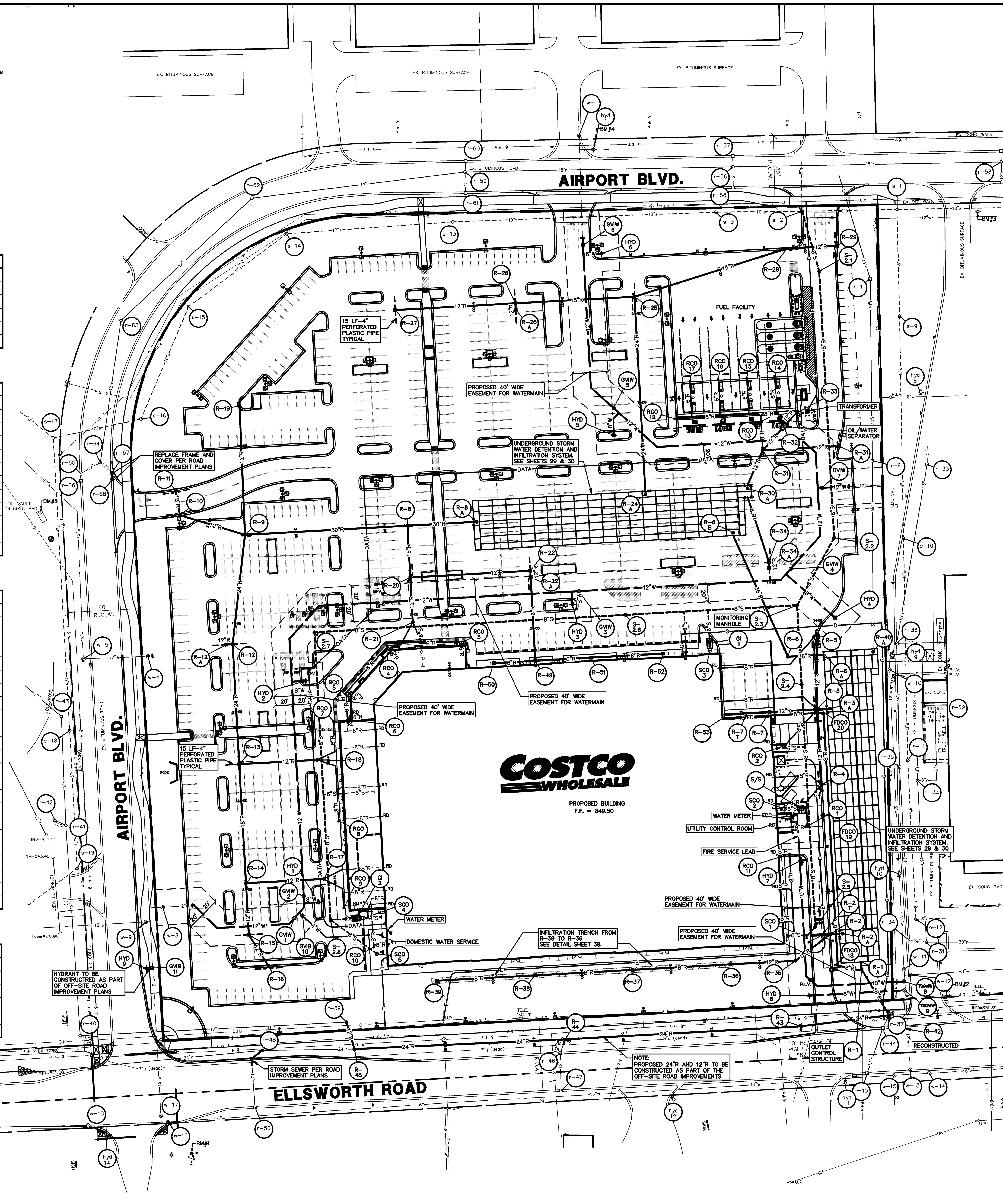
STORM SEWER QUANTITIES (ON-SITE)*

Item	Quantity	Unit
12-inch diam C-76 Cl-IV Reinf Conc Pipe	1553	LF
15-inch diam C-76 Cl-IV Reinf Conc Pipe	385	LF
18-inch diam C-76 Cl-IV Reinf Conc Pipe	278	LF
24-inch diam C-76 Cl-IV Reinf Conc Pipe	478	LF
30-inch diam C-76 Cl-IV Reinf Conc Pipe	258	LF
36-inch diam C-76 Cl-IV Reinf Conc Pipe	190	LF
6-inch diam Sch 40 PVC Pipe	386	LF
8-inch diam Sch 40 PVC Pipe	1034	LF
4-inch diam Perf PVC Pipe	555	LF
8-inch diam Perf PVC Pipe	330	LF
2-foot diam Inlet	11	Each
4-foot diam Manhole	6	Each
5-foot diam Manhole	2	Each
6-foot diam Manhole	2	Each
2-foot diam Catch Basin w/Sump	3	Each
4-foot diam Catch Basin w/Sump	15	Each
Plastic Yard Drain	7	Each
6-inch diam PVC Clean-out	8	Each
8-inch diam PVC Clean-out	12	Each
Trench Drain	75	LF
Oil-Water Separator Tank	1	Each
Detention System Outlet Manhole	1	Each
UG Detention Storage System	1	Each

*All building leads are counted to 5 feet from building

STORM SEWER QUANTITIES (ELLSWORTH R.O.W. Ditch Enclosure & Culvert)

Item	Quantity	Unit
12-inch diam C-76 Cl-IV Reinf Conc Pipe	60	LF
24-inch diam C-76 Cl-IV Reinf Conc Pipe	702	LF
24-inch RCP End Section	2	Each
4-foot diam Catch Basin w/Sump	1	Each
4-foot diam Manhole	3	Each
Reconstructed Manhole	2	Each



UTILITY NOTES

1. ALL PROPOSED UTILITY LINES AND EXTENSIONS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE UTILITY AGENCY / DISTRICT / MUNICIPALITY / COMPANY REQUIREMENTS. CONTRACTOR SHALL COORDINATE UTILITY DISCONNECTIONS, IF APPLICABLE, WITH THE APPROPRIATE AGENCY.
2. ALL SEWER CONSTRUCTION AND MATERIALS SHALL CONFORM TO AND BE IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND ALL APPLICABLE LOCAL AND STATE CODES AND REGULATIONS.
3. BEFORE INSTALLATION OF STORM OR SANITARY SEWER, OR OTHER UTILITY, THE CONTRACTOR SHALL VERIFY ALL CROSSINGS, BY EXCAVATION WHERE NECESSARY, AND INFORM THE OWNER'S REPRESENTATIVE OF ANY CONFLICTS OR UNCHARTED EXISTING UTILITIES ENCOUNTERED. SUBMIT NOTIFICATION SO AS TO ALLOW DESIGN ADJUSTMENTS THAT MAY BE REQUIRED TO AVOID CONFLICTS. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
4. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION AND REQUEST FIELD VERIFICATION OF UTILITY LOCATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RELOCATE EXISTING UTILITIES CONFLICTING WITH IMPROVEMENTS SHOWN HEREON IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS.
5. THE CONTRACTOR SHALL OBTAIN ALL APPLICABLE REQUIRED PERMITS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. MAINTAIN A MINIMUM OF 10 FEET HORIZONTAL AND A MINIMUM OF 18 INCHES VERTICAL SEPARATION BETWEEN SANITARY SEWER OR STORM SEWER AND WATER SUPPLY PIPING, UNLESS OTHERWISE INDICATED.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE SEQUENCING OF CONSTRUCTION FOR ALL UTILITY LINES SO THAT WATER LINES, GAS LINES, AND UNDERGROUND ELECTRIC DO NOT CONFLICT WITH SANITARY SEWERS OR STORM SEWERS. INSTALL UTILITIES PRIOR TO PAVEMENT CONSTRUCTION.
8. ALL UTILITY TRENCH EXCAVATION SPOILS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE INDICATED AND, IF REQUIRED, SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
9. ADJUST ALL EXISTING UTILITY SURFACE FEATURES INCLUDING BUT NOT LIMITED TO CASTINGS, VALVE BOXES, PEDESTALS, CLEANOUTS, ETC. TO MATCH PROPOSED FINISHED GRADES, UNLESS OTHERWISE INDICATED.
10. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND LOCATIONS OF UTILITY SERVICE ENTRANCES, BUILDING DRAINS, ROOF DRAINS, DOORS AND EXIT FEATURES.
11. TERMINATE UTILITY SERVICES AND DOWNSPOUT LEADER PIPING 5 FEET FROM BUILDING EXTERIOR WALL UNLESS INDICATED OTHERWISE. INSTALL DETECTABLE UTILITY WARNING TAPE ABOVE ALL UTILITY PIPING OR CONDUITS, 12 INCHES BELOW FINISHED GRADE, EXCEPT 6 INCHES BELOW SUBGRADE UNDER PAVEMENTS AND SLABS.
12. SANITARY SEWER SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS.
13. ALL SANITARY SEWER OUTSIDE THE RIGHT-OF-WAY AND NOT IN AN EASEMENT WILL REMAIN PRIVATE AND WILL BE MAINTAINED PRIVATELY.
14. WATER SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH PROJECT SPECIFICATIONS, UTILITY AGENCY REQUIREMENTS AND OF NFPA-24 "STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES."
15. ALL WATER MAIN AND FIRE SERVICE PIPING SHALL BE CLASS 54, DUCTILE IRON PIPE, PER TOWNSHIP SPECIFICATIONS.
16. IRRIGATION WATER PIPING SHALL BE COPPER TUBE ASTM B 88, TYPE K, SEAMLESS WATER TUBE WITH ASME B16.18 CAST COPPER ALLOY OR B16.22 WROUGHT COPPER SOLDER-JOINT PRESSURE TYPE FITTINGS.
17. CONTRACTOR TO INSTALL CONDUIT SYSTEMS FOR UNDERGROUND ELECTRIC AND TELEPHONE SERVICES IN ACCORDANCE WITH UTILITY COMPANIES' REQUIREMENTS, INCLUDING PULL CORDS INSIDE CONDUITS AND HIGHWAY LOAD-BEARING PULL BOXES AND MANHOLES.
18. CONTRACTOR SHALL INSTALL PAD(S) FOR TRANSFORMER(S) AND CONDUITS FOR UNDERGROUND ELECTRIC SERVICE IN ACCORDANCE WITH ELECTRIC COMPANY'S REQUIREMENTS. ELECTRIC COMPANY TO PLACE TRANSFORMER AND RUN UNDERGROUND ELECTRIC PRIMARY CONDUCTORS TO TRANSFORMER AT OWNER'S COST.
19. ELECTRIC SERVICE CONDUITS SHALL BE MINIMUM SCHEDULE 40 PVC, AND/OR IN ACCORDANCE WITH THE: REQUIREMENTS OF THE UTILITY COMPANY. INSTALL INSULATED WIRE WITH CONDUITS TO FACILITATE LOCATION AFTER CONSTRUCTION.
20. TELEPHONE SERVICE CONDUITS SHALL BE RIGID, NONMETALLIC CONDUITS. NEMA TC 2, SCHEDULE 40 PVC, AND/OR IN ACCORDANCE WITH THE: REQUIREMENTS OF THE UTILITY COMPANY. INSTALL INSULATED WIRE WITH CONDUITS TO FACILITATE LOCATION AFTER CONSTRUCTION.
21. CONTRACTOR SHALL INSTALL GAS SERVICE PIPING TO BUILDING; UTILITY COMPANY TO MAKE TAP TO MAIN AND SET METER. NATURAL GAS SERVICE PIPE SHALL BE POLYETHYLENE PLASTIC PIPE, ASTM D 2513, SDR 11, POLYETHYLENE FITTINGS, AND HEAT-FUSION JOINTS, IN ACCORDANCE WITH THE REQUIREMENTS OF THE UTILITY COMPANY. INSTALL INSULATED WIRE WITH GAS PIPING TO FACILITATE LOCATION AFTER CONSTRUCTION.
22. ALL BUILDING ROOF DRAIN COLLECTION PIPES SHALL HAVE A MINIMUM SLOPE OF 1.00%.
23. ALL SEWER LEADS FROM 5' OUTSIDE OF BUILDING WALLS INTO BUILDING ARE TO BE INSTALLED BY MECHANICAL CONTRACTOR.

Know what's **below.** **Call** before you dig. (811)

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FINAL SITE PLAN

OVERALL UTILITY PLAN

14

JOB No. **10046**

DATE: 6-23-11
SHEET 14 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH: WAJ
FINAL\10046UP1
FB#:

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11
PER WCRC REVIEW	2-07-12

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STORM SEWER STRUCTURE SCHEDULE

STRUCT NO.	TYPE	RIM ELEV.	INV.	INV.	INV.	INV.	INV.	DEPTH	SUMP	TYPE OF CASTING
R-1	6' Diam MH Outlet Control Structure	848.24	18" SE 834.98	18" N 834.98	8"W 839.50			13.26	NO	EJIW 1040 Type B
R-1A	Connection to UG Det		18" S 835.00	Bottom 835.00						None
R-2	4' Diam. Catch Basin	844.50	12" E 839.25	12" SW 841.25	Trench Drain W			5.25	2'	EJIW 7045 Type M1
R-2A	Access/Conn to UG Det	849.00	12" W 839.03	Bottom 835.00						EJIW 1040 Type B
R-3	4' Diam. Catch Basin	848.12	12" E 838.64	8" NW 838.64	12" W 840.34	12" N&S 841.14	8" SW 844.14	9.48	2'	EJIW 7045 Type M1
R-3A	Access/Conn to UG Det	850.50	12" W 838.50	Bottom 835.00						EJIW 1040 Type B
R-4	4' Diam Catch Basin	847.62	12" N 841.19	8" NW 843.62	8" SW 843.62			6.43	NO	EJIW 7045 Type M1
R-5	2' Diam Inlet	846.06	12" S 841.16	8" SW 842.48				4.90	NO	EJIW 7045 Type M1
R-6	6' Diam Manhole	847.02	36" E 835.00	36" NW 835.00				12.02	NO	EJIW 1040 Type B
R-6A	Connection to UG Det		36" W 835.00	Bottom 835.00						None
R-6B	Access/Conn to UG Det	847.00	36" SE 835.00	Bottom 835.00						EJIW 1040 Type B
R-7	4' Diam. Catch Basin	845.33	12" E 840.87	8" W 843.83	Trench Drain W			4.46	2'	EJIW 7045 Type M1
R-8	5' Diam. Manhole	849.23	30" E 837.66	30" W 837.66	15" S 839.66			11.57	NO	EJIW 1040 Type B
R-8A	Access/Conn to UG Det	849.45	30" W 837.45	Bottom 835.00						EJIW 1040 Type B
R-9	5' Diam Manhole	849.00	30" E 838.18	24" S 838.58	12" W 840.18	12" N 841.18		10.82	NO	EJIW 1040 Type B
R-10	4' Diam Catch Basin	847.23	12" SE 841.70	12" N 841.90				5.53	2'	EJIW 7045 Type M1
R-11	2' Diam Inlet	847.23	12" S 842.48					4.75	NO	EJIW 7045 Type M1
R-12	4' Diam Catch Basin	847.05	24" N 839.32	24" S 839.32	12" W 842.32			7.73	2'	Neenah Grate
R-12A	2' Diam Inlet	847.10	12" E 842.46					4.64	NO	Neenah Grate
R-13	4' Diam Catch Basin	847.70	24" N 840.13	18" S 840.53	12" E 841.19			7.57	2'	Neenah Grate
R-14	4' Diam Manhole	848.08	18" N 841.33	12" S 841.73	12" E 841.79			6.75	NO	Neenah Grate
R-15	4' Diam Catch Basin	847.49	12" N 842.31	12" SE 842.31				5.18	2'	Neenah Grate
R-16	2' Diam Inlet	847.24	12" NW 842.73					4.51	NO	EJIW 7045 Type M1
R-17	4' Diam Manhole	848.83	12" W 843.55	8" NE 844.05	8" SE 844.05			5.28	NO	EJIW 1040 Type B
R-18	4' Diam Manhole	848.90	12" W 842.95	8" NE 843.45	8" SE 843.45			5.95	NO	EJIW 1040 Type B
R-19	4' Diam Catch Basin	848.32	12" S 843.21					5.11	2'	EJIW 7045 Type M1
R-20	4' Diam Catch Basin	848.10	15" N 840.87	12" E 841.07	12" S 842.87			7.23	2'	Neenah Grate
R-21	4' Diam Manhole	848.65	12" N 843.25	6" SW 843.75	6" SE 843.75			5.40	NO	EJIW 1040 Type B
R-22	4' Diam Catch Basin	847.92	12" W 842.42	12" N 843.42				5.50	2'	Neenah Grate
R-22A	2' Diam Inlet	847.96	12" N 843.56	6"S 844.10				4.40	NO	Neenah Grate

NOTE: EQUIVALENT NEENAH FRAME AND CASTING MAY BE USED WHERE EJIW BRAND IS LISTED.

STRUCT NO.	TYPE	RIM ELEV.	INV.	INV.	INV.	INV.	INV.	DEPTH	SUMP	TYPE OF CASTING
R-24A	Access/Conn to UG Det	849.31	24" N 837.45	Bottom 835.00						EJIW 1040 Type B
R-25	4' Diam Catch Basin	847.79	24" S 838.55	15" W 839.15	15" NE 839.15			9.24	2'	Neenah Grate
R-26	4' Diam Catch Basin	847.83	15" E 840.49	12" W 841.49	12" S 843.49			7.34	2'	Neenah Grate
R-26A	2' Diam Inlet	847.90	12" N 843.63					4.27	NO	Neenah Grate
R-27	2' Diam Inlet	848.36	12" E 843.38					4.98	2'	Neenah Grate
R-28	4' Diam Catch Basin	846.02	15" SW 841.13	12" E 841.23				4.89	2'	EJIW 7045 Type M1
R-29	2' Diam Inlet	845.33	12" W 841.86					3.47	NO	EJIW 7045 Type M1
R-30A	Access/Conn to UG Det	847.95	18" S 839.66	12" NE 839.66	Bottom 835.00					EJIW 1040 Type B
R-31	4' Diam Manhole	848.20	12" SW 840.52	12"E 841.95	12"NE 842.78	8"N 842.78		7.68	NO	EJIW 1040 Type M1
R-31A	2' Diam Inlet	847.22	12"W 842.81					4.41	NO	EJIW 1040 Type M1
R-32	Oil-Water Separator	848.16	12" SW 843.26	12" NE 843.84				4.90		EJIW 1040 Type B
R-33	2' Diam Inlet	848.12	12" SW 844.31					3.81	NO	EJIW 5150
R-34	4' Diam Catch Basin	846.41	18" N 840.42	12' S 841.69				5.99	2'	Neenah Grate
R-34A	2' Diam Inlet	846.49	12" N 841.83					4.66	NO	Neenah Grate
R-35	4' Diam Manhole	848.00	12" NE 842.23	12" W 842.23	8" N 843.23			5.77	NO	EJIW 1040 TYPE B
R-36	4' Diam Catch Basin	847.70	12" E 842.52	8" W 845.22				2.48	NO	EJIW 1040 Type M1
R-37	Yard Drain Inlet	847.70	8" E 845.55	8" W 845.55				2.20	1'	Nyloplast 10" Dome Grate
R-38	Yard Drain Inlet	847.70	8" E 845.88	8" W 845.88				1.82	1'	Nyloplast 10" Dome Grate
R-39	Yard Drain Inlet	847.70	8" E 846.21					1.49	1'	Nyloplast 10" Dome Grate
R-40A	Access/Conn to UG Det	844.50	Ex 30" N 836.80	Bottom 835.00						EJIW 1040 Type B
R-42 * (r-37)	Rebuilt Existing MH	837.20	Ex 24" E 832.44	24" W 832.48	18" NW 834.80	Ex 12" SW 832.53		4.76	NO	Ex solid Cover
R-43	4' Diam Manhole	839.10	24" E 833.47	24" W 833.47				5.83	NO	EJIW 1040 Type B
R-44	4' Diam Manhole	842.90	24" E 836.24	24" W 836.24	12" SW 836.86			6.66	NO	EJIW 1040 Type B
R-45	4' Diam Manhole	845.85	24" E 838.70	Ex. 24" W 838.72	12" NW 838.90			7.15	NO	EJIW 1040 Type B
R-47	24" End Section		24" W 830.69							
R-48	24" End Section		24" E 830.85							
R-49	Yard Drain Inlet	849.35	6"N 845.04	6"W 845.12	6"E 845.12				1'	Nyloplast 10" Dome Grate
R-50	Yard Drain Inlet	849.35	6"E 845.35						1'	Nyloplast 10" Dome Grate
R-51	Yard Drain Inlet	849.35	6"W 845.43	6"E 845.43					1'	Nyloplast 10" Dome Grate
R-52	Yard Drain Inlet	848.40	6"W 845.84						1'	Nyloplast 10" Dome Grate
r-39	Existing MH	846.90	12" SE 839.06	Ex. 12" W 839.06				7.84	NO	EJIW 1040 Type B

* IN ELLSWORTH ROAD

STORM CLEANOUT STRUCTURE SCHEDULE

STRUCT NO.	TYPE	RIM ELEV.	INV.	DEPTH	TYPE OF CASTING
RCO-1	8" Cleanout	848.50	8" 844.12	4.38	PVC Cap
RCO-2	8" Cleanout	849.20	8" 844.66	4.54	PVC Cap
RCO-3	6" Cleanout	849.20	6" 844.49	4.91	PVC Cap
RCO-4	6" Cleanout	849.20	6" 844.18	5.02	PVC Cap
RCO-5	6" Cleanout	849.20	6" 844.89	4.31	PVC Cap
RCO-6	6" Cleanout	849.40	6" 845.17	4.23	PVC Cap
RCO-7	8" Cleanout	849.40	8" 844.12	5.28	PVC Cap
RCO-8	8" Cleanout	849.40	8" 844.29	5.11	PVC Cap
RCO-9	8" Cleanout	848.90	8" 844.55	4.35	PVC Cap
RCO-10	8" Cleanout	849.15	8" 845.25	3.90	PVC Cap
RCO-11	8" Cleanout	849.00	8" 844.42	4.58	PVC Cap
RCO-12	8" Cleanout	850.10	8" 844.13	5.97	PVC Cap
RCO-13	8" Cleanout	848.32	8" 843.51	4.81	PVC Cap
RCO-14	6" Cleanout	848.62	6" 844.35	4.27	PVC Cap
RCO-15	6" Cleanout	848.93	6" 844.22	4.71	PVC Cap
RCO-16	6" Cleanout	849.25	6" 844.54	4.71	PVC Cap
RCO-17	6" Cleanout	849.58	6" 844.86	4.72	PVC Cap
FDCO-18	8" Cleanout (Footing Drain)	844.00	8"SE 837.77	7.25	PVC Cap
FDCO-19	8" Cleanout (Footing Drain)	849.00	8"N/S 839.19	9.81	PVC Cap
FDCO-20	8" Cleanout (Footing Drain)	849.33	8"S 840.62	8.71	PVC Cap

EX. STORM SEWER STRUCTURE MODIFICATIONS SCHEDULE

Existing structures to be adjusted or castings changed

STRUCT NO.	TYPE	RIM ELEV.	INV.	INV.	INV.	INV.	DEPTH	SUMP	TYPE OF CASTING
r-1	Existing Catch Basin	844.50 Ex. 844.81	Ex. 30" S 839.36	Ex. 24" N 839.44					Adjust Ex. Frame & Cover
r-6	Existing Catch Basin	843.50 Ex. 843.02	Ex. 30"S 837.93	Ex. 30" N 837.94					Adjust Ex. Frame & Cover
r-67 *	Existing Catch Basin	846.82 Ex. 846.82	Ex. 12" NW 842.77	Ex. 12" S 842.91					EJIW 7065 Type M1
r-68 *	Existing Catch Basin	846.88 Ex. 846.88	Ex. 12" N 843.17						EJIW 7065 Type M1

* IN AIRPORT BOULEVARD

SANITARY SEWER STRUCTURE SCHEDULE

STRUCT NO.	TYPE	RIM ELEV.	INV.	INV.	INV.	INV.	INV.	DEPTH (FEET)	TYPE OF CASTING	NOTES
s-2	Existing Manhole	846.06	Ex. 10" E 829.76	Ex. 10" W 829.76	Ex 8" N 830.16	Ex 8"N 835.75	8" SE 830.21	16.30	EJIW 1040 Type A	Ex. 8" S and drop conn to be removed
S-2.1	4' Diam Manhole	846.06	8" NW 830.56	8" S 830.66				15.50	EJIW 1040 Type A	
S-2.2	4' Diam Manhole	847.47	8" N 832.16	8" SW 832.36				15.31	EJIW 1040 Type A	
S-2.3	4' Diam Manhole	847.17	8" NE 832.79	8" S 832.99	8" W 832.99			14.38	EJIW 1040 Type A	Monitoring Manhole
S-2.4	4' Diam Manhole	847.59	8" N 833.44	8" S 834.18				14.15	EJIW 1040 Type A	
S-2.5	4' Diam Manhole	845.35	8" N 839.64	6" SW 840.14				5.71	EJIW 1040 Type A	
S-2.6	4' Diam Manhole	848.73	8" E 833.96	8" W 834.64				14.77	EJIW 1040 Type A	
S-2.7	4' Diam Manhole	848.08	8" E 836.74	8" S 836.94				11.34	EJIW 1040 Type A	
S-2.8	4' Diam Manhole	848.70	8" N 840.19	6" SE 840.44	6" E 840.44			8.51	EJIW 1040 Type A	
SCO-1	6" Diam Cleanout	846.00	6" NE 840.38	6" W 841.56				5.62	PVC Plug	Cleanout
SCO-2	6" Diam Cleanout	849.40	6" E 843.90					5.50	PVC Plug	Cleanout
SCO-3	6" Diam Cleanout	846.92	6" N 842.00					4.92	PVC Plug	Cleanout
SCO-4	6" Diam Cleanout	849.24	6"W 842.04					7.20	PVC Plug	Cleanout
SCO-5	6" Diam Cleanout	849.40	6" NW 841.64	6" E 843.54				7.76	PVC Plug	Cleanout
GI-1	Box (See Detail)	847.08S 847.00N	841.30 6" OUT	841.80 6" IN				(See Detail)	(2) EJIW 1040 Type A	Grease Interceptor
GI-2	Box (See Detail)	849.15E 849.15W	841.44 6" OUT	841.94 6" IN				(See Detail)	(2) EJIW 1040 Type A	Grease Interceptor
SS	Box (See Detail)	848.15W 848.10E	842.85 6" OUT	843.18 6" IN				(See Detail)	(2) EJIW 1040 Type A	Sand Separator

WATERMAIN STRUCTURE SCHEDULE

STRUCT NO.	TYPE	RIM ELEV.	T/PIPE	T/PIPE	DEPTH (FEET)	TYPE OF CASTING
GVW 1 12"	5' Diam Well	848.18	842.20		5.98	EJIW 1040 Type AGS
GVW 2 12"	5' Diam Well	848.48	842.10		6.38	EJIW 1040 Type AGS
GVW 3 12"	5' Diam Well	848.71	843.00		5.71	EJIW 1040 Type AGS
GVW 4 12"	5' Diam Well	846.69	841.19		5.50	EJIW 1040 Type AGS
GVW 5 12"	5' Diam Well	849.65	844.15		5.50	EJIW 1040 Type AGS
GVW 6 12"	5' Diam Well	849.05	841.75		7.30	EJIW 1040 Type AGS
GVW 7 12"	5' Diam Well	847.94	840.80		7.14	EJIW 1040 Type AGS
TSGVW 8	5' Diam Well	837.25	831.60		5.65 Existing	EJIW 1040 Type AGS
TSGVW 9	5' Diam Well	837.20	831.60		5.60 Existing	EJIW 1040 Type AGS
GVIB 10 4"	Curb Box	848.29	842.09		6.20	
GVIB 11 6"	Gate Valve in Box	848.50	843.00		5.50	
PIV	Post Indicator Valve	842.60	835.70		6.90	
w-8 12"	Existing Gate Well	850.20 Ex 848.95	842.83		7.37	Adjust Ex Frame & Cover

HYDRANT STRUCTURE SCHEDULE

STRUCT NO.	FINISHED GRADE	T/PIPE	Hyd Model	NOTES
HYD 1	849.10	843.10	EJIW 5BR250	w/ 6" Barrel Extension
HYD 2	849.10	843.10	EJIW 5BR250	w/ 6" Barrel Extension
HYD 3	849.30	843.30	EJIW 5BR250	w/ 6" Barrel Extension
HYD 4	847.50	841.50	EJIW 5BR250	w/ 6" Barrel Extension
HYD 5	850.70	844.70	EJIW 5BR250	w/ 6" Barrel Extension
HYD 6	849.20	842.20	EJIW 5BR250	w/ 18" Barrel Extension
HYD 7	849.20	843.20	EJIW 5BR250	w/ 6" Barrel Extension
HYD 8	841.00	835.90	EJIW 5BR250	
HYD 9	848.30	842.80	EJIW 5BR250	

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COSTCO
FINAL SITE PLAN
PROPOSED UTILITY STRUCTURE SCHEDULES

14A

JOB No. 10046
DATE: 8-22-11
SHEET 15 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH: WAJ
FINAL\10046UP1
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REVISIONS:	REV. DATE
PER TWP. REVIEW	9-9-11
PER WCRC REVIEW	2-07-12

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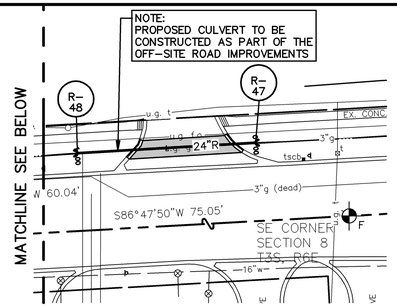
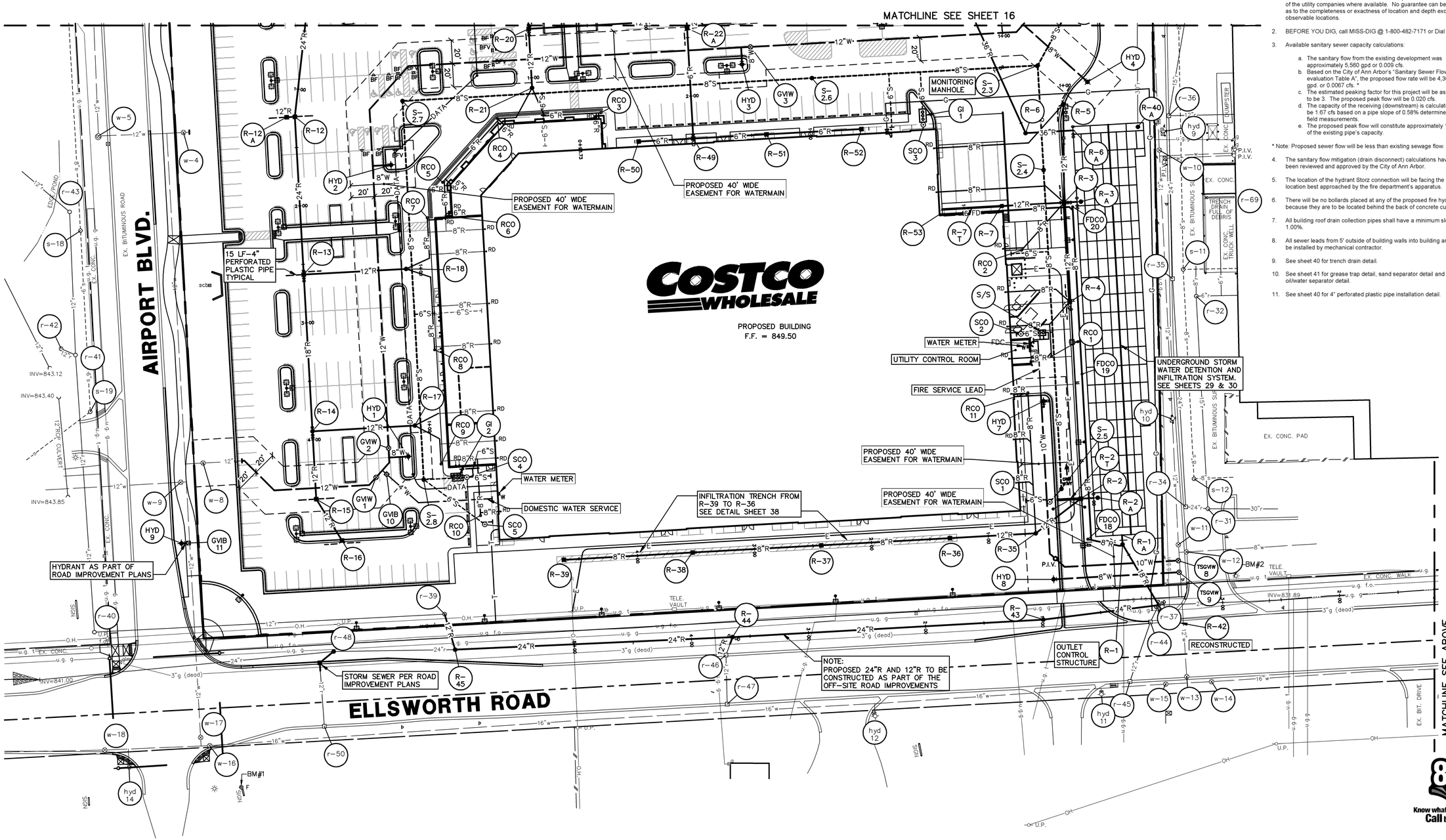


LEGEND

U.P.	EXIST. UTILITY POLE		EXIST. STORM SEWER		SPRINKLER CONTROL BOX
	GUY WIRE		PROP. STORM SEWER		GAS METER
	ELEC. TRANSFORMER		EXIST. CATCH BASIN OR INLET		POST
	EXIST. OVERHEAD UTILITY LINE		PROP. CATCH BASIN OR INLET		SINGLE TREE
	EXIST. LIGHT POLE		END SECTION		FENCE
	EXIST. TELEPHONE LINE		CULVERT	O F	FOUND IRON PIPE
	EXIST. ELECTRIC LINE		EXIST. SANITARY SEWER	GI	GREASE TRAP
	EXIST. GAS LINE		PROP. SANITARY SEWER	S/S	SAND SEPARATOR
	EXIST. WATER MAIN		EXIST. CLEANOUT		
	PROP. WATER MAIN		PROP. CLEANOUT		
	EXIST. HYDRANT		℄ OF DITCH		
	PROP. HYDRANT		SIDEWALK RAMP		
	EXIST. GATE VALVE IN BOX		SIGN		
	PROP. GATE VALVE IN BOX		MAILBOX		
	EXIST. GATE VALVE IN WELL		TELEPHONE RISER		
	PROP. GATE VALVE IN WELL		CABLE TELEVISION RISER		
	EXIST. CURB STOP & BOX		ELECTRIC METER		
	PROP. CURB STOP & BOX		WATER METER		
P.I.V.	POST INDICATOR VALVE				

SCALE: 1" = 40'

0 40 80 120



Miscellaneous Utility Notes:

1. The location of existing underground water main, sanitary sewer, storm sewer, gas mains and services, and electric and telephone lines and services were obtained from municipal records and records of the utility companies where available. No guarantee can be made as to the completeness or exactness of location and depth except at observable locations.
2. BEFORE YOU DIG, call MISS-DIG @ 1-800-482-7171 or Dial 811.
3. Available sanitary sewer capacity calculations:
   a. The sanitary flow from the existing development was approximately 5,560 gpd or 0.009 cfs.
   b. Based on the City of Ann Arbor's "Sanitary Sewer Flow evaluation Table A", the proposed flow rate will be 4,362 gpd. or 0.0067 cfs. *
   c. The estimated peaking factor for this project will be assumed to be 3. The proposed peak flow will be 0.020 cfs.
   d. The capacity of the receiving (downstream) is calculated to be 1.67 cfs based on a pipe slope of 0.58% determined from field measurements.
   e. The proposed peak flow will constitute approximately 1.2% of the existing pipe's capacity.

* Note: Proposed sewer flow will be less than existing sewage flow.

4. The sanitary flow mitigation (drain disconnect) calculations have been reviewed and approved by the City of Ann Arbor.
5. The location of the hydrant Storz connection will be facing the location best approached by the fire department's apparatus.
6. There will be no bollards placed at any of the proposed fire hydrants because they are to be located behind the back of concrete curbs.
7. All building roof drain collection pipes shall have a minimum slope of 1.00%.
8. All sewer leads from 5' outside of building walls into building are to be installed by mechanical contractor.
9. See sheet 40 for trench drain detail.
10. See sheet 41 for grease trap detail, sand separator detail and oil/water separator detail.
11. See sheet 40 for 4" perforated plastic pipe installation detail.

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FINAL SITE PLAN
UTILITY PLAN – SOUTH

15

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-23-11
PER WCRC REVIEW	2-07-12

DATE: 6-23-11
SHEET 16 OF 64
CADD: WAJ
ENG.: JAF
PM.: DMB
FILE: 10046UP1.dwg
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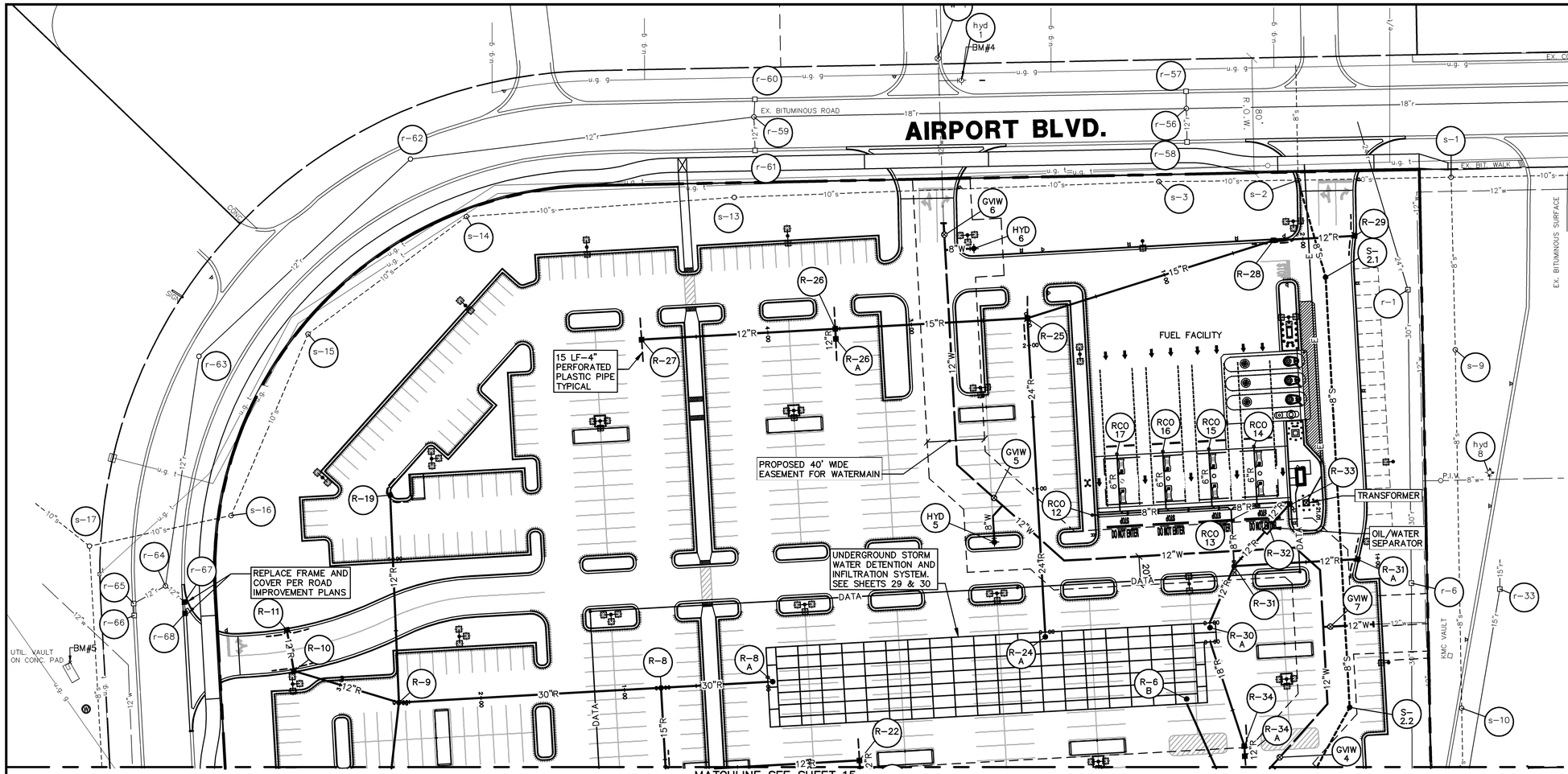

SCALE: 1" = 40'

0 40 80 120

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LEGEND

U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	℄ OF DITCH
	SIDEWALK RAMP
	SIGN
MAIL	MAILBOX
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
g	GAS METER
	POST
	SINGLE TREE
	FENCE
F	FOUND IRON PIPE
GI	GREASE TRAP
S/S	SAND SEPARATOR

NOTE:
SEE SHEET 15 FOR MISCELLANEOUS UTILITY NOTES.

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UTILITY PLAN – NORTH

16

DATE: 6-23-11
SHEET 17 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH: WAJ
FINAL\10046UP1
FB/

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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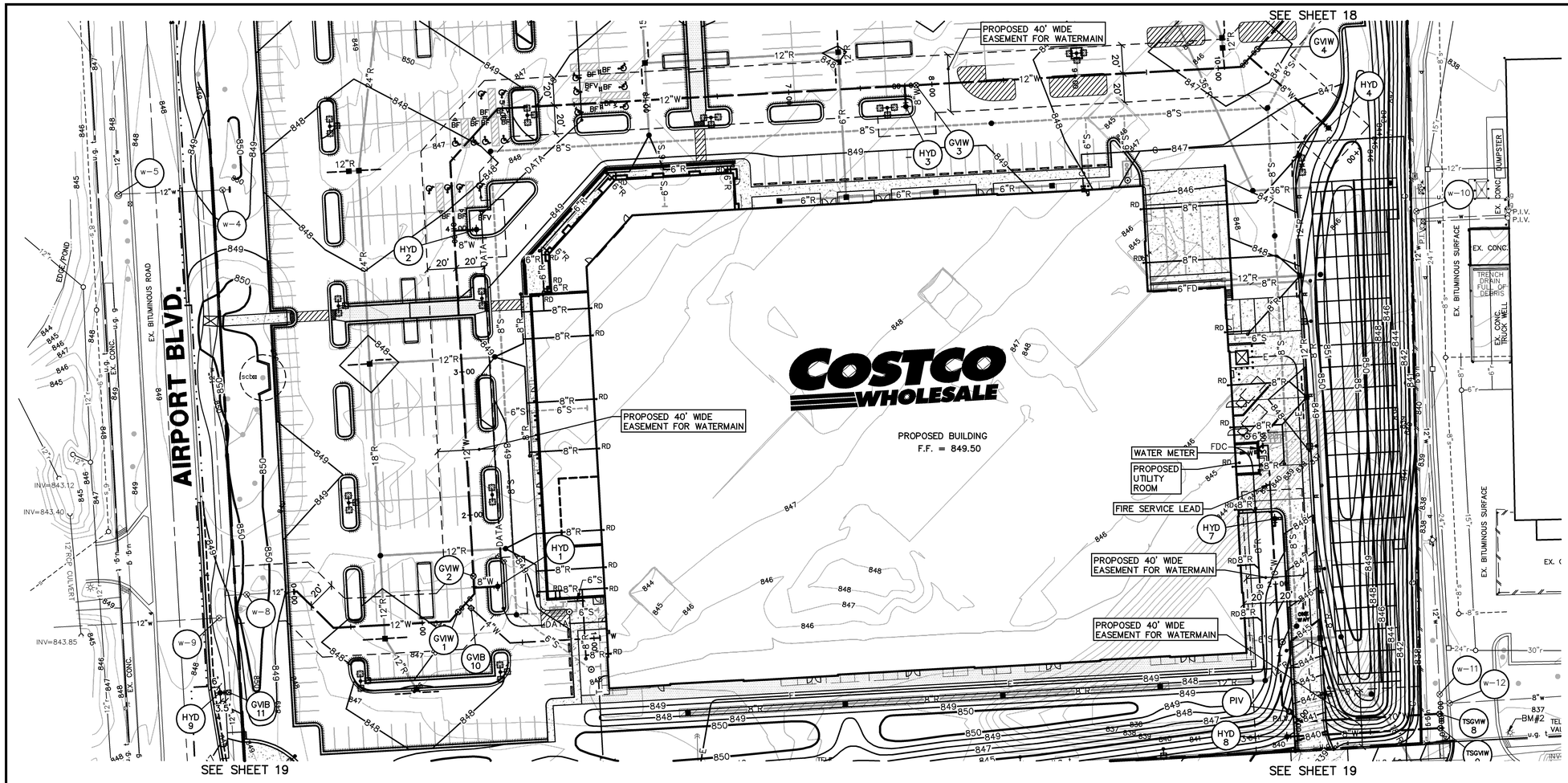
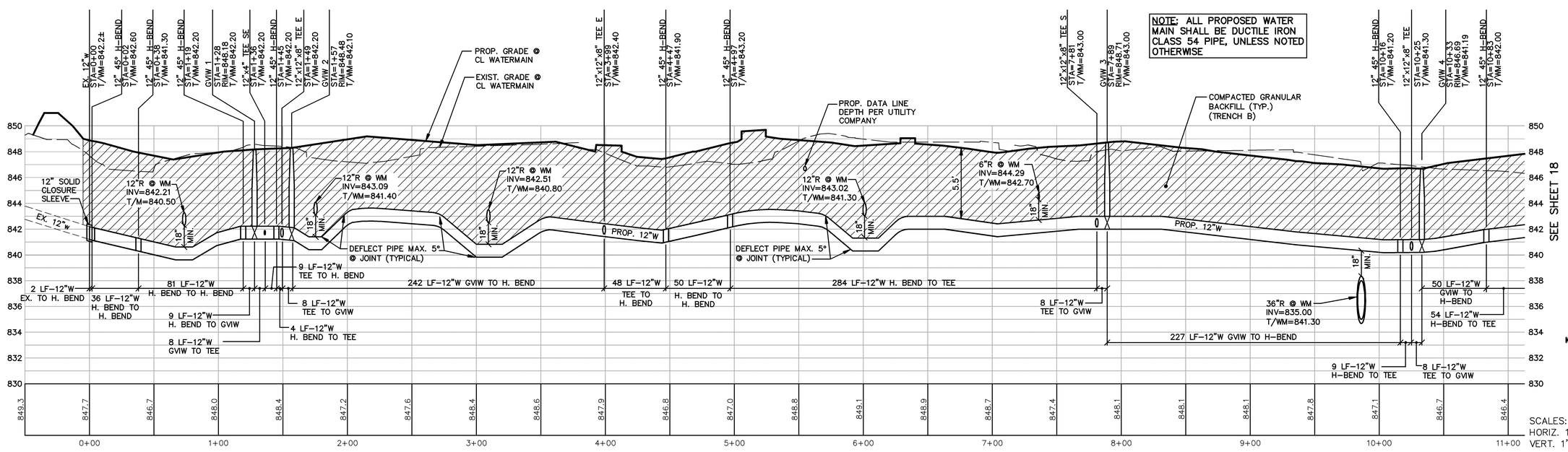


SCALE: 1" = 40'

0 40 80 120

LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	℄ OF DITCH
	SIGN
MBL	MAILBOX
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
g	GAS METER
	POST
	SINGLE TREE
	FENCE
	TREE OR BRUSH LIMIT



SCALES:
HORIZ. 1"=40'
VERT. 1"=4'

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WATERMAIN – PLAN AND PROFILE

17

DATE: 6-23-11
SHEET 18 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FILE: FINAL\10046PW1

JOB No. **10046**

REVISIONS:	REV. DATE
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PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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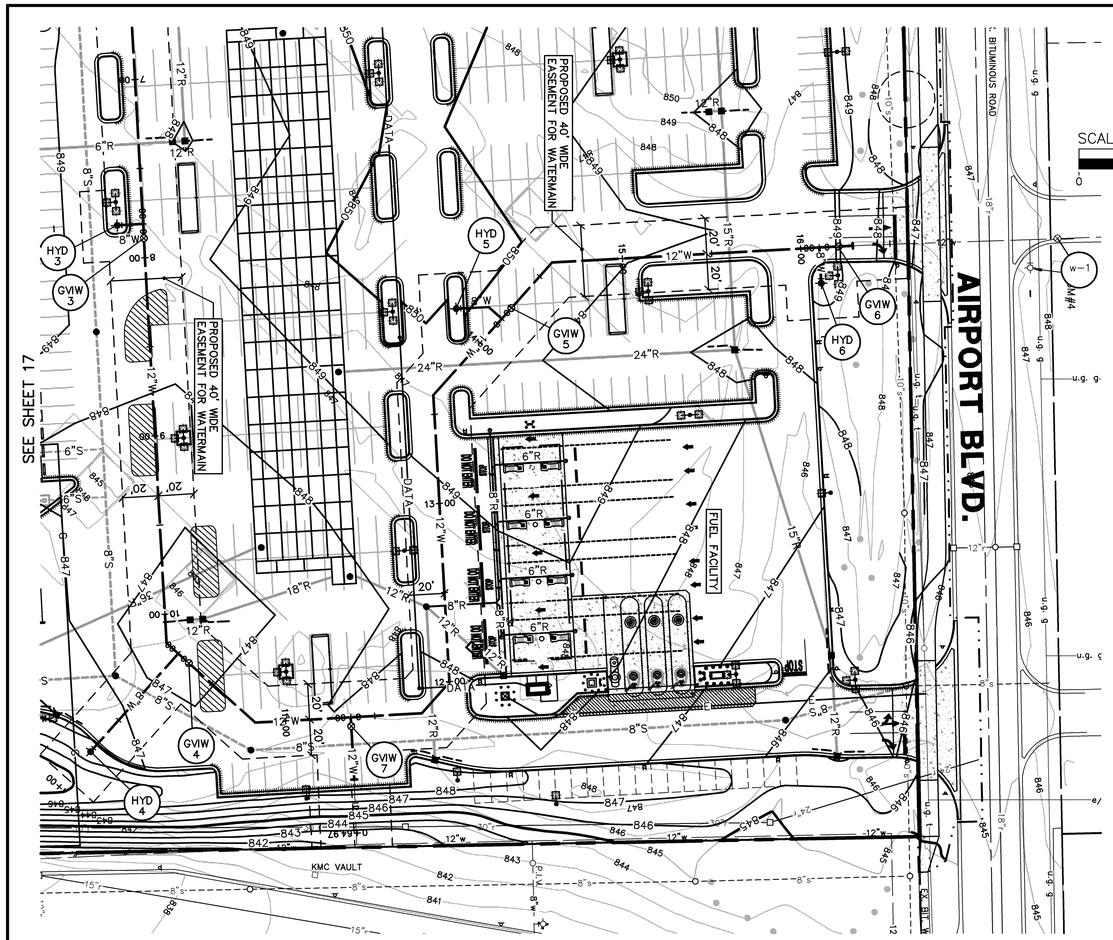
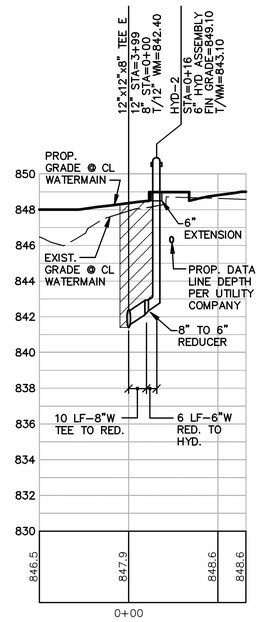
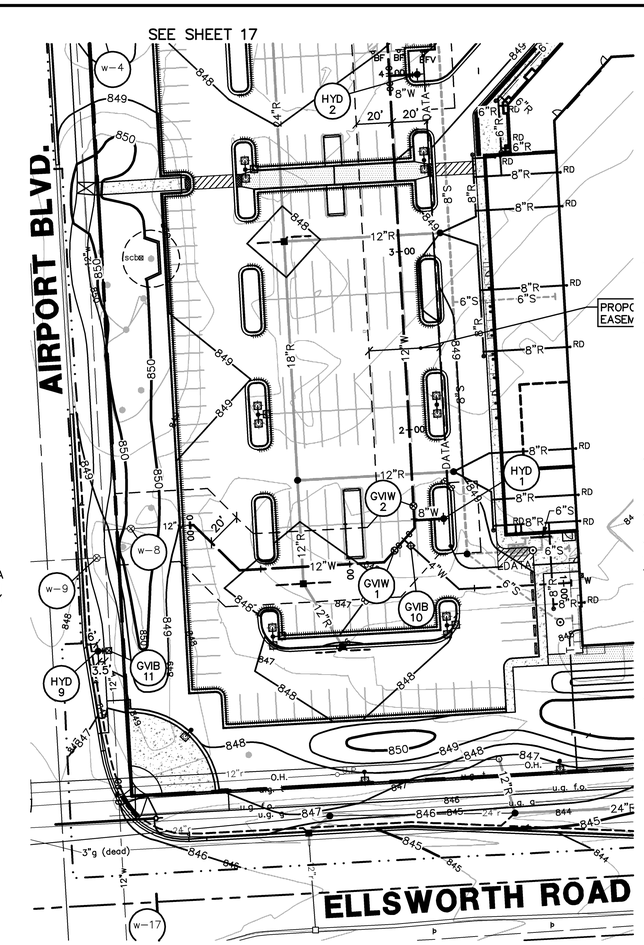
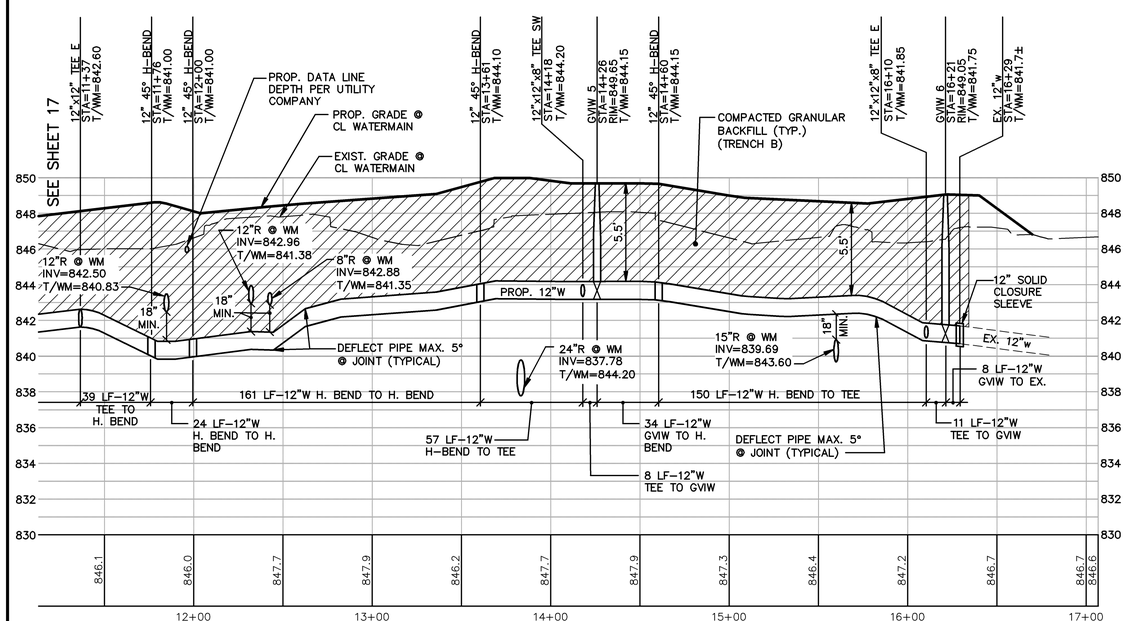


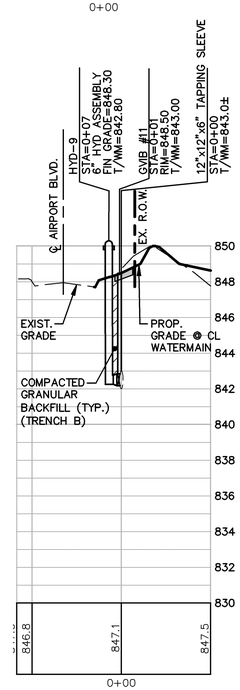




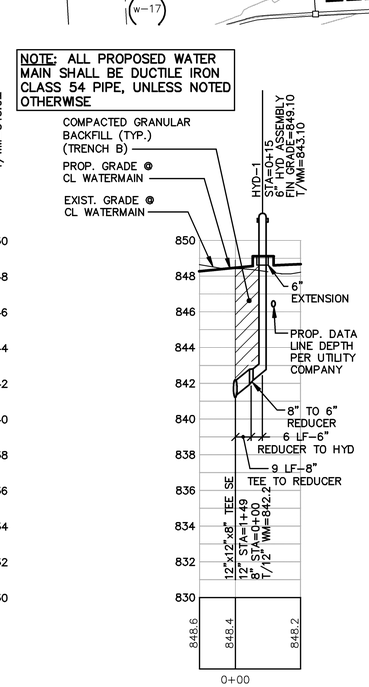
LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
	CULVERT
S	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	℄ OF DITCH
	SIGN
MAIL	MAILBOX
	TELEPHONE RISER
catv	CABLE TELEVISION RISER
	ELECTRIC METER
	WATER METER
	GAS METER
	POST
	SINGLE TREE
	FENCE
	TREE OR BRUSH LIMIT

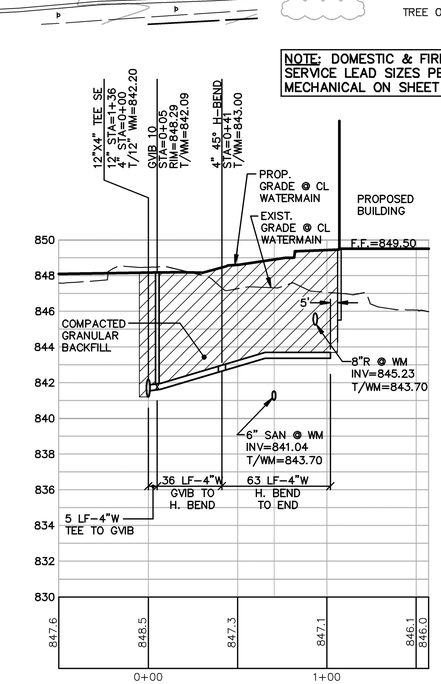




NOTE: ALL PROPOSED WATER MAIN SHALL BE DUCTILE IRON CLASS 54 PIPE, UNLESS NOTED OTHERWISE



NOTE: DOMESTIC & FIRE SERVICE LEAD SIZES PER MECHANICAL ON SHEET 57



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SCALES:
HORIZ. 1"=40'
VERT. 1"=4'

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DATE: 6-23-11
SHEET 19 OF 64

JOB No. **10046**

REVISIONS:	REV. DATE	
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11	CADD: WAJ
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PER TWP. & OWNER REVIEW	8-22-11	PM: DMB
PER TWP. REVIEW	9-23-11	TECH:
PER WCRC REVIEW	2-07-12	FINAL \ 10046PW1

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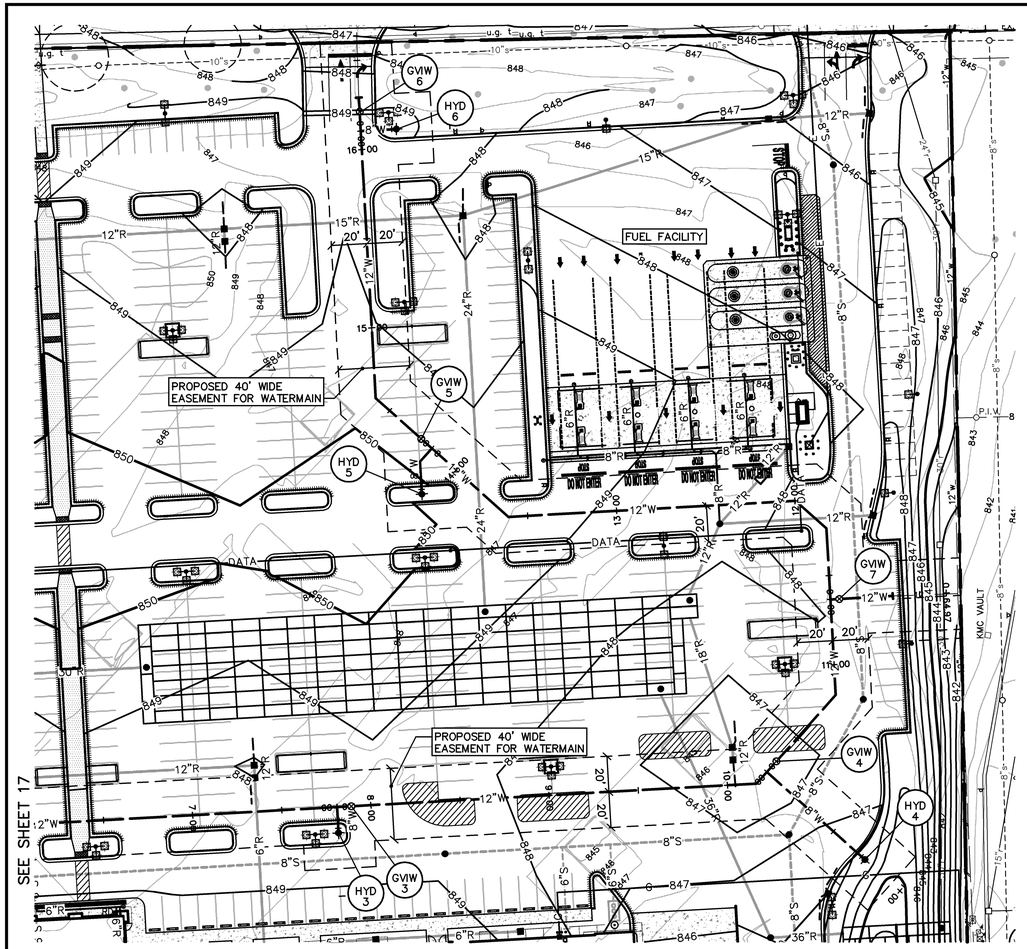
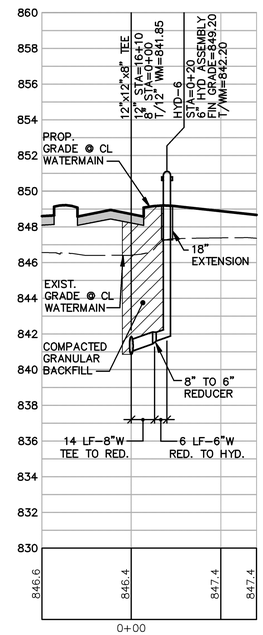
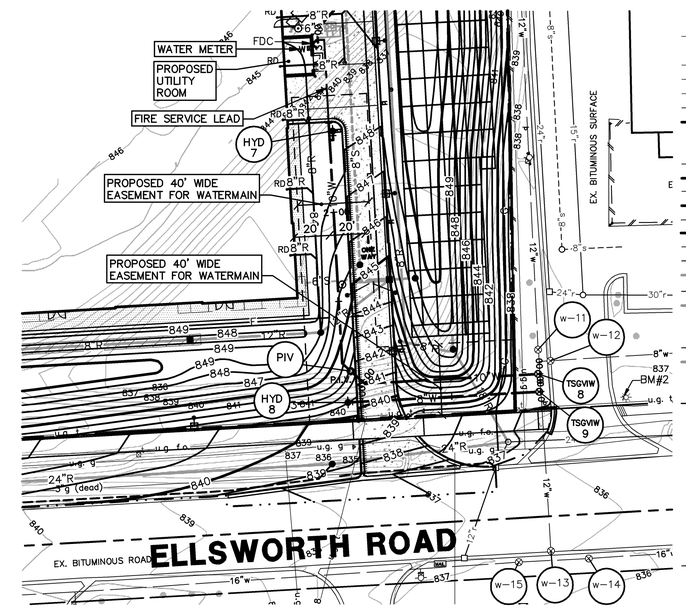




NOTE: ALL PROPOSED WATER MAIN SHALL BE DUCTILE IRON CLASS 54 PIPE, UNLESS NOTED OTHERWISE

811 Know what's below. Call before you dig.

SCALES:
HORIZ. 1"=40'
VERT. 1"=4'

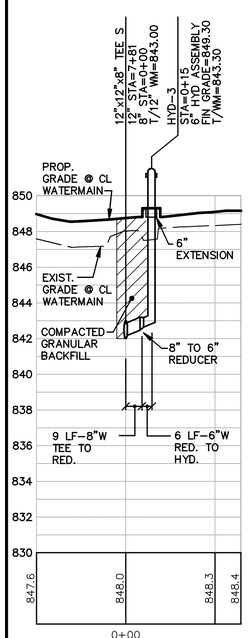


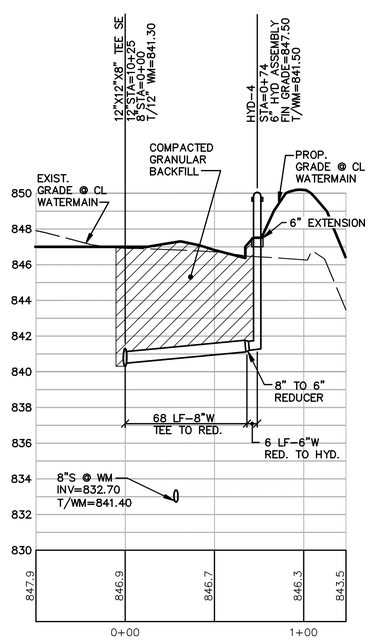
SCALE: 1" = 40'
0 40 80 120

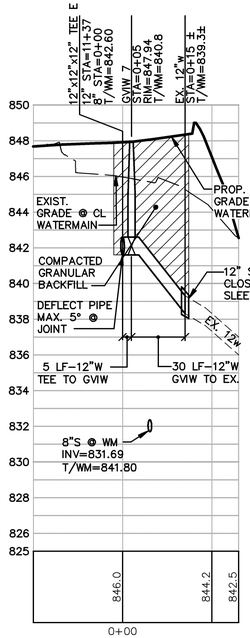
LEGEND

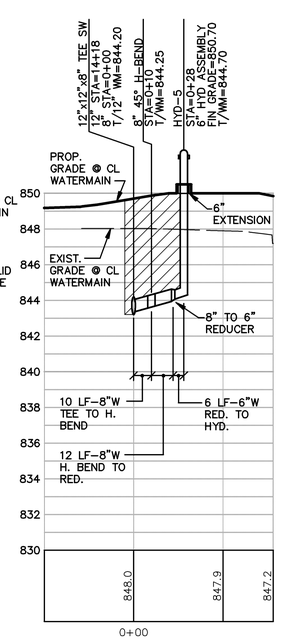
838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	℄ OF DITCH
	SIGN
MAIL	MAILBOX
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
g	GAS METER
	POST
	SINGLE TREE
	FENCE
	TREE OR BRUSH LIMIT

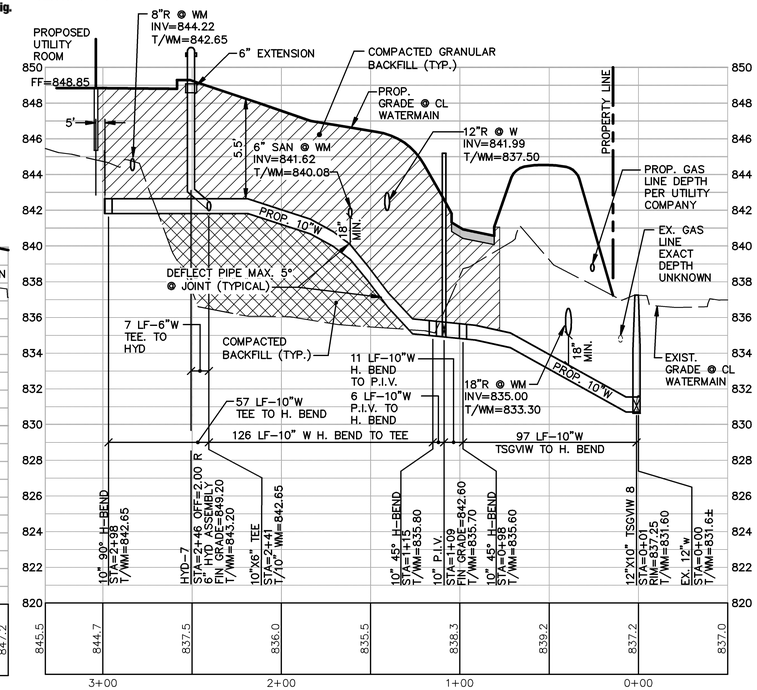
NOTE: DOMESTIC & FIRE SERVICE LEAD SIZES PER MECHANICAL ON SHEET 57

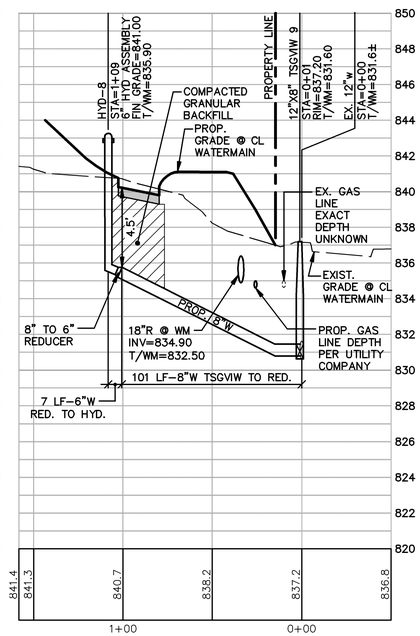












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WATERMAIN – PLAN AND PROFILE

19

DATE: 6-23-11
SHEET 20 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FB#:
FINAL\10046PW1

JOB No. 10046

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PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-26-11
PER WCRC REVIEW	2-07-12

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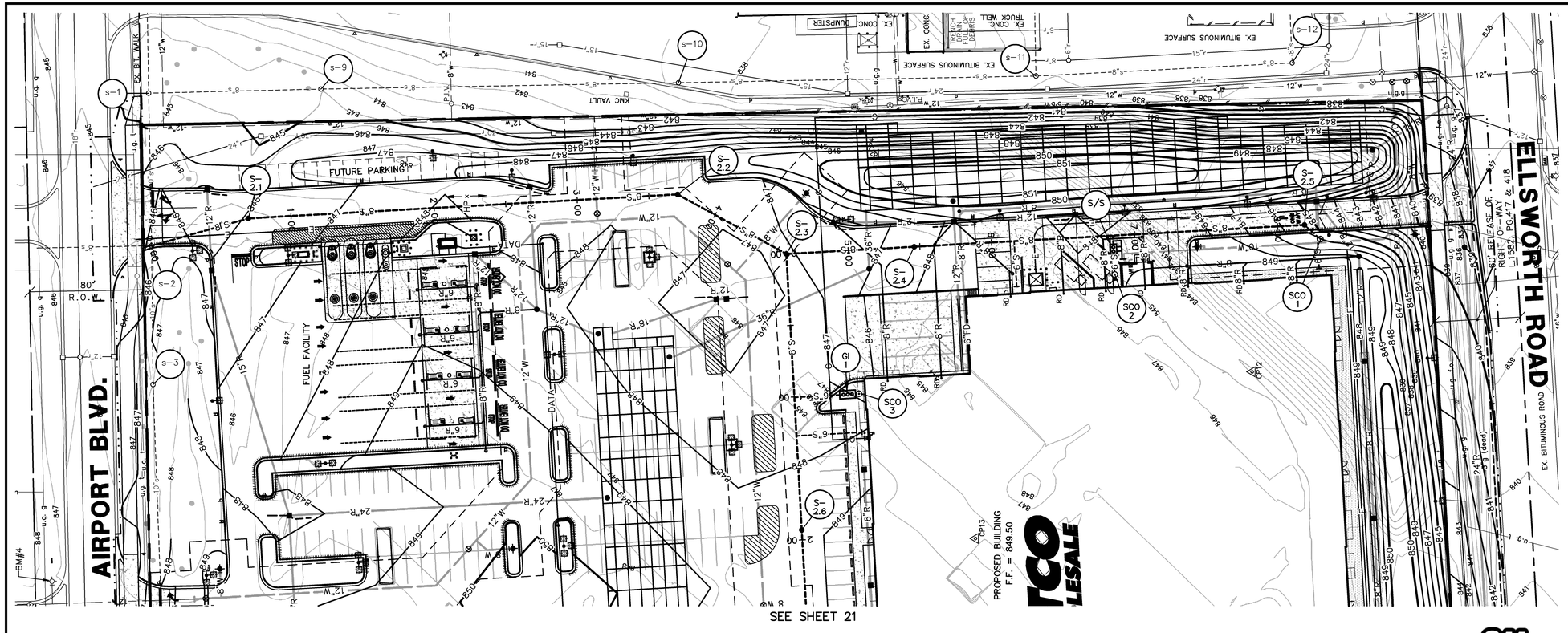


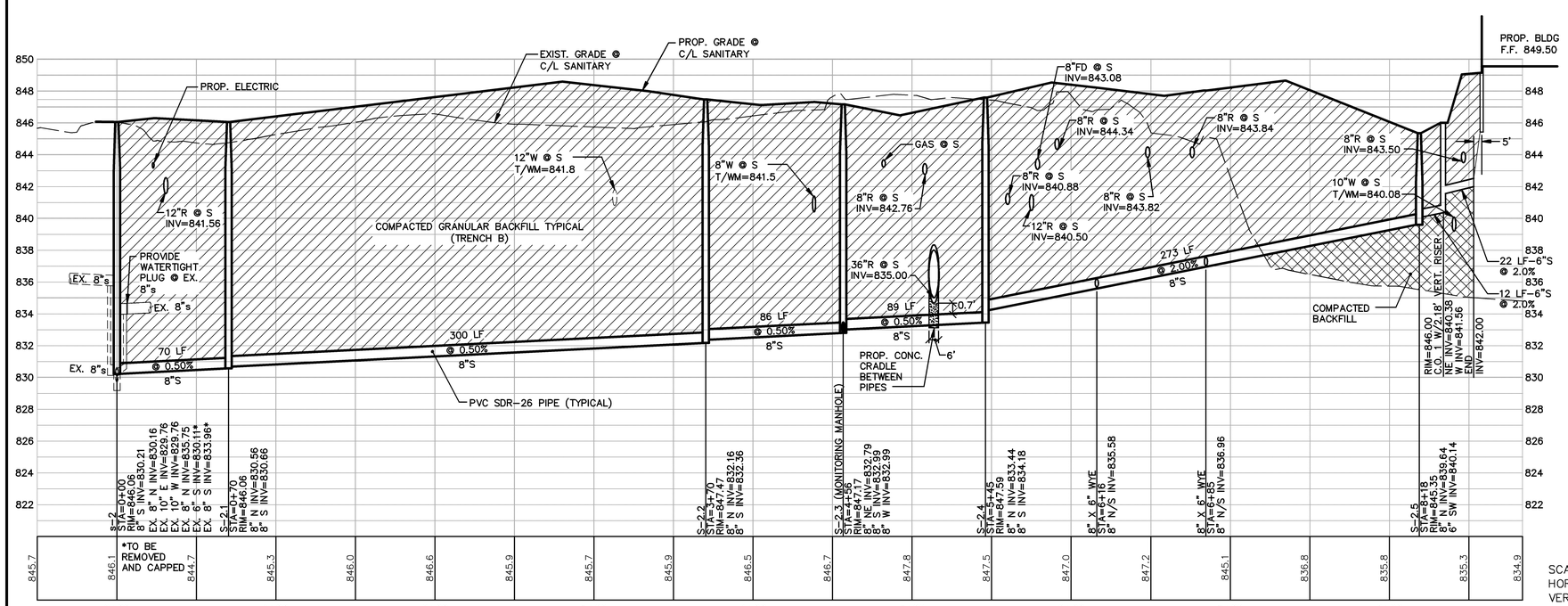
SCALE: 1" = 40'

0 40 80 120

LEGEND

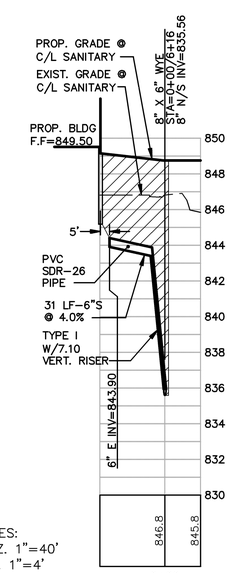
- 838 EXIST. CONTOUR
- 838 PROP. CONTOUR
- ×836.2 EXIST. SPOT ELEVATION
- U.P. EXIST. UTILITY POLE
- GUY WIRE
- ELEC. TRANSFORMER
- OH EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- t EXIST. TELEPHONE LINE
- e EXIST. ELECTRIC LINE
- g EXIST. GAS LINE
- w EXIST. WATER MAIN
- W PROP. WATER MAIN
- EXIST. HYDRANT
- PROP. HYDRANT
- EXIST. GATE VALVE IN BOX
- PROP. GATE VALVE IN BOX
- EXIST. GATE VALVE IN WELL
- PROP. GATE VALVE IN WELL
- EXIST. CURB STOP & BOX
- PROP. CURB STOP & BOX
- P.I.V. POST INDICATOR VALVE
- r EXIST. STORM SEWER
- R PROP. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- PROP. CATCH BASIN OR INLET
- END SECTION
- CULVERT
- s EXIST. SANITARY SEWER
- S PROP. SANITARY SEWER
- EXIST. C/LEANOUT
- PROP. C/LEANOUT
- ℄ OF DITCH
- SIGN
- MAILBOX
- t TELEPHONE RISER
- catv CABLE TELEVISION RISER
- e ELECTRIC METER
- w WATER METER
- g GAS METER
- POST
- SINGLE TREE
- FENCE
- TREE OR BRUSH LIMIT

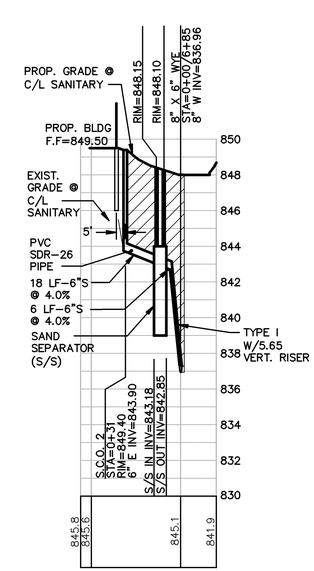
811 Know what's below. Call before you dig.



NOTE: ALL PIPE SHALL BE PVC SDR-26

SCALES:
HORIZ. 1"=40'
VERT. 1"=4'





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SANITARY SEWER – PLAN AND PROFILE

20

DATE: 6-23-11
SHEET 21 OF 64
CADD: WJJ
ENG.: JAF
PM: DMB
QC: TTD
FINAL\10046PS1
PBF

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PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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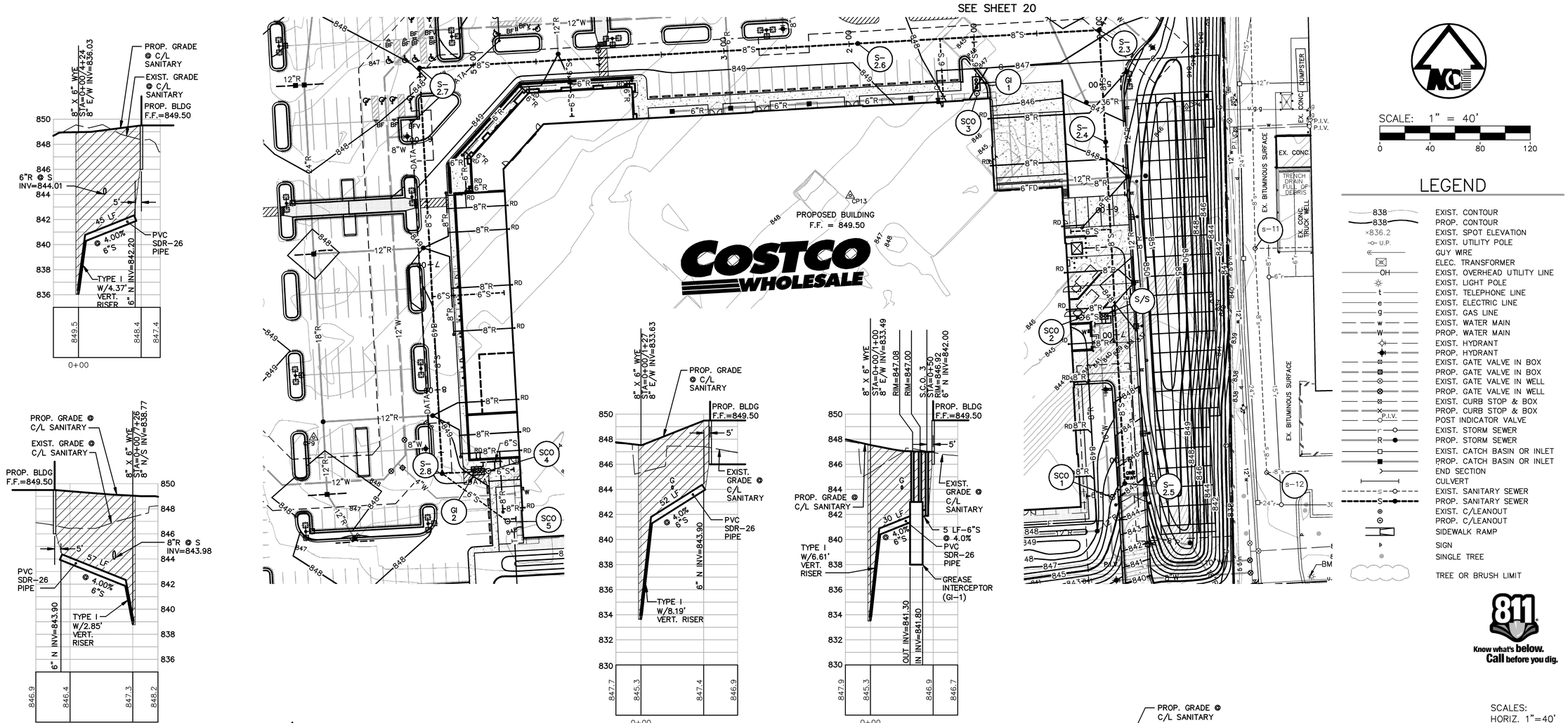

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Fax: 734.995.0599

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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
SANITARY SEWER – PLAN AND PROFILE

21

DATE: 6-23-11
SHEET 22 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
PROJECT: 10046
FINAL \10046PS1
FB#:

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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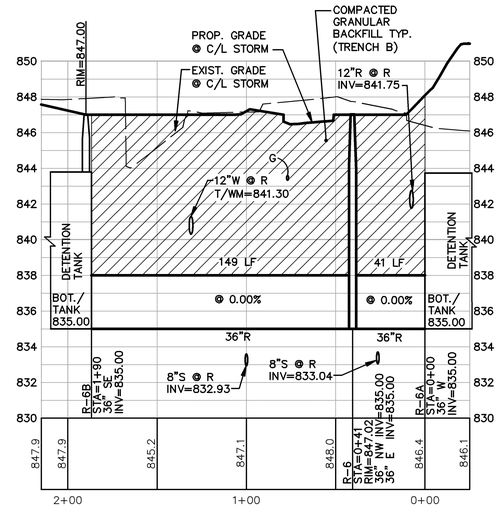
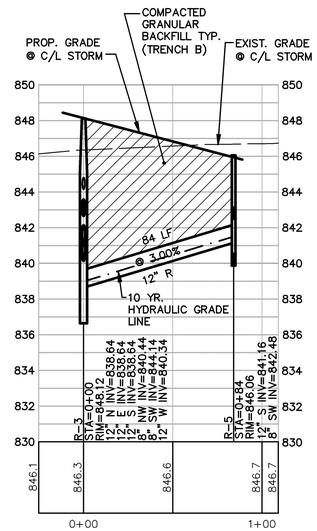
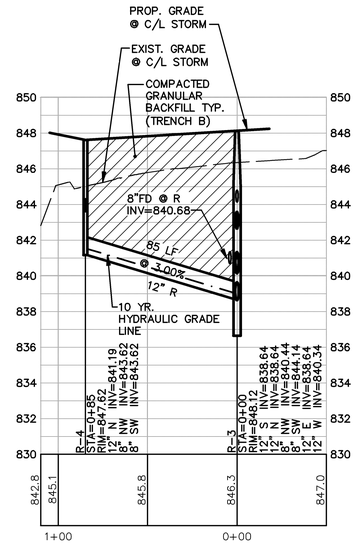


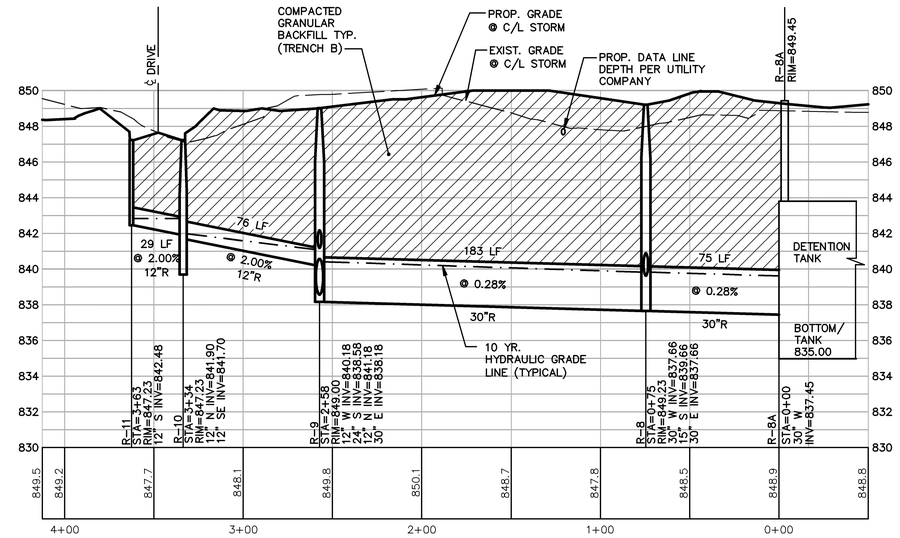
R-6A THRU R-6B
DETENTION CONNECTOR-EQUALIZER PIPE RUN



R-3 TO R-5



R-3 TO R-4

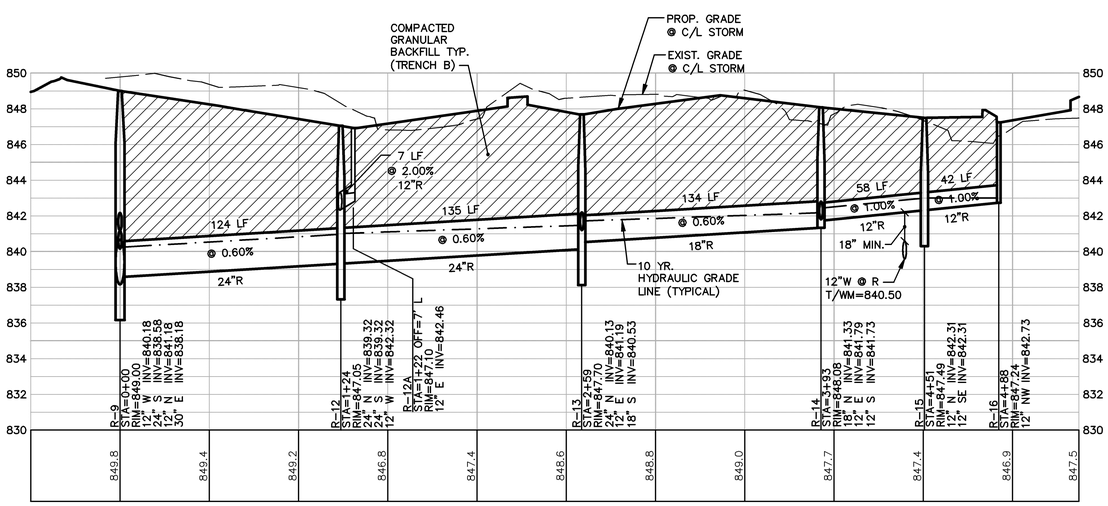


R-11 THRU R-8A

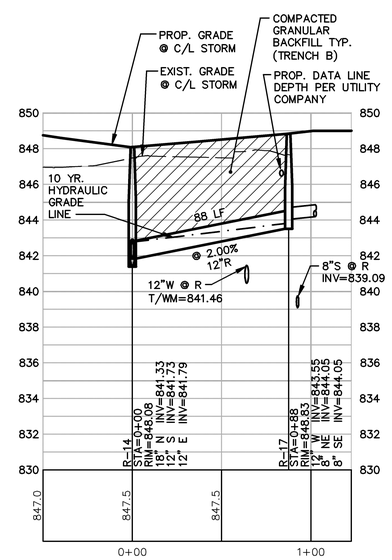
NOTES:

1. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE, C-76 CL IV OR APPROVED EQUAL, UNLESS OTHERWISE NOTED.
2. ALL 6" AND 8" DIAMETER PIPES SHALL BE PVC SCHEDULE 40.

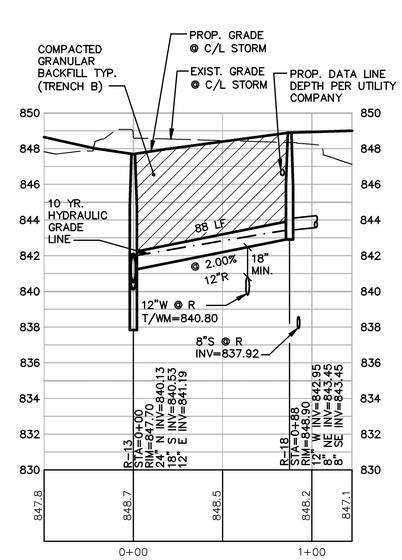
SCALES:
HORIZ. 1"=40'
VERT. 1"=4'



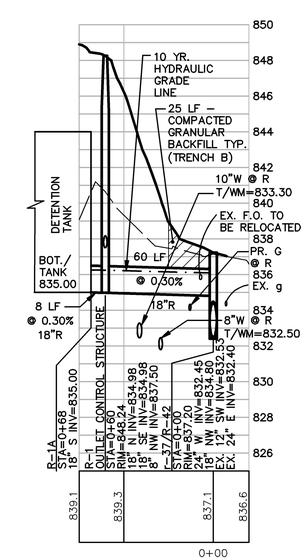
R-9 THRU R-16



R-14 TO R-17



R-13 TO R-18



R-1A TO r-37\R-42

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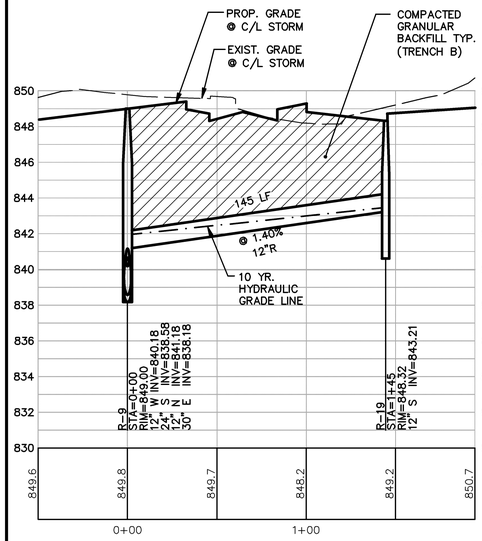
STORM SEWER PROFILES

22

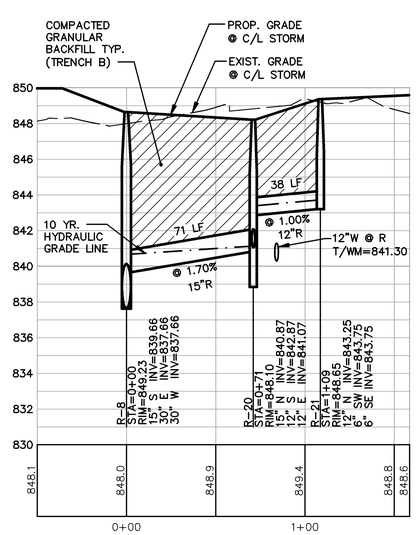
DATE: 6-23-11
SHEET 23 OF 64

JOB No. 10046

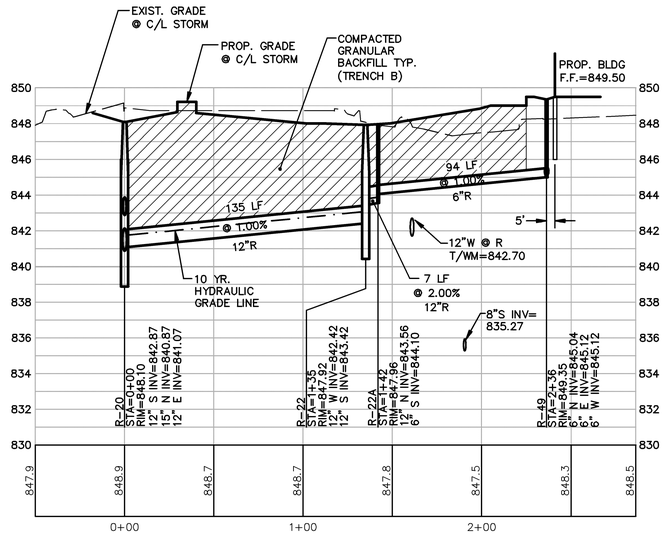
REVISIONS:	REV. DATE	
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11	CADD: WAJ
PER TWP. REVIEW	7-22-11	ENG: JAF
PER TWP. & OWNER REVIEW	8-22-11	PM: DMB
PER TWP. REVIEW	9-9-11	REVIEW:
		FINAL \10046PR1



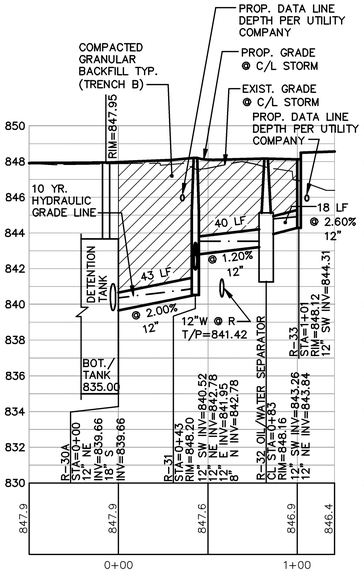
R-9 TO R-19



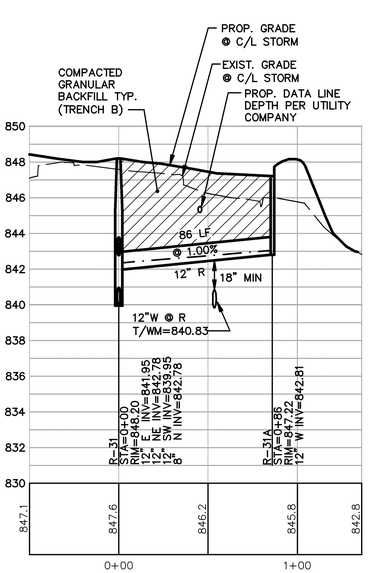
R-8 THRU R-21



R-20 THRU R-22A



R-30A THRU R-33



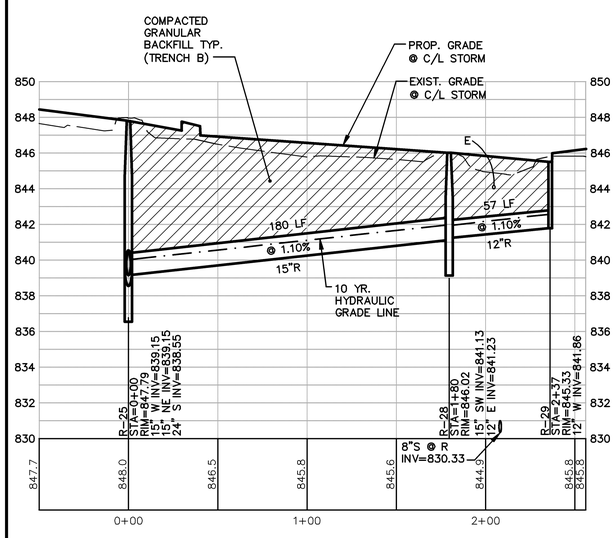
R-31 THRU R-31A

NOTES:

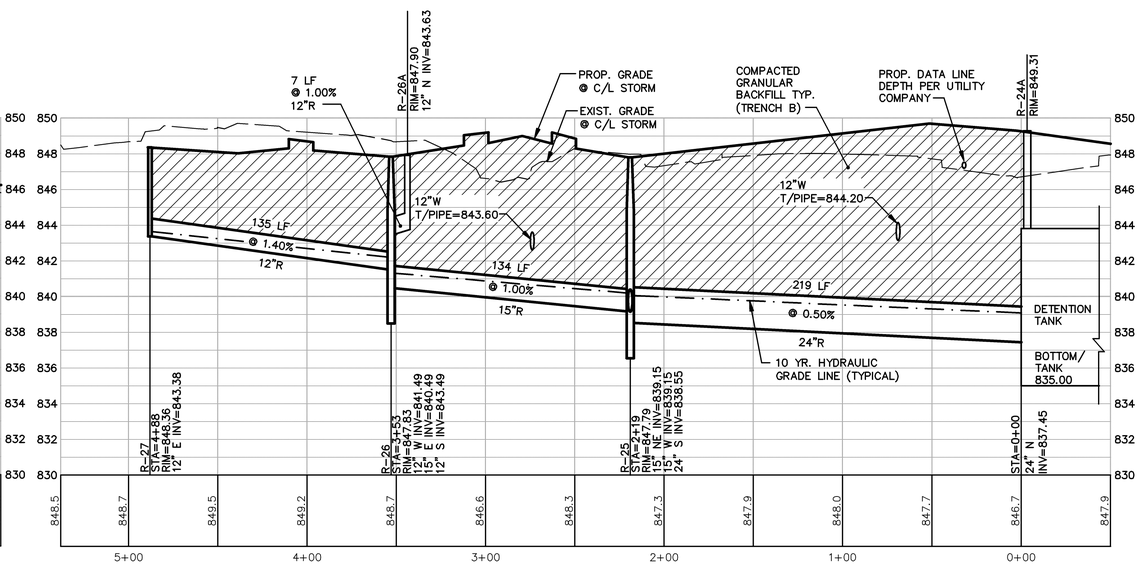
1. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE, C-76 CL IV OR APPROVED EQUAL, UNLESS OTHERWISE NOTED.

2. ALL 6" AND 8" DIAMETER PIPES SHALL BE PVC SCHEDULE 40.

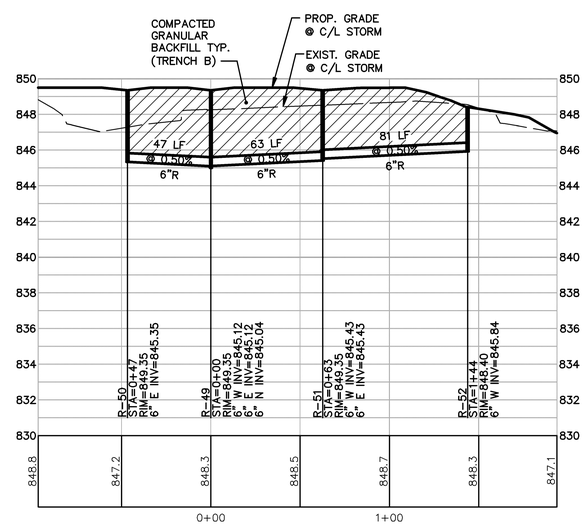
SCALES:
HORIZ. 1"=40'
VERT. 1"=4'



R-25 THRU R-29



R-27 THRU R-24A



R-50 THRU R-52

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STORM SEWER PROFILES

23

DATE: 6-23-11
SHEET 24 OF 64

JOB No. 10046

REVISIONS:	REV. DATE	CADD: WAJ
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11	ENG: JAF
PER TWP. REVIEW	7-22-11	PM: DMB
PER TWP. & OWNER REVIEW	8-22-11	FILE: 10046PR1
PER TWP. REVIEW	9-9-11	FINAL\10046PR1

PB#:

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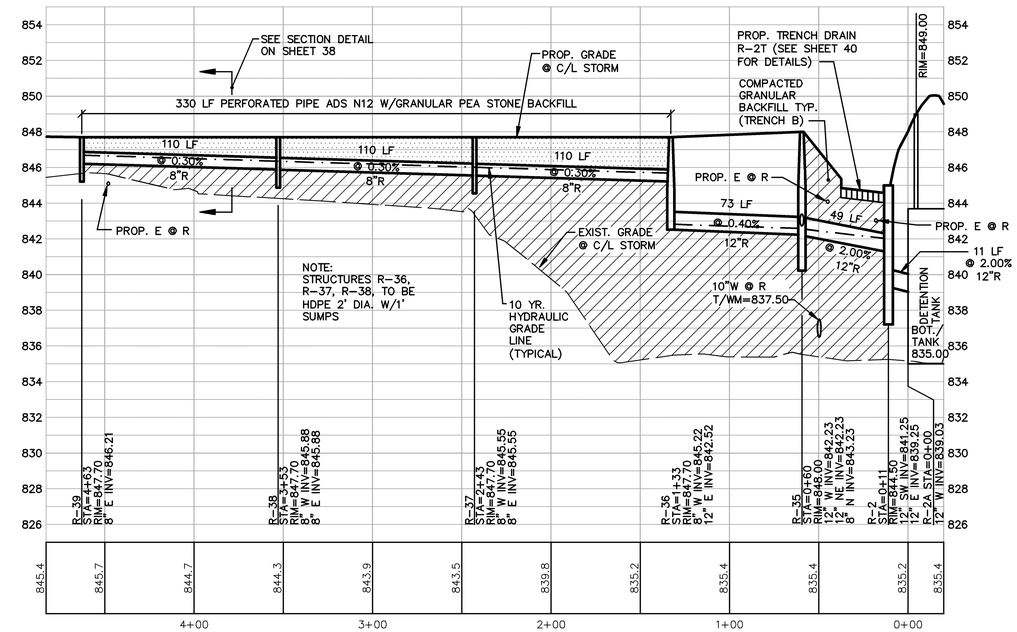
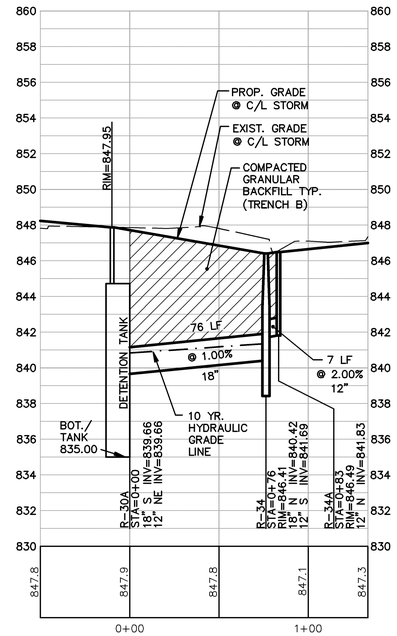
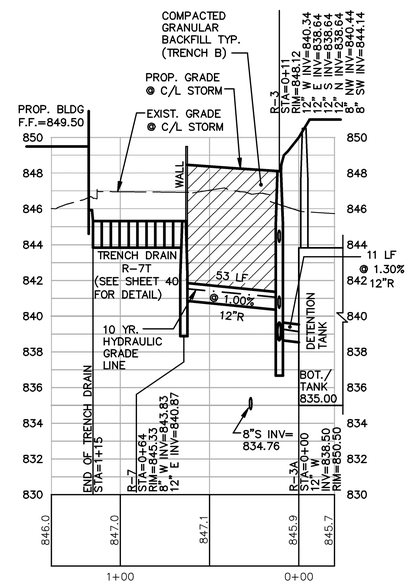


R-39 THRU R-2



R-30A THRU R-34A



R-3A TO R-7

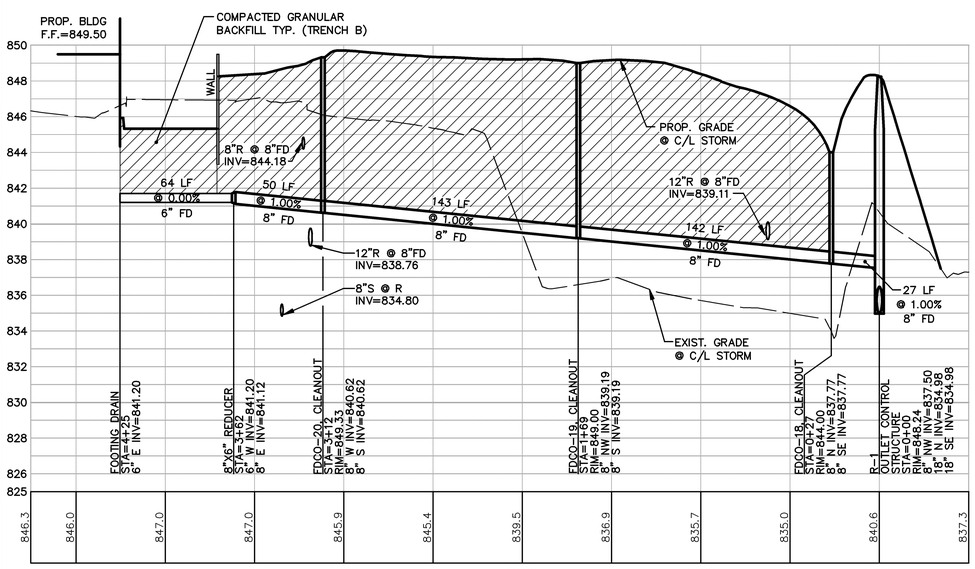
STORM SEWER NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE INSTALLATION, INSPECTION, TESTING AND FINAL ACCEPTANCE OF ALL NEW STORMWATER MANAGEMENT FACILITIES CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH ALL APPLICABLE REGULATING AGENCIES CONCERNING INSTALLATION, INSPECTION AND APPROVAL OF THE STORM DRAINAGE SYSTEM CONSTRUCTION.
2. ALL STORMWATER MANAGEMENT FACILITIES, INCLUDING COLLECTION AND CONVEYANCE STRUCTURES SHALL BE INSTALLED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND ALL APPLICABLE LOCAL AND STATE CODES AND REGULATIONS. REFER TO UTILITY AGENCY'S STORM SEWER STANDARD DETAILS AND NOTES.
3. ANY WORK PERFORMED IN THE LOCAL OR STATE RIGHT OF WAYS SHALL BE IN ACCORDANCE WITH THE APPLICABLE LOCAL OR STATE REQUIREMENTS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN THE NECESSARY PERMITS FOR THE WORK, SCHEDULE NECESSARY INSPECTIONS, AND PROVIDE THE NECESSARY TRAFFIC CONTROL MEASURES AND DEVICES, ETC., FOR WORK PERFORMED IN THE RIGHT OF WAYS.
4. INSTALL DETECTABLE UTILITY WARNING TAPE ABOVE STORM DRAINAGE PIPING, 12 INCHES BELOW FINISHED GRADE, EXCEPT 6 INCHES BELOW SUBGRADE UNDER PAVEMENTS AND SLABS.
5. ALL STORM DRAINAGE STRUCTURES SHALL BE PRECAST CONCRETE, UNLESS OTHERWISE NOTED.
6. PROVIDE PAVEMENT UNDERDRAINS AT ALL PAVEMENT INLET STRUCTURES. EXTEND 6-INCH DIAMETER PERFORATED PVC PIPE UNDERDRAINS, WITH PERFORATIONS DOWN, A MINIMUM OF 20 FEET OUTWARD FROM ALL SIDES OF INLET BELOW PAVEMENT.
7. TYPICAL BUILDING FOUNDATION SUBDRAINAGE SYSTEM CONNECTION: PROVIDE CLEANOUT AND HEADER PIPING (MATCH SUBDRAINAGE PIPING) TO STORM DRAINAGE STRUCTURE, LOCATIONS AS REQUIRED. SEE ARCHITECTURAL DRAWINGS FOR SUBDRAINAGE SYSTEMS FOR FOUNDATIONS AND RETAINING WALLS.
8. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERIODIC INSPECTION AND MAINTENANCE OF THE STORM SEWER SYSTEM.
9. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF BUILDING ROOF DRAINS. ALL ROOF DRAINS ARE TO BE CONNECTED TO THE STORM SEWER SYSTEM. ROOF DRAINS, FOUNDATION DRAINS OR ANY OTHER CLEAN WATER CONNECTION TO THE SANITARY SEWER SYSTEM IS PROHIBITED.
10. ALL STORM SEWER OUTSIDE THE RIGHT-OF-WAY AND NOT IN AN EASEMENT WILL REMAIN PRIVATE AND WILL BE MAINTAINED PRIVATELY.

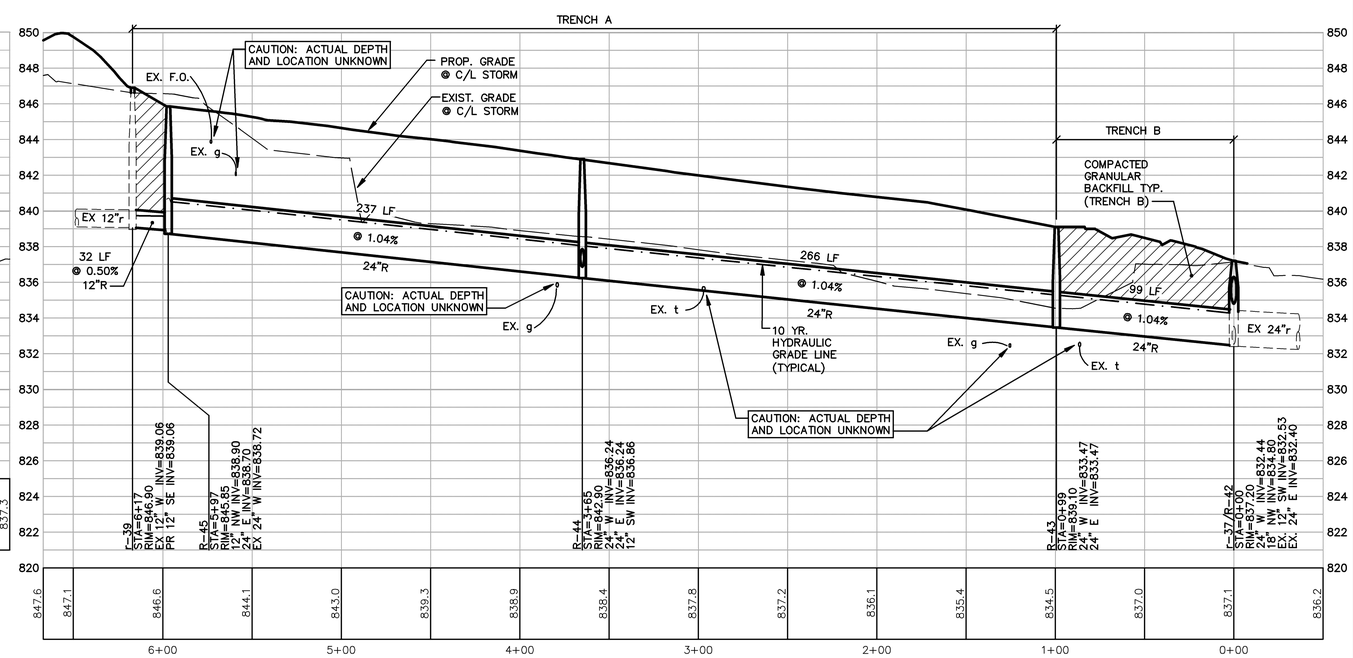
NOTES:

1. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE, C-76 CL IV OR APPROVED EQUAL, UNLESS OTHERWISE NOTED.
2. ALL 6" AND 8" DIAMETER PIPES SHALL BE PVC SCHEDULE 40.

SCALES:
HORIZ. 1"=40'
VERT. 1"=4'



FOOTING DRAIN ONLY DISCHARGE LINE TO R-1



r-39 THRU r-37/R-42
(ELLSWORTH ROAD RIGHT-OF-WAY)

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STORM SEWER PROFILES

24

DATE: 6-23-11
SHEET 25 OF 64

JOB No. 10046

REVISIONS:	REV. DATE	CADD: WAJ
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11	ENG: JAF
PER TWP. REVIEW	7-22-11	PM: DMB
PER TWP. & OWNER REVIEW	8-22-11	TECH: WAJ
PER TWP. REVIEW	1-23-12	FILE: 10046PR1
PER WCRC REVIEW	2-07-12	

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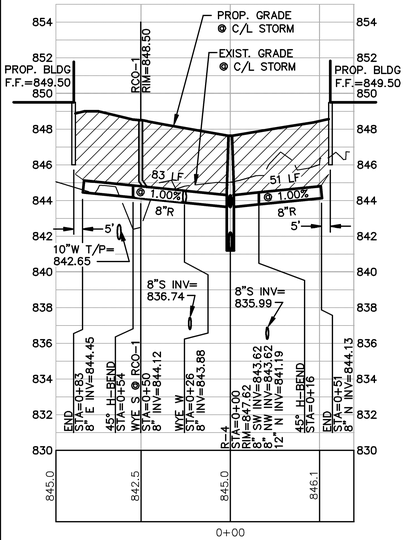
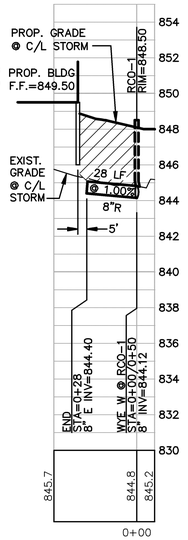
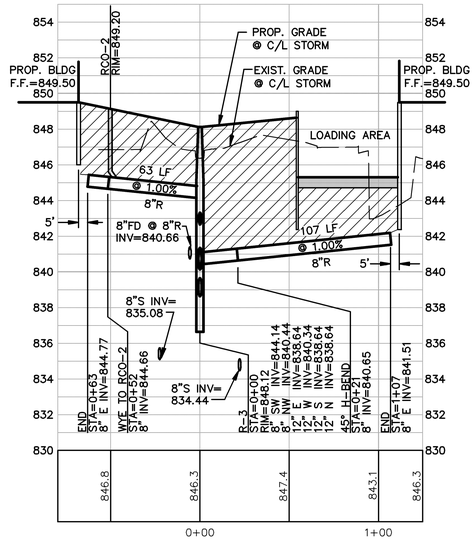


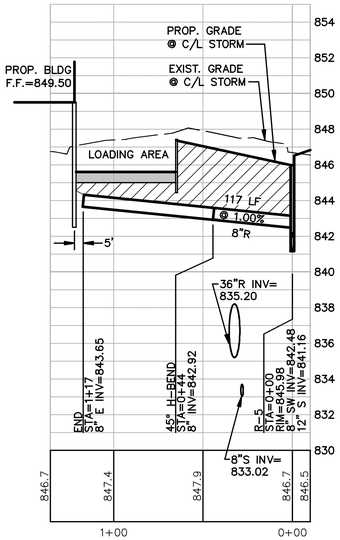
ROOF DRAINS TO R-4



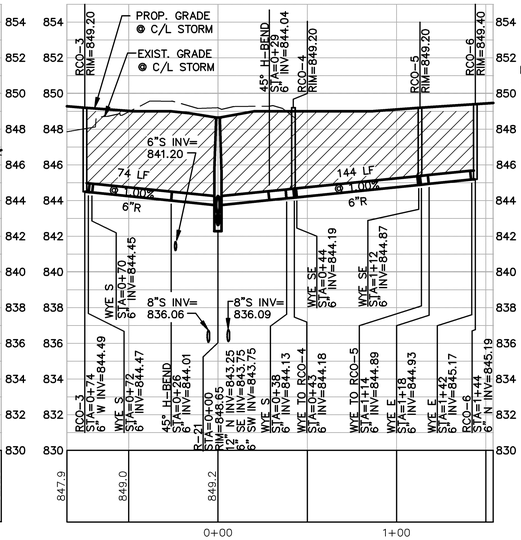
ROOF DRAIN TO R-4



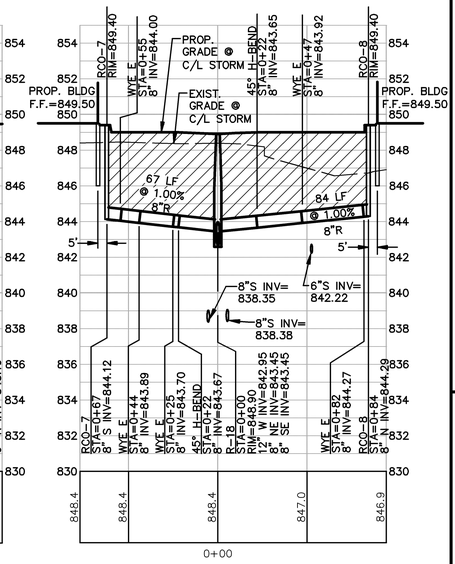
ROOF DRAINS TO R-3



ROOF DRAIN TO R-5



ROOF DRAIN TO R-21



ROOF DRAIN TO R-18

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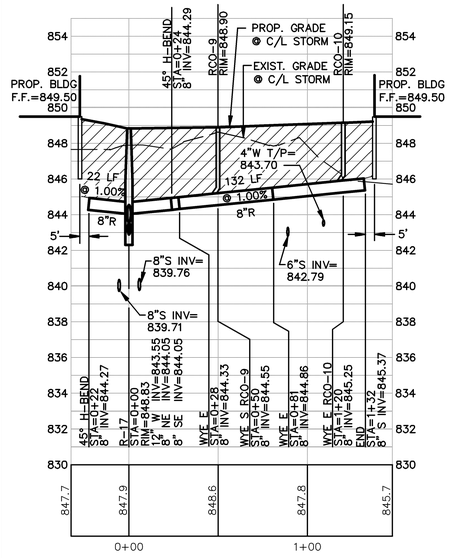
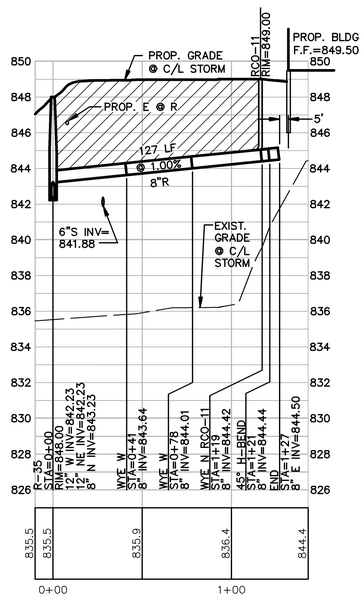
SCALES:
HORIZ. 1"=40'
VERT. 1"=4'

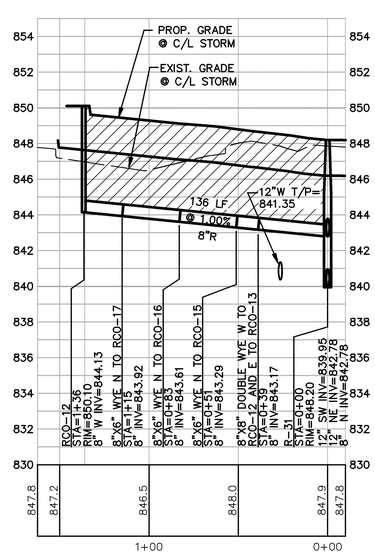


ROOF DRAIN TO R-17

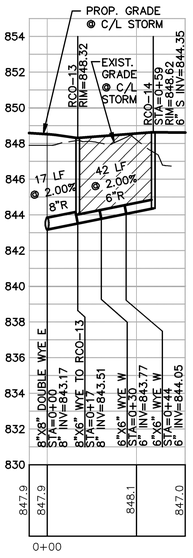


ROOF DRAIN TO R-35

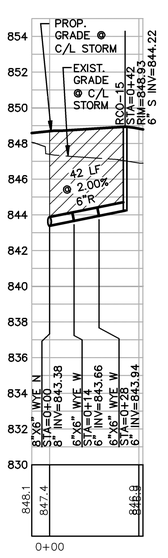
DOUBLE WYE



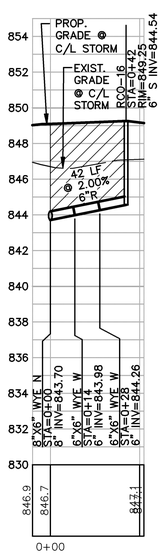
ROOF DRAIN RCO-12 TO R-31
(GAS STATION)



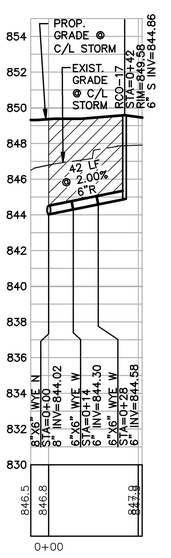
ROOF DRAIN TO
RCO-13 AND RCO-14



ROOF DRAIN TO RCO-15
(GAS STATION)



ROOF DRAIN TO RCO-16
(GAS STATION)



ROOF DRAIN TO RCO-17
(GAS STATION)

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STORM SEWER PROFILES – ROOF DRAINS

25

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

DATE: 7-22-11
SHEET 26 OF 64
CADD: WAJ
ENG: JAF
PM:
DWG: DMB
FILE: FINAL\10046PR1
FB#:

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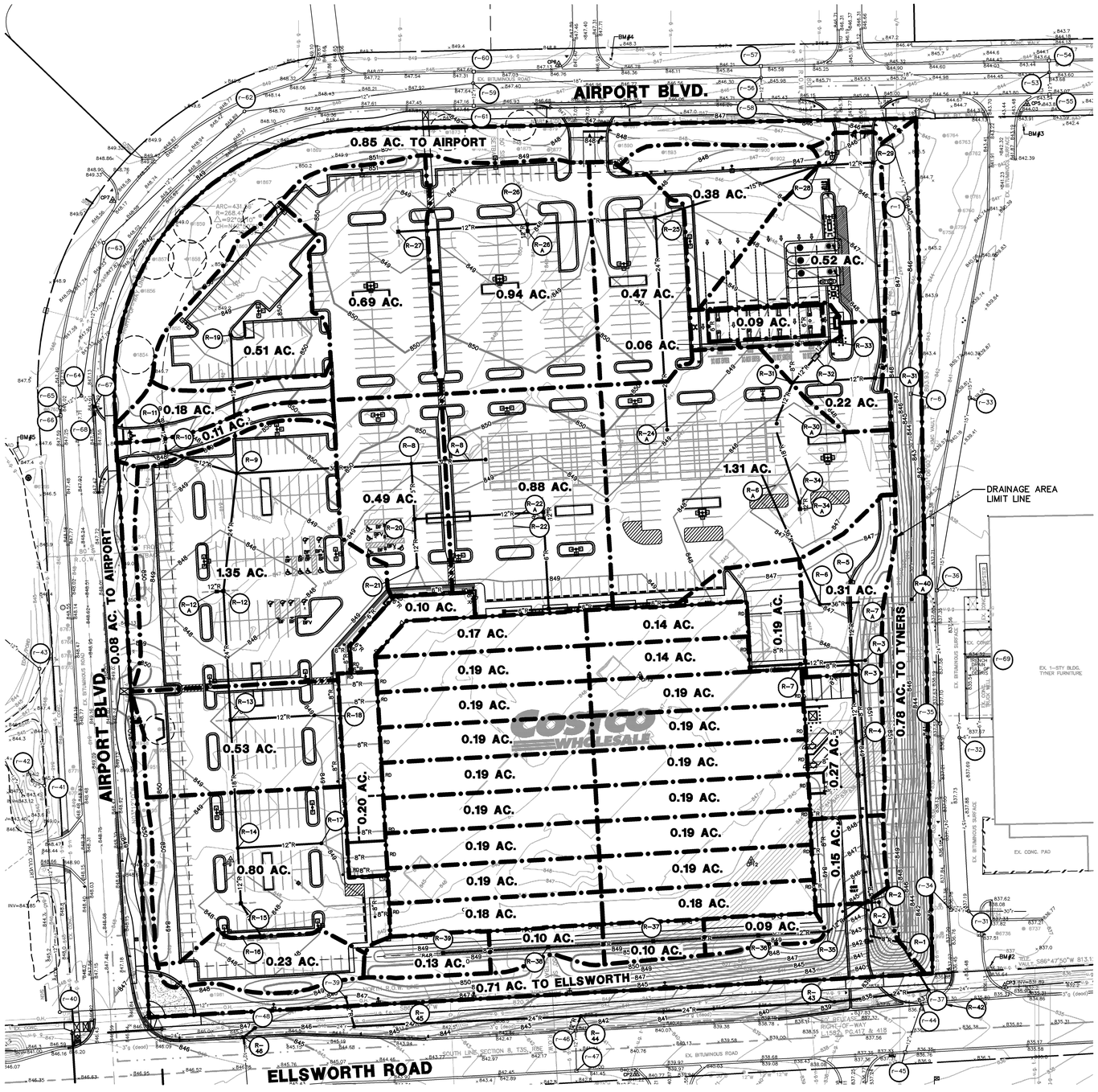

SCALE: 1" = 60'

0 60 120 180

STORM DRAINAGE CALCULATION SHEET

MIDWESTERN CONSULTING, L.L.C.
3815 Plaza Drive
Ann Arbor, MI 48108
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Runoff Formula: Q = CIA

I = x/T+y x = 175 y= 25 (10 Year Storm)

Type of Pipe = RCP

n = 0.013

PROJECT/CLIENT:
Costco
Job No.: 10046
Date: 07/21/11
By: JAF
Rev: 09/06/11

Structure No. From	Structure No. To	Drainage Area A (Acres)	Runoff Coeff. C	CxA	ADD. CxA	ΣCxA	Time T (min.)	Rainfall I (in./hr.)	Q (cfs)	Pipe Dia. (in.)	Pipe Length (ft.)	Pipe Slope %	H.G. Slope %	Velocity Flowing Full (ft./sec.)	Travel Time (min.)	Pipe Capacity (cfs)
R-22	R-20	0.88	0.89	0.78		0.78	15.00	4.38	3.43	12	135	1.00	0.92	4.55	0.49	3.57
R-21	R-20	0.10	0.95	0.10		0.10	15.00	4.38	0.42	12	51	1.00	0.01	4.55	0.19	3.57
R-20	R-8	0.49	0.90	0.44	0.88	1.32	15.49	4.32	5.70	15	58	1.70	0.78	6.88	0.14	8.45
							15.64									
R-19	R-9	0.51	0.76	0.39		0.39	15.00	4.38	1.70	12	145	1.40	0.23	5.38	0.45	4.23
							15.45									
R-18	R-13	1.13	0.95	1.07		1.07	15.00	4.38	4.70	12	88	2.00	1.74	6.43	0.23	5.05
							15.23									
R-17	R-14	0.75	0.95	0.71		0.71	15.00	4.38	3.12	12	88	2.00	0.77	6.43	0.23	5.05
							15.23									
R-16	R-15	0.23	0.74	0.17		0.17	15.00	4.38	0.74	12	42	1.00	0.04	4.55	0.15	3.57
R-15	R-14	0.80	0.81	0.65	0.17	0.82	15.15	4.36	3.57	12	58	1.00	1.00	4.55	0.21	3.57
							15.37									
R-14	R-13	0.00	0.00	0.00	1.53	1.53	15.37	4.34	6.64	18	134	0.60	0.40	4.62	0.48	8.16
							15.85									
R-13	R-12	0.53	0.82	0.43	2.60	3.04	15.85	4.28	13.02	24	135	0.60	0.33	5.59	0.40	17.57
R-12	R-9	1.35	0.82	1.11	3.04	4.15	16.25	4.24	17.59	24	124	0.60	0.60	5.61	0.37	17.57
							16.62									
R-11	R-10	0.18	0.56	0.10		0.10	15.00	4.38	0.44	12	29	2.00	0.02	6.43	0.08	5.05
R-10	R-9	0.11	0.76	0.08	0.10	0.18	15.08	4.37	0.81	12	76	2.00	0.05	6.43	0.20	5.05
							15.28									
R-9	R-8	0.00	0.00	0.00	4.72	4.72	16.62	4.20	19.84	30	183	0.28	0.23	4.43	0.69	21.76
R-8	R-8A	0.00	0.00	0.00		4.72	17.31	4.14	19.51	30	75	0.28	0.23	4.43	0.28	21.76
R-34	R-30A	1.31	0.93	1.22		1.22	15.00	4.38	5.33	18	76	1.00	0.26	5.96	0.21	10.53
							15.21									
R-31A	R-31	0.22	0.86	0.19		0.19	15.00	4.38	0.83	12	86	1.00	0.05	4.55	0.32	3.57
							15.32									
R-33	R-32	0.06	0.81	0.05		0.05	15.00	4.38	0.21	12	18	2.60	0.00	7.33	0.04	5.76
R-32	R-31	0.00	0.00	0.00	0.05	0.05	15.04	4.37	0.21	12	48	1.00	0.00	4.55	0.18	3.57
R-31	R-30A	0.09	0.95	0.09	0.24	0.33	15.32	4.34	1.41	12	43	2.00	0.16	6.43	0.11	5.05
							15.43									
R-29	R-28	0.52	0.86	0.85		0.85	15.00	4.38	3.72	12	57	1.10	1.09	4.77	0.20	3.75
R-28	R-25	0.31	0.38	0.69	0.85	1.54	15.20	4.35	6.70	15	180	1.10	1.08	5.54	0.54	6.79
							15.74									
R-27	R-26	0.69	0.88	0.61		0.61	15.00	4.38	2.66	12	135	1.40	0.56	5.38	0.42	4.23
R-26	R-25	0.94	0.87	0.82	0.61	1.43	15.42	4.33	6.17	15	134	1.00	0.91	5.28	0.42	6.48
							15.84									
R-25	R-24A	0.47	0.88	0.41	2.97	3.38	15.84	4.28	14.48	24	219	0.50	0.41	5.11	0.71	16.04
							16.56									
R-39	R-38	0.13	0.28	0.04		0.04	15.00	4.38	0.16	8	110	0.30	0.02	1.90	0.96	0.66
R-38	R-37	0.10	0.29	0.03	0.04	0.07	15.96	4.27	0.28	8	110	0.30	0.05	1.90	0.96	0.66
R-37	R-36	0.10	0.29	0.03	0.07	0.09	16.93	4.17	0.39	8	110	0.30	0.11	1.90	0.96	0.66
R-36	R-35	0.09	0.29	0.03	0.09	0.12	17.89	4.08	0.49	12	73	0.44	0.02	3.02	0.40	2.37
R-35	R-2	0.56	0.95	0.53		0.12	18.30	4.04	0.49	12	49	0.44	0.02	3.02	0.27	2.37
R-2	R-2A	0.15	0.49	0.07		0.07	15.00	4.38	0.32							
R-7	R-3	0.19	0.88	0.17		0.17	15.00	4.38	0.74	12	52	1.00	0.04	4.55	0.19	3.57
R-5	R-3	0.31	0.69	0.21		0.21	15.00	4.38	0.94	12	84	3.00	0.07	7.88	0.18	6.19
R-4	R-3	0.27	0.71	0.19	0.54	0.73	15.00	4.38	3.20	12	85	3.00	0.81	7.88	0.18	6.19
R-3	R-3A	0.56	0.95	0.53	1.11	1.64	15.18	4.36	7.15	12	11	1.30	4.03	9.13	0.02	4.07

LEGEND

838	EXIST. CONTOUR	g	EXIST. GAS LINE	r	EXIST. STORM SEWER		ENCLOSED TRASH AREA
838	PROP. CONTOUR	w	EXIST. WATER MAIN	R	PROP. STORM SEWER		SIGN
×836.2	EXIST. SPOT ELEVATION	W	PROP. WATER MAIN		EXIST. CATCH BASIN OR INLET		MAILBOX
36.60	PROP. SPOT ELEVATION		EXIST. HYDRANT		PROP. CATCH BASIN OR INLET		TELEPHONE RISER
U.P.	EXIST. UTILITY POLE		PROP. HYDRANT		END SECTION	catv	CABLE TELEVISION RISER
	GUY WIRE		EXIST. GATE VALVE IN BOX		CULVERT		ELECTRIC METER
	ELEC. TRANSFORMER		PROP. GATE VALVE IN BOX	s	EXIST. SANITARY SEWER		WATER METER
OH	EXIST. OVERHEAD UTILITY LINE		EXIST. GATE VALVE IN WELL	S	PROP. SANITARY SEWER		GAS METER
	EXIST. LIGHT POLE		PROP. GATE VALVE IN WELL		EXIST. CLEANOUT		POST
t	EXIST. TELEPHONE LINE		EXIST. CURB STOP & BOX		PROP. CLEANOUT		SINGLE TREE
e	EXIST. ELECTRIC LINE		PROP. CURB STOP & BOX		℄ OF DITCH		FENCE
		P.I.V.	POST INDICATOR VALVE		SIDEWALK RAMP		

TREE OR BRUSH LIMIT

SECTION CORNER

O F FOUND IRON PIPE

CONTROL PT.

EXIST. FLAG POLE

DRAINAGE AREA BOUNDARY

811 Know what's below. Call before you dig.

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Civil, Environmental and Transportation Engineers
Planners, Surveyors
Landscape Architects
3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200
Fax: 734.995.0599

CLIENT
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
DRAINAGE AREA PLAN

26

DATE: 6-23-11
SHEET 27 OF 64

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

CADD: WAJ,SGF
ENG: JAF
PM: DMB
FILE: 10046 FINAL\10046DA1
FBR

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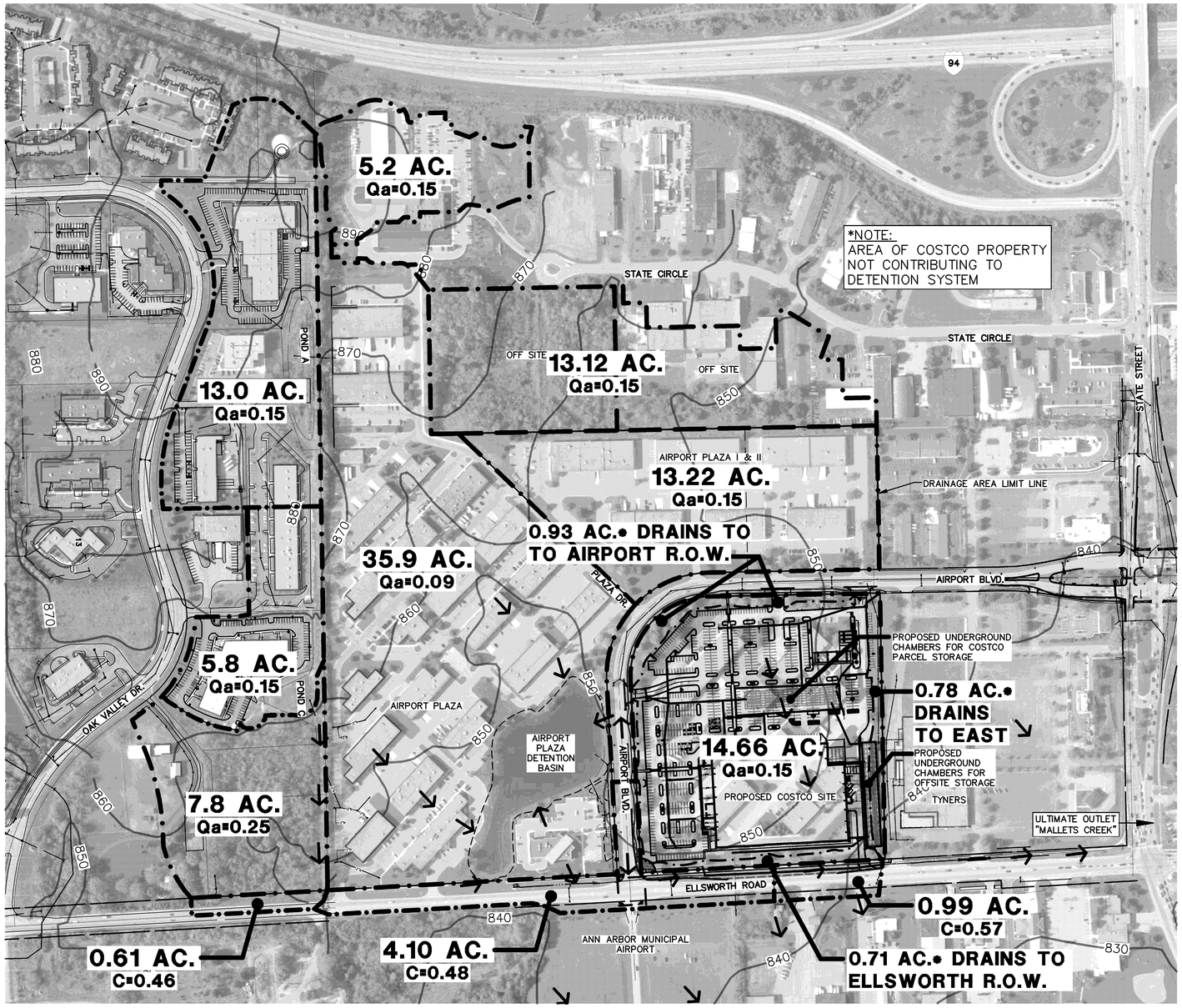


STORMWATER DETENTION CALCULATIONS-COSTCO PARCEL

A. Runoff Coefficients (C):

Proposed Building and Pavement	@	0.95
Proposed Pervious Pavement	@	0.50
Proposed Lawn Area	@	0.25

B. Area Analysis

Area south of State Circle

a. Existing Undeveloped area	=	6.95 Acres	@ 0.25
b. Existing Developed area			
1. Impervious area	=	2.87 Acres	@ 0.90
2. Pervious area	=	3.30 Acres	@ 0.15
Subtotal	=	13.12 Acres	@ 0.37

Area north of Airport Blvd (aka Airport Plaza I & II)

a. Existing Impervious area	=	8.96 Acres	@ 0.90
b. Existing Pervious area	=	4.26 Acres	@ 0.15
Subtotal	=	13.22 Acres	@ 0.66

Costco Parcel

a. Proposed Impervious area	=	12.41 Acres	@ 0.95
b. Proposed Pervious area	=	0.17 Acres	@ 0.50
c. Proposed Lawn area	=	2.08 Acres	@ 0.25
Total Detained Area	=	14.66 Acres	@ 0.85
d. Un-detained area	=	2.42 Acres	
Subtotal	=	17.08 Acres	
Grand Total Area Contributing Area	=	41.00 Acres	

C. Calculate Average Runoff Coefficient

$$C_{avg} = \frac{(13.12 \times 0.37) + (13.22 \times 0.66) + (14.66 \times 0.85)}{41.00} = 0.635$$

D. Detention Volumes:

First Flush: Vol_{FF} = 1,815 x 41.00 x 0.635 = 47,254 CF

Bank Full Vol_{BF} = 8,170 x 41.00 x 0.635 = 212,706 CF

100-Year: WCWRC Method of Calculating Detention Volume

Q_A = 41.00 acres x 0.15 cfs/acre + Infiltration Rate under UG storage

Infiltration area = 16,923 sq. ft north area and 15,072 sq. ft. east area)

Infiltration rate determined from field testing:

North area = 43.95 in/hr x 0.50 (Factor of Safety) = 21.975 in/hr = 0.00051 fps

East area = 65 in/hr x 0.50 (Factor of Safety) = 32.5 in/hr = 0.00075 fps

Q_A = (41.00 x 0.15) + (0.00051 x 16,923) + (0.00075 x 15,072)

= 26.085 CFS

$Q_D = Q_A / AC$

Q_D = 10.112 / (41.00 x 0.635) = 1.002

T = $-25 + (10312.5 / Q_D)^{0.5}$ = 76.5 mins.

V_S = 16500T / (T + 25) - 40 Q_DT = 9,370 CF/AC

$V_T = V_S$ x A x C = 243,951 CF

5% volume in sediment forebay = 12,198 CF

Total Volume = 256,149 CF

E. Detention Volumes Provided:

Elevation	Area (SF)	Volume (CF)	Total (CF)
835.0	0	0	0
836.0	34,578	29,980	29,980
837.0	34,578	29,980	59,960
838.0	34,578	29,980	89,940
839.0	34,578	29,980	119,920
840.0	34,578	29,980	149,900
840.67	34,578	20,084	169,984
841.0	27,516	9,293	179,277
842.0	27,516	28,165	207,442
843.0	27,516	28,165	235,607
843.83	27,516	23,377	258,984

F. Storage Elevations:

First Flush: $H_W = \frac{47,254 - 29,980}{29,980} + 836.0 = 836.58$

Bank Full: $H_W = \frac{212,706 - 207,442}{28,165} + 842.0 = 842.19$

100-Year: $H_W = \frac{256,149 - 235,607}{23,377} \times 0.83 + 843.0 = 843.73$

G. Outlet Structure

First Flush:

$Q_{AVG} = \frac{47,254}{24 \times 3,600}$ = 0.547 CFS

H_{AVG} = 2/3 (836.58 - 835.10) = 0.99 FT

$A = \frac{0.547}{0.62(2 \times 32.2 \times 0.99)^{0.5}}$ = 0.111 SF

A 2-1/2-inch diameter hole has an area of 0.0341 SF

Use three (3) 2-1/2-inch diameter holes with centerline elevation of 835.10.

$Q_{FF} = 0.62 \times 3 \times 0.0341 \times (2 \times 32.2 \times 0.99)^{0.5}$ = 0.506 CFS

$T_{FF} = \frac{47,254}{0.506 \times 3,600}$ = 25.9 HRS

Bankfull:

H_{AVG} = 2/3 (842.19 - 835.10) = 4.73 FT

$Q = 0.62 \times 3 \times 0.0341 \times (2 \times 32.2 \times 4.73)^{0.5}$ = 1.107 CFS

$T = \frac{212,706}{1.107 \times 3,600}$ = 53.4 HRS

Time exceeds 48 hours; therefore, additional holes are needed.

Target time for detention assumed to be 42 hours.

$V_{REM} = V_{BF} - V_{FF}$ = 212,706 - 47,254 = 165,452 CF

$T_{REM} = T_{TOT} - T_{FF}$ = 42.0 - 25.9 = 16.1 HRS

Volume through three (3) 2-1/2-inch diameter holes is:

$H_{AVG} = 2/3 (ELEV_{BF} - ELEV_{FF}) + (ELEV_{FF} - ELEV_{BT})$

= 2/3 (842.19 - 836.58) + (836.58 - 835.10) = 5.22 FT

$Q_1 = 0.62 \times 3 \times 0.0341 \times (2 \times 32.2 \times 5.22)^{0.5}$ = 1.163 CFS

V_1 = 1.163 x 16.1 x 3,600 = 67,402 CF

$V_2 = V_{REM} - V_1$ = 165,452 - 67,402 = 98,050 CF

$Q_2 = \frac{V_2}{T_{REM}} = \frac{98,050}{16.1 \times 3,600}$ = 1.692 CFS

$H_{AVG} = 2/3 (ELEV_{BF} - ELEV_{FF})$ = 2/3 (842.19 - 836.58) = 3.74 FT

$A = \frac{1.692}{0.62(2 \times 32.2 \times 3.74)^{0.5}}$ = 0.176 SF

A 2-1/2-inch diameter hole has an area of 0.0341 SF.

Use five (5) 2-1/2 inch diameter holes at an elevation of 836.58.

(3) 100-Year: Allowable Discharge (Not including infiltration)

Q_1 = 0.15 CFS x 41.00 ac = 6.150 CFS

$Q_{BF}+Q_{BF} = 0.62 \times 3 \times 0.0341 \times ((2 \times 32.2 \times (843.73 - 835.10))^{0.5} +$

$0.62 \times 5 \times 0.0341 \times ((2 \times 32.2 \times (843.73 - 836.58))^{0.5}$ = 3.764 CFS

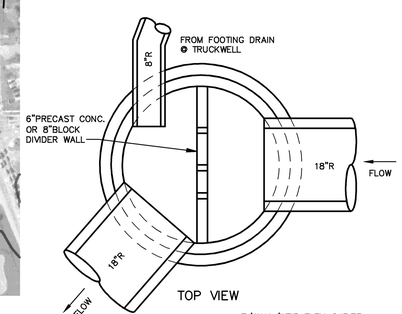
Q_{100} = 6.150 – 3.764 = 2.386 CFS

H = $ELEV_{100} - ELEV_{BF}$ = 843.73 - 842.19 = 1.54 FT

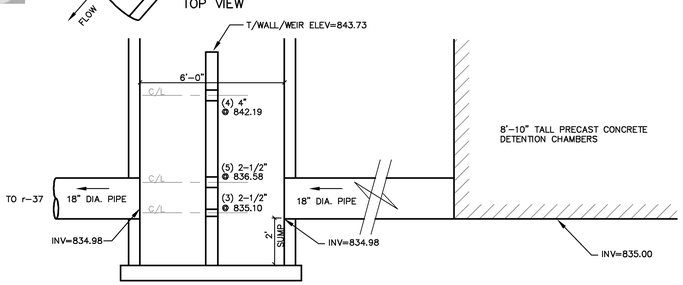
$A = \frac{2.386}{0.62 (2 \times 32.2 \times 1.54)^{0.5}}$ = 0.387 SF

A 4 inch diameter hole has an area of 0.0873 SF

Use four (4) 4 inch diameter holes with centerline elevation of 842.19.



TOP VIEW



PLAN VIEW

OUTLET CONTROL STRUCTURE
MANHOLE R-1 DETAIL

NOT TO SCALE

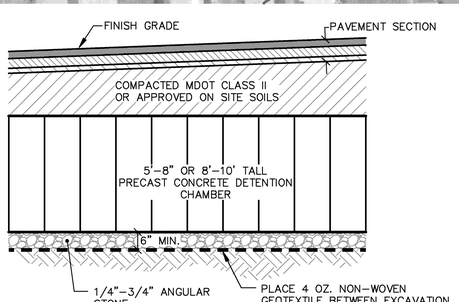
SCALE: 1" = 200'

0 200 400 600

Know what's **below.** **Call** before you dig.

LEGEND

850	USGS CONTOUR
	DRAINAGE AREA BOUNDARY
3.2 AC	DRAINAGE AREA IN ACRES
C=0.83	DRAINAGE AREA RUNOFF COEFFICIENT
Qa=0.09	ALLOWABLE DISCHARGE IN CFS/ACRE



INFILTRATION INTERFACE DETAIL
@ UNDERGROUND PIPE SYSTEM

NOT TO SCALE

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COSTCO
FINAL SITE PLAN
DRAINAGE AREA & STORM WATER MANAGEMENT PLAN

DATE: 6-23-11
SHEET 28 OF 64
CADD: WAJ,SGF
ENG: JAF
PM: DMB
TECH: SGF
FINAL\10046DA1
FB#:

JOB No. **10046**

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCWRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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OUTLET DITCH AND CULVERT CAPACITY CALCULATIONS

A. Contributing Drainage Areas

(1)	Valley Ranch (Northeast – Pond A)	=	13.0 Acres
(2a)	Valley Ranch (Center-east – Pond C)	=	5.8 Acres
(2b)	Valley Ranch (Southeast corner)	=	7.8 Acres
(3)	Airport Plaza (between Valley Ranch and Airport Blvd Former AP Phases 4, 5, 6, and 8	=	35.9 Acres
(4)	Huron Valley Ambulance (part of former AP Phase 7)	=	5.2 Acres
(5)	North of Airport Blvd (between Airport Blvd and State Circle)	=	26.3 Acres
(6)	Costco Parcel	=	15.27 Acres
(7)	Ellsworth Road (West portion) = 0.61 ac + 4.10 ac)	=	4.71 Acres
(8)	Ellsworth Road (East portion)	=	0.99 Acres

(Note: The storm water drainage and collection system for most of Airport Blvd is a separate system, not connected to any of the areas listed above.)

B. Structure R-53 to structure R-37
Calculation of the maximum (10 year design) storm water runoff contributing to sewer from proposed structure R-53 to reconstructed structure R-37

(1) Assumptions
a. The areas contributing to this sewer are items (1), (2a & 2b), (3), (4) and (7).
b. Areas (1), (2a) & 4 are controlled by detention pond outlets designed after and per the current WCWRC requirements for a maximum discharge of 0.15 cfs/acre.
c. Area (3) has a discharge controlled according to the original (see attached) calculations done in June of 1982 of 4.84 cfs for 52.7 acres or 0.09 cfs/acre
d. Areas (2b) and (7) have their runoff calculated by Q= ACI with "t" (initial time of concentration + travel time) = 40 minutes used in the rainfall intensity formula I=175/(t+25)

(2) Stormwater flow (Q) calculations

Q = ((13.0 + 5.8 + 5.2) x 0.15 cfs/acre)) + (35.9 x 0.09 cfs/acre) + (((7.8 x 0.25)+ (0.61 x 0.46) + (4.10 x0.48)) x (175/(40 + 25))
= 3.50 + 3.23 + 11.30 = 18.13 cfs

The existing ditch is to be eliminated and a proposed 24" diameter reinforced concrete pipe will be installed at a slope of 1.04% with a capacity of 23.0 cfs. The depth of flow in the pipe that is approximately 79% (18.13/23.0) of that flowing full would be (from the sewer pipe hydraulics curves) approximately 0.66 x 2.0 feet = 1.32 ft.

C. Structure R-37 to end section
Calculation of the maximum (10 year design) storm water runoff contributing to sewer from reconstructed structure R-37 to existing end section
(1) Assumptions
a. The areas contributing to this sewer are all the items listed above
b. Areas (5 and (6) are controlled by detention pond outlets designed after and per the current WCWRC requirements for a maximum discharge of 0.15 cfs/acre.
c. Area (8) runoff is calculated by Q= ACI where t = (40 + 1) minutes in the rainfall intensity formula I=175/(t+25)

(2) Stormwater flow (Q) calculations

Q = 18.13 cfs + ((26.3 + 15.27) x 0.15)) + ((0.99 x 0.52 x (175/(41 + 25))
= 18.13 + 6.24 + 1.37 = 25.74 cfs

The existing 24" diameter reinforced concrete pipe has a slope of 0.54% with a capacity of 16.6 cfs. Since this is less than the calculated flow, the hydraulic grade line to accommodate that 25.74 cfs flow would be approximately 1.30%. Based on a pipe length of 94 feet and a hydraulic slope of 1.30%, the elevation of the hydraulic grade line at R-37 will be above the top of the pipe and calculated as follows:

HGL = (existing end section invert of 831.89) + (0.8 pt of 24" pipe = 1.6)
+ (HG of 1.3% x 94 feet = 1.22 feet) = 834.72

A. Analysis of Existing Ellsworth Road Ditch Capacity
Using Manning's equation for open ditch flow $Q = (1.486/n) \times (A \times R^{0.67} \times S^{0.5})$

Assume: n = 0.022
Depth in ditch of 1.46 feet
A = 7.85 square feet
WP = 10.23 feet
R = A/WP = 7.85/10.23 = 0.767 $R^{0.67}$ = 0.838
S = 0.34% $S^{0.5}$ = 0.058

Q = (1.486/0.022) x 7.95 x 0.842 x 0.058 = 25.78 cfs (slightly > 25.74 cfs)

Therefore the depth of water in the ditch would be slightly less than 1.46 feet.

B. Analysis of Existing 18-inch diameter CMP culvert (@ east Tyner's driveway from Ellsworth Rd)
With "inlet control" condition, the capacity of the culvert is determined based on the available headwater elevation as follows:

HW = 834.08 (top of curb nearest to end of pipe) – 831.11 (invert of pipe)
= 2.93 feet

HW/D = 2.93/1.5 = 1.98

Using HEC-5, Chart 5 (attached) nomograph for corrugated metal pipe, the capacity of this pipe for HW/D of 1.98 and an entrance condition of type 2 would be approximately 11.1 cfs.

With a calculated flow passed this culvert of approximately 25.74 cfs and only 11.1 cfs capable of passing through it, the remaining 14.64 cfs is forced to spill over the driveway and into the street, and then once passed the driveway back into the ditch. Therefore this culvert should be replaced

F. Design/Analysis of Replacement Culvert (@ east Tyner's driveway from Ellsworth Rd)
Using HEC-5, Chart 2 nomograph for concrete pipe with "inlet control" condition

(Note: there will not be an "outlet control" condition since the high water elevation of the ditch is less than 0.8 pt of pipe (1.45 vs 1.60)

Assume: Pipe is 24" diameter, reinforced concrete pipe
Q = 25.74 cfs
Existing slope = 0.50%; Proposed slope = 0.27%
Entrance type is 2 (for end section)

HW/D = 1.70 (See attached nomograph); for D = 2, HW = 3.40 feet

It is proposed to hold the invert of the downstream end of the existing culvert at 830.69 and set the upstream invert to 830.69 + (100 x 0.16%) = 830.85. Therefore the high water elevation at the culvert entrance (upstream end) would be 830.85 + 3.40 = 834.25.

The hydraulic grade line elevation of 834.25 controls until it meets the hydraulic grade line of the existing 24-inch pipe east from structure R-37. The controlling elevation at r-37/R-42 will be 834.74 due to the capacity of the existing 24" pipe. To keep the outlet end of the discharge pipe above the hydraulic grade line of the receiving manhole, the bottom of the detention basin will be set at 835.00, and the invert elevation of the discharge pipe from the proposed detention basin will be 835.00 – (60 lf x 0.30%) = 834.82 which will be above that HG elevation of 834.74. (See sewer and ditch profile.)

STORM WATER DRAINAGE NARRATIVE

The proposed Costco site is the existing Phase III of Airport Plaza. The parcel is located west of S. State Street, on the north side of W. Ellsworth Road. It is bounded on the west and north by Airport Boulevard, in the southeast 1/4 of Section 8 of Pittsfield Township.

The proposed drainage area encompasses the same areas that now drain into an existing detention basin at the southeast corner of the property. This drainage area includes the off-site areas north of Airport Blvd., including most of Airport Plaza Phase I and Phase II, and much of the area south of State Circle, as shown on the overall drainage map. (Note: It does not include Airport Blvd, which has its own detention system.)

The area north of Airport Blvd currently drains via storm sewers south along the east property line of the Costco site to and through the existing detention basin at the southeast corner of the Costco property. It is proposed that this drainage be directed into the proposed underground chamber system.

The proposed detention system is designed to meet the current Washtenaw County Water Resources Commission requirements for first flush, bank full and 100-year storm events. Detention volume will be provided by the use of the "StormTrap" underground system of chambers located in two (2) areas, one north of the proposed building in/under the proposed parking area and the other along the east side of the property between the proposed driveway east of the proposed building and the east property line.

The two (2) underground detention arrays of chambers are connected by a 36-inch diameter pipe which will act as an equalizer, making the 2 arrays a unified system to provide the various levels of detention required. The entire detention system will have its discharge controlled to the allowable flows by a new control structure (riser) with holes at various levels to provide the required detention volumes for the various rainfall events. The structure/riser will outlet into the existing 24-inch reinforced concrete pipe culvert in Ellsworth Road, the same as does the existing detention basin discharges.

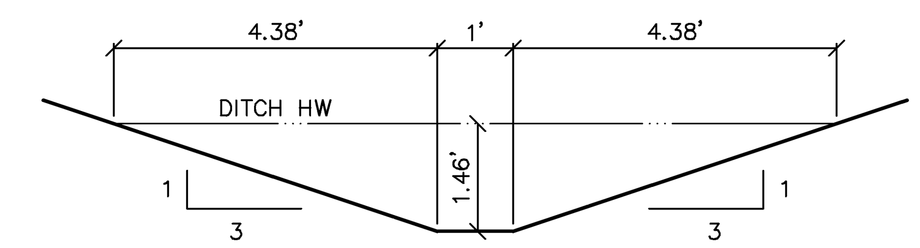
Because the site is composed of sandy/gravel soils with rapid infiltration, particularly in the areas below the detention chamber system, the allowable discharge from the detention system has been increased as permitted by the WCWRC, thus reducing the proposed storm water detention volume that would normally be required. Per in-situ double ring infiltrometer tests by Somat Engineering Co. report dated August 24, 2011, the infiltration rate of the east detention area was determined to be 65 in/hr; the infiltration rate of the north detention area was determined to be 43.95 in/hr. Per the WCWRC, these rates were reduced by 50% before determining the allowable discharge. The resulting detention volume required 100 year storm event plus 5% for sediment control was calculated to be 256,149 cubic feet.

The sediment will be controlled at the upper end of the chambers. Sediment forebays will be inserted at each inlet point of the underground detention chamber system. The size of each sediment forebay is related to the area and runoff coefficient contributing to it. The forebays are to be constructed by "boxing" in an area to provide the required volume. The boxing is achieved by either precasting or building-in-place with concrete blocks and mortar the required area as shown on the plan. The top of the sediment volume is at or below the invert elevation of the inlet pipe. Part of the areas under the sediment forebays is not counted towards the infiltration discussed above.

Note: To assure the capacity of the receiving culvert(s) and ditch, the existing 18-inch diameter corrugated metal pipe culvert under the Tyner's driveway leading to the front of Tyner's, will need to be replaced with a 24-inch diameter reinforced concrete pipe.) The route of the storm water is easterly along and through the Ellsworth Road ditch and culverts to the main branch of Malletts Creek east of State Street.

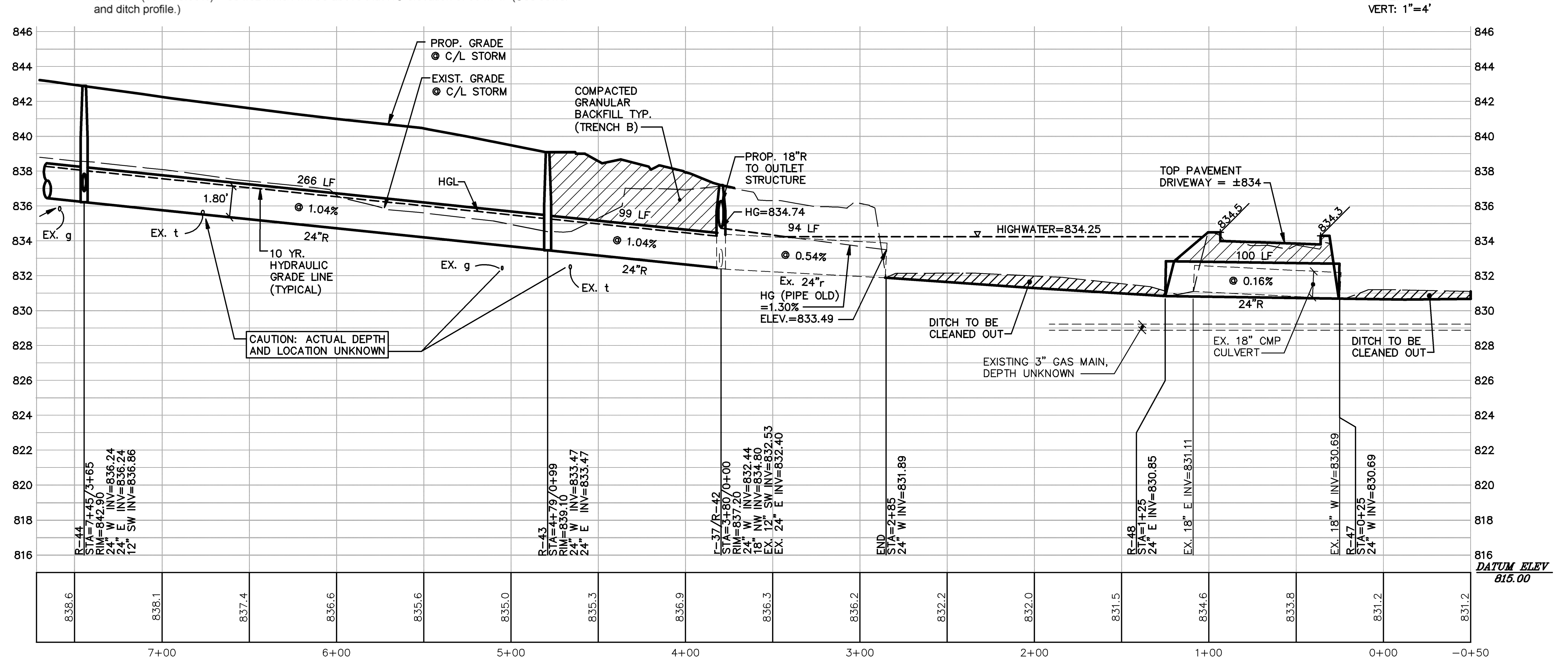
There will be small portions of the site (from a perimeter berm to the right-of-way/property line) that are not detained on the site. Because of the sandy nature of the soils, the runoff will either infiltrate the soil or continue to drain off-site as they have historically done.

With the methods proposed for storm water management at this project, we believe that there will be no negative downstream impacts as a result of this development.



EXISTING DITCH SECTION
SCALE: 1/2"=1'

SCALES:
HORZ: 1"=40'
VERT: 1"=4'



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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
OFFSITE DITCH, CULVERT DETAILS & STORM WATER DRAINAGE NARRATIVE

28

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11
PER WCRC REVIEW	2-07-12

DATE: 6-23-11
SHEET 29 OF 64
CADD: SGF,WAJ
ENG: JAF
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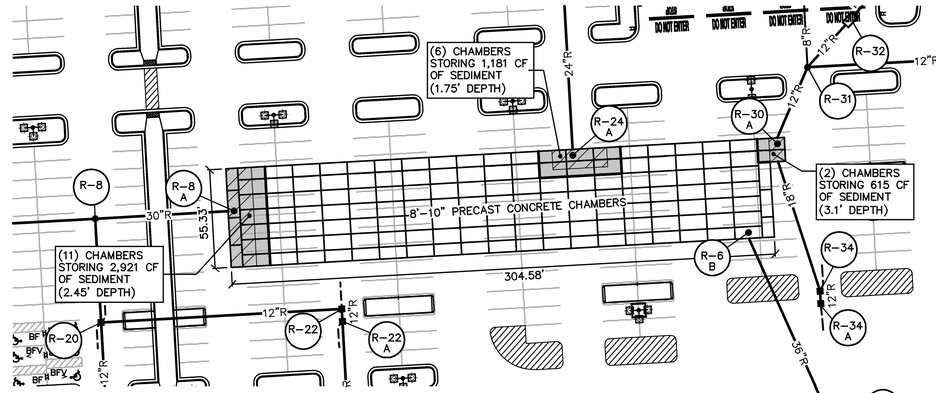
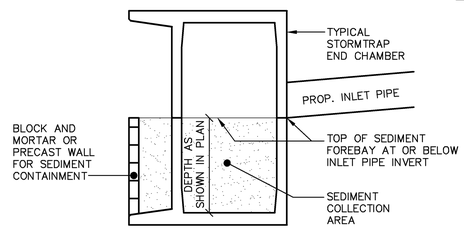


NORTH STORMWATER STORAGE SYSTEM

SCALE 1" = 40'

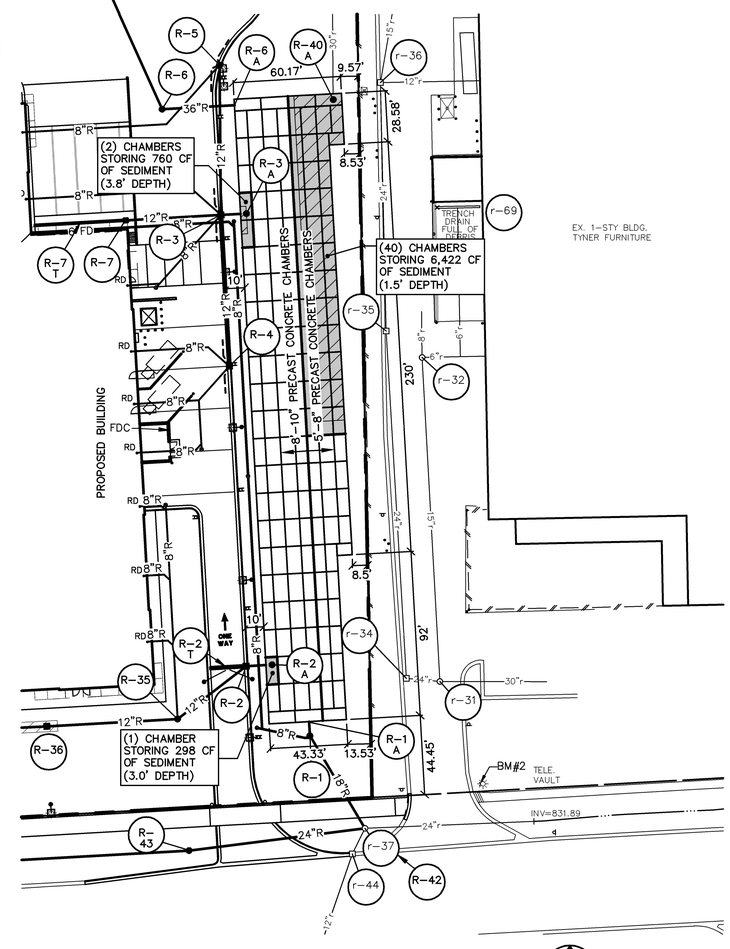
HATCHED AREA IS AREA UNDER SEDIMENT FOREBAY NOT USED FOR AREA OF INFILTRATION



SEDIMENT FOREBAY X-SECTION

NOT TO SCALE

FOREBAY NOTE:
FOREBAY AREAS WITHIN THE CHAMBERS SHALL BE CREATED BY BLOCKING IN CHAMBERS TO CREATE WALLS TO HOLD THE SEDIMENT IN THE DESIGNATED AREA. THIS MAY BE ACCOMPLISHED BY EITHER FIELD PLACED CONCRETE BLOCK AND MORTAR, OR PRECAST WITH THE CHAMBERS AT THE MANUFACTURER'S PLANT. SEE SHEET 30 FOR STORMTRAP CHAMBER DETAILS



EAST STORMWATER STORAGE SYSTEM

SCALE 1" = 40'

ANNUAL MAINTENANCE BUDGET	
INSPECT FOR FLOATABLES, DEBRIS AND SEDIMENT ANNUALLY AND AFTER MAJOR STORMS.	$500
REMOVE FLOATABLES, DEBRIS AND SEDIMENT ANNUALLY AND AFTER MAJOR STORMS.	$800
RE-ESTABLISH PERMANENT VEGETATION ON ERODED SLOPES.	$250
INSPECT STORM WATER PRETREATMENT UNITS, DURING WET WEATHER AND COMPARE TO AS BUILT PLANS EVERY 4 YEARS	$150
HAVE A MICHIGAN REGISTERED PROFESSIONAL ENGINEER CARRY OUT EMERGENCY INSPECTIONS UPON IDENTIFICATION OF SEWER PROBLEMS	$300
PREPARE AN ANNUAL INSPECTION, MAINTENANCE AND REPAIR REPORT PREPARED BY A MICHIGAN REGISTERED PROFESSIONAL ENGINEER AND SUBMIT TO THE OFFICE FO THE WASHTENAW COUNTY DRAIN COMMISSIONER.	$1,500
	$3,500

STORM WATER MANAGEMENT SYSTEM MAINTENANCE TASKS AND SCHEDULE DURING CONSTRUCTION

TASKS	Adjacent Public Streets	Storm Sewer System	Catch Basin Sumps	Catch Basin Inlet Castings	Natural Areas	Stormwater Pretreatment Units	Undergound Storm Water Detention Systems	Outflow Control Structures	Emergency Overflow	Schedule
Inspect for sediment accumulation	X	X	X		X	X	X	X		Weekly
Removal of sediment accumulation		X	X		X	X	X	X	X	As needed* & prior to turnover
Inspect for floatables and debris			X	X	X	X		X		Weekly
Cleaning of floatables and debris			X	X	X	X		X		As needed and at turnover
Inspection for erosion					X					Weekly
Re-establish permanent vegetation on eroded slopes					X					As needed & at turnover
Clean Streets	X									As needed
Inspect stormwater system components		X	X	X		X		X	X	After rain events and at turnover
Make adjustments or replacements		X	X	X		X		X	X	As needed
*As Needed means when sediment has accumulated to a maximum depth of one foot.										
**The Contractor will be responsible for maintenance during construction										

PERMANENT MAINTENANCE TASKS AND SCHEDULE

Task	COMPONENTS										Maintenance Schedule
	Streets or Parking Lot	Storm Sewer System	Catch Basin Sumps	Catch Basin Inlet Castings	Ditches & Swales	Outflow Control Structures	Riprap	Filtration Basins	Storm Detention Areas	Emergency Overflow	
Inspect for sediment accumulation		X	X		X	X		X	X		After 1" rain event and annually
Removal of sediment accumulation		X	X		X	X		X	X		As needed
Inspect for floatables and debris				X	X	X		X	X		After 1" rain event and annually
Cleaning of floatables and debris				X	X	X		X	X		After 1" rain event and annually
Inspection for erosion					X	X		X	X		Annually
Re-establish permanent vegetation on eroded slopes					X			X	X		As needed
Replacement of stone						X					Every 3-5 years, as needed
Clean pavement	X										Semi-annually
Mowing					X			X	X		0-2 times per year
Inspect stormwater components during wet weather and compare to as-built plans (by professional engineer reporting to Costco)		X	X	X	X	X	X	X	X	X	Annually
Make adjustments or replacements as determined by annual wet weather inspection		X	X	X	X	X	X	X	X	X	As needed
Keep records of all inspections and maintenance activities. Report to Costco.											Annually
Keep records of all costs for inspections, maintenance and repairs. Report to Costco.											Annually

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COSTCO

FINAL SITE PLAN
MISC. DETENTION CHAMBER SYSTEM DETAILS AND STORM WATER MAINTENANCE SCHEDULES

DATE: 6-23-11
SHEET 30 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FILE: FINAL\10046011.PB#

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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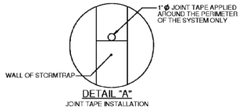
STORMTRAP INSTALLATION SPECIFICATION

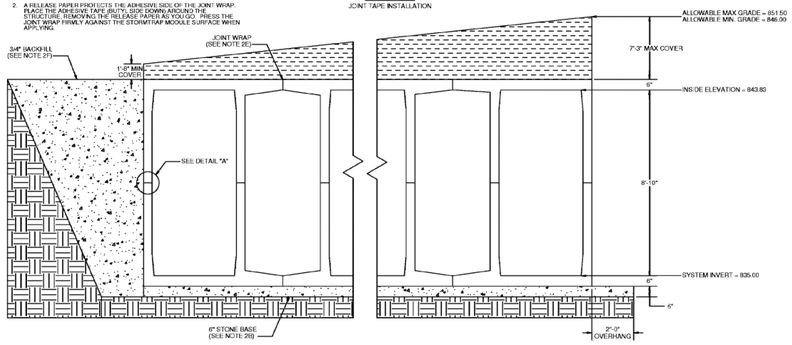
1. STORMTRAP MODULES SHALL BE MANUFACTURED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/OUTLET PIPE OPENINGS.
2. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891-90, STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRE-CAST CONCRETE UTILITY STRUCTURES. THE FOLLOWING ADDITIONS AND/OR ACCEPTABLE ALTERNATIVES:
   A. SPECIFICATIONS ON THE ENGINEER'S DRAWINGS SHALL TAKE PRECEDENCE.
   B. STORMTRAP MODULES SHALL BE PLACED ON LEVEL 6" PAD OF 3/4" CRUSHED STONE. THE PAD SHALL EXTEND 12" BEYOND THE PERIMETER. PER ASTM C891-90 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES.
   C. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED 3/4". IF THE SPACE EXCEEDS 3/4", THE MODULES SHALL BE reset WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.
   D. THE PERIMETER HORIZONTAL JOINT OF THE STORMTRAP MODULES SHALL BE SEALED TO THE FOOTINGS WITH PREFORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891 90, § 8 AND § 12.
   E. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH PRE-FORMED, COLD-APPLIED, SELF-ADHERING, ASPHALT-RUBBER JOINT WRAP CONFORMING TO ASTM C877 AND WEATHER RESISTANT POLYMER WRAP CONFORMING TO ASTM C919-89 AND SHALL BE 9-8" INTEGRATED PRIMER SEALANT AS APPROVED BY STORMTRAP. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:
      1. USING A WIRE BRUSH, THOROUGHLY CLEAN THE OUTSIDE SURFACES AT THE POINT WHERE THE JOINT WRAP IS TO BE APPLIED.
      2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PEACE THE ADHESIVE TAPE BUTTS, SIDE DOWN AROUND THE STRUCTURE. REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.
   F. THE FILL PLACED AROUND THE STORMTRAP UNITS MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL DEVIATE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 12" IN THICKNESS OR AS OTHERWISE SPECIFIED BY ENGINEER. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES BOUNDING OR WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR BENCHED TO PREVENT WEDGE ACTION. (REFERENCE ARTICLE 602.10 I.D.O.T. S.S.R.B.D.) CARE SHALL BE TAKEN TO PREVENT DAMAGE TO THE STORMTRAP UNITS. ANY EQUIPMENT DURING THE BACKFILL PROCESS. BACKFILL MATERIAL NOT TO EXCEED 120 PCF SOIL DENSITY OR 60 LBS PER FOOT OF LATERAL SATURATED PRESSURE. (RECOMMENDED BACKFILL IS CONSIST OF 3/4" COARSE AGGREGATE STONE OR APPROVED EQUAL AND SHALL CONFORM TO THE ABOVE DENSITY/LATERAL SATURATED PRESSURE REQUIREMENTS.

STORMTRAP SPECIFICATION

1. TOTAL COVER, MIN. 1'-0" MAX. 7'-3" CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
2. CONCRETE CHAMBERS DESIGNED FOR AASHTO HS-20 HIGHWAY LOADING. MIN. SOIL PRESSURE 3000 PSF.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE WATER TABLE IS ASSUMED TO BE BELOW THE SYTEM INVERT.
5. FOR STRUCTURAL CALCULATIONS THE SOIL DENSITY IS ASSUMED TO BE 120 PCF.
6. STORMTRAP IS NOT WATERTIGHT - PLEASE ADVISE IF A WATERTIGHT SOLUTION IS NEEDED.



DETAIL "A"
JOINT TAPE INSTALLATION



DOUBLETRAP

RECOMMENDED PIPE/RISER SPECIFICATION

1. CONNECTING PIPES SHALL BE INSTALLED WITH A 1/2" CONCRETE COLLAR, AND A CONCRETE CRADLE FOR AT LEAST ONE PIPE LENGTH, AS SHOWN. A STRUCTURAL GRADE CONCRETE OR GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
2. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH NON-SHRINK GROUT.

RECOMMENDED INSTALLATION INSTRUCTIONS

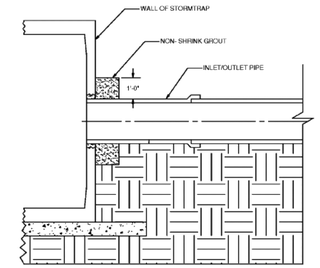
1. CLEAN AND LIGHTLY LUBRICATE ALL OF PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

RECOMMENDED ACCESS OPENING SPECIFICATION

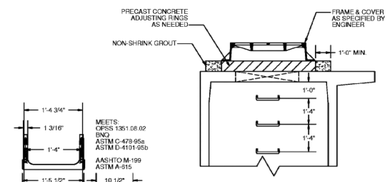
1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM RANGES FROM 2'-0" TO 3'-6" IN DIAMETER. ACCESS OPENINGS LARGER THAN 2'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PSS-PFC (SEE DETAIL TO THE RIGHT) ARE PROVIDED INSIDE ANY UNIT WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE UNIT IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP UNITS. ALL ENSUING STEPS SHALL BE PLACED WITH A MINIMUM DISTANCE OF 1'-0" BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE UNIT.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO COINCIDE WITH THE ACCESS OPENING OR THE CENTER OF GRAVITY OF THE UNIT AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY NOT INTERFERE WITH INLET AND/OR OUTLET OPENINGS.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST ONE ACCESS OPENING PER SYSTEM.

RECOMMENDED PIPE OPENING SPECIFICATION

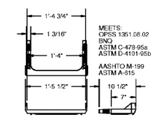
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE IN ALL DIRECTIONS FROM THE EDGE OF THE STORMTRAP UNITS.
3. OPENING SIZE SHALL NOT EXCEED Ø36" OR 1'-6" LESS THEN THE INSIDE HEIGHT OF THE UNIT. EXAMPLE: 3'-0" UNIT MAXIMUM OPENING = Ø1'-6".
4. OPENINGS ARE NOT LIMITED TO THE ABOVE PARAMETERS BUT ARE RECOMMENDED. ANY OPENING NEEDED THAT DOES NOT FIT THE CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.



FOUNDATION
PIPE CONNECTION



RISER / STAIR DETAIL



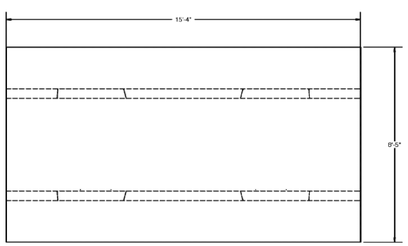
MEETS:
OPSS 1351.08.02
ENG
ASTM C-478-95a
ASTM E-1511-95b

AASHTO M-199
ASTM A-015

STAIR DETAIL

NOTES:
1. INFILTRATION OPENINGS WILL NOT BE USED IN UNITS USED FOR SEDIMENT FOREBAYS.

2. FOREBAY AREAS WITHIN THE CHAMBERS SHALL BE CREATED BY BLOCKING IN CHAMBERS TO CREATE WALLS TO HOLD THE SEDIMENT IN THE DESIGNATED AREA. THIS MAY BE ACCOMPLISHED BY EITHER FIELD PLACED CONCRETE BLOCK AND MORTAR, OR PRECAST WITH THE CHAMBERS AT THE MANUFACTURER'S PLANT.



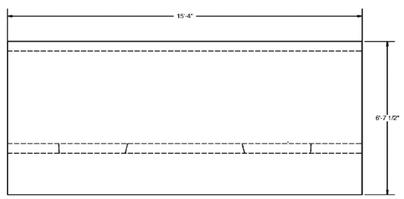
PLAN VIEW

INSIDE CHAMBERS

CHAMBER HEIGHT	CHAMBER VOLUME
68 INCHES	676 CF
106 INCHES	1,069 CF

CORNER CHAMBERS

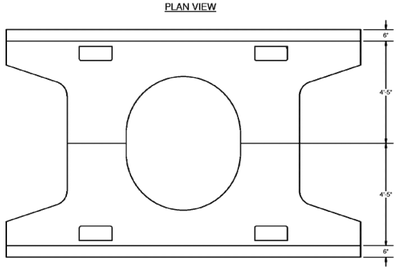
CHAMBER HEIGHT	CHAMBER VOLUME
68 INCHES	255 CF
106 INCHES	402 CF



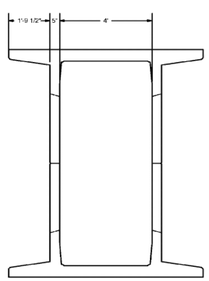
PLAN VIEW

OUTSIDE CHAMBERS

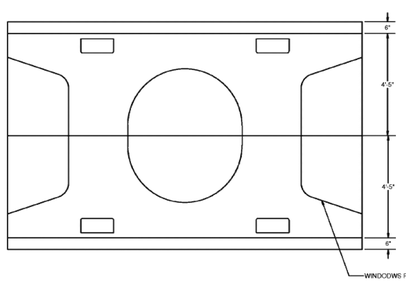
CHAMBER HEIGHT	CHAMBER VOLUME
68 INCHES	511 CF
106 INCHES	804 CF

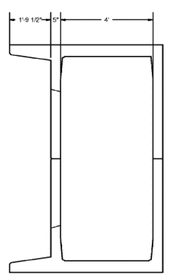


ELEVATION VIEW



SIDE VIEW





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COSTCO
FINAL SITE PLAN
UNDERGROUND DETENTION CHAMBERS DETAILS

30

DATE: 6-23-11
SHEET 31 OF 64
CADD: WAJ
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1. STORMTRAP MODULES SHALL BE MANUFACTURED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/OUTLET PIPE OPENINGS.
2. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891-90, STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRE-CAST CONCRETE UTILITY STRUCTURES. THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:

A. SPECIFICATIONS ON THE ENGINEER'S DRAWINGS SHALL TAKE PRECEDENCE.

B. STORMTRAP MODULES SHALL BE PLACED ON A BED OF CLEAN, CRUSHED, ANGULAR STONE, WITH A NOMINAL SIZE DISTRIBUTION BETWEEN 1/2" TO 3/4" OR APPROVED EQUAL. THE BED SHALL BE PROPERLY COMPACTED TO A MINIMUM 2-CYCLE PLATE VIBRATORY COMPACTION. THE BED SHALL EXTEND A MINIMUM 2'-0" OVERHANG BEYOND THE LIMITS OF THE STORMTRAP INSTALLATION. A MINIMUM 2'-0" OVERLAP MUST BE MAINTAINED ON ALL AREAS OF THE GEOGRID.

1. FOR SYSTEMS REQUIRING INFILTRATION, REFER TO THE CIVIL ENGINEER'S DRAWINGS FOR SPECIFICATIONS PERTAINING TO THE SUBGRADE.
2. IF INFILTRATION IS NOT NECESSARY, DISK, DRY AND COMPACT THE TOP 8" OF THE SUBGRADE SOILS TO 95% OF THE STANDARD DRY DENSITY AND 110% OPTIMUM MOISTURE CONTENT.

C. AGGREGATE SHALL BE GRADED TO WITHIN +/- 1/4" OF THE GRADE SHOWN ON THE PLANS

D. MINIMUM 3000 PSF SOIL BEARING CAPACITY. SOIL STRENGTHS TO BE VERIFIED IN FIELD BY OTHERS.

E. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED 3/4". IF THE SPACE EXCEEDS 3/4", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

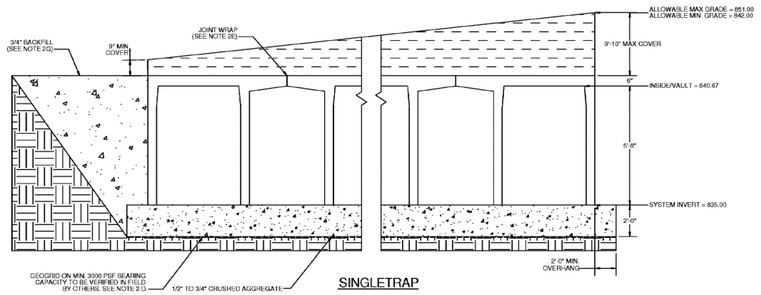
F. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC BUTYL BONDED TO A WOVEN HIGHLY PUNCTURE RESISTANT POLYMER WRAP CONFORMING TO ASTM C891-90 AND SHALL BE 6"x9" INTEGRATED PRIMER SEALANT AS APPROVED BY STORMTRAP. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE THE JOINT WRAP IS TO BE APPLIED.
2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. TO ACTIVATE THE ADHESIVE TAPE, ADHESIVE SIDE DOWN AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

G. THE REMAINING BACKFILL PLACED AROUND THE STORMTRAP UNITS MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL BE COMPACTED TO 95% OF THE STANDARD DRY DENSITY AND 110% OPTIMUM MOISTURE CONTENT. SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES BOUNDING OR WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR BENCHED TO PREVENT WEDGE ACTION. (REFERENCE ARTICLE 502.03.D.C.T.S.S.B.D.C.) CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MAT SHALL NOT TO EXCEED 120 PCF. (REFERENCE ARTICLE 502.03.D.C.T.S.S.B.D.C.) THE BACKFILL MATERIAL RECOMMENDED BACKFILL TO CONSIST OF 3/4" COARSE AGGREGATE STONE OR APPROVED EQUAL AND SHALL CONFORM TO THE ABOVE DENSITY/LATERAL SATURATED PRESSURE REQUIREMENTS.

STORMTRAP SPECIFICATION

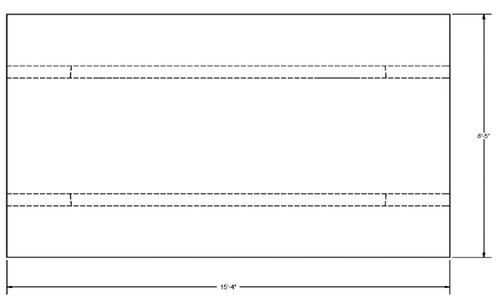
1. TOTAL COVER MIN. 9" MAX. 9'-10" CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
2. CONCRETE CHAMBER DESIGNED FOR AASHTO HS-20 WHEEL LOAD. MIN. SOIL PRESSURE 3000 PSF.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE SOIL DENSITY IS ASSUMED TO BE 120 PCF.
5. FOR STRUCTURAL AND FLOATATION CALCULATIONS GROUND WATER TABLE IS ASSUMED TO BE BELOW THE SYTEM INVERT. IF DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.



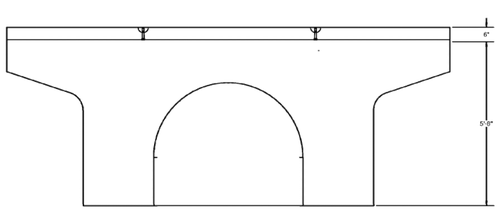
SINGLETRAP

NOTES:
1. INFILTRATION OPENINGS WILL NOT BE USED IN UNITS USED FOR SEDIMENT FOREBAYS.

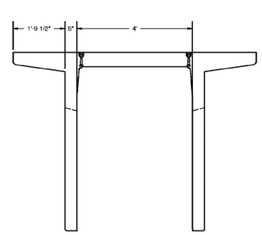
2. FOREBAY AREAS WITHIN THE CHAMBERS SHALL BE CREATED BY BLOCKING IN CHAMBERS TO CREATE WALLS TO HOLD THE SEDIMENT IN THE DESIGNATED AREA. THIS MAY BE ACCOMPLISHED BY EITHER FIELD PLACED CONCRETE BLOCK AND MORTAR, OR PRECAST WITH THE CHAMBERS AT THE MANUFACTURER'S PLANT.



PLAN VIEW



ELEVATION VIEW



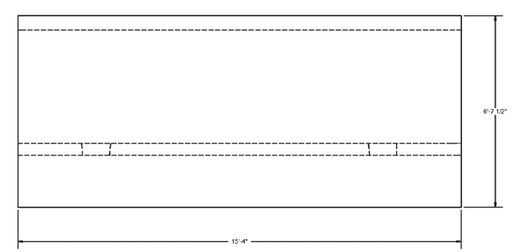
SIDE VIEW

INSIDE CHAMBERS

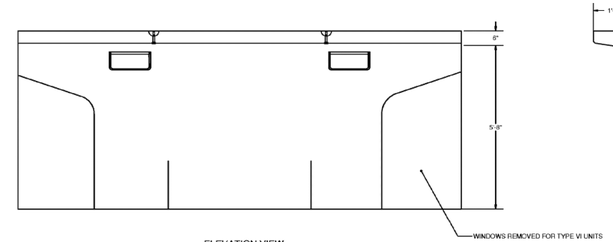
CHAMBER HEIGHT	CHAMBER VOLUME
68 INCHES	676 CF
106 INCHES	1,069 CF

CORNER CHAMBERS

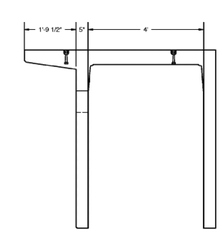
CHAMBER HEIGHT	CHAMBER VOLUME
68 INCHES	255 CF
106 INCHES	402 CF



PLAN VIEW



ELEVATION VIEW



SIDE VIEW

OUTSIDE CHAMBERS

CHAMBER HEIGHT	CHAMBER VOLUME
68 INCHES	511 CF
106 INCHES	804 CF

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999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
UNDERGROUND DETENTION CHAMBERS DETAILS

30A

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SHEET 32 OF 64
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Earthwork

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall perform all excavation and backfilling necessary to complete the work. This shall include the excavation of earth and rock, the removal and disposal of unsuitable material, dewatering, placement of suitable fill and backfill material, pipe boring and jacking, all quality assurance testing, and the restoration and final grading for all earth surfaces.

1.02 WORK WITHIN RIGHTS-OF-WAY

A. Where the governmental bodies having jurisdiction of the streets or rights-of-way have specific specifications relating to the requirements for work within their jurisdiction, such requirements must be met as a minimum requirement, and if these Specifications impose further limitation on the work, they shall also be met as the required work standard.

B. During all operations of the CONTRACTOR in the streets and roadways, the CONTRACTOR shall maintain barricades, lights, and warning signs as required by the agency having jurisdiction.

1.03 WORK WITHIN EASEMENTS

A. During construction within any easements, the CONTRACTOR shall confine himself to the limits shown on the Plans. He shall notify property owners in advance of moving equipment on easements and use of the access routes which will be designated by the OWNER. The OWNER will cooperate in working out the details of access. The topsoil over the trench shall be removed and carefully replaced upon completion of the work. The backfill of the trench in the easement may be left slightly high to provide for any slight residual settlement. Any trees, shrubs, or bushes removed shall be replaced to the satisfaction of the property owner.

1.04 SOIL BORINGS

A. Soil boring results, if taken on a site, are appended to these Specifications with locations noted. Boring logs are shown to be generally representative of the site and to assist in the design and construction of the work.

2.00 PRODUCTS

2.01 BACKFILL MATERIAL

A. For areas not requiring "granular backfill" material, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site. Stone larger than 3 inches in any dimension shall be excluded from the backfill and removed from the site by the CONTRACTOR.

B. Where "granular material" backfill is required as specified herein, backfill material shall be defined as a material meeting granular material Class II as defined in 2003 MDOT 902.08.

C. All utilities within road right-of-way corridor (existing or proposed) shall be backfilled with MDOT CL II granular material compacted to 95% maximum unit weight.

D. All utilities shall be installed with 2 NS sand bedding or better.

2.02 ENCASING PIPE

A. Steel encasing pipe for boring and jacking shall conform to the requirements of either, ASTM A53, Type E or S, Grade B or ASTM A139, Grade B.

B. Steel encasing pipe used under channels and highways shall meet the requirements of the governmental agency having jurisdiction and the following minimum requirements:

Nominal Diameter (Inches)	Maximum Wall Thickness
Under 13	0.188 inches
13-24	0.250 inches
25-36	0.312 inches
42	0.438 inches
48	0.500 inches
54	0.563 inches

C. Steel encasing pipe used under railroads shall meet the requirements of the railroad and the following minimum requirements:

	Minimum Wall Thickness (inches)	
Nominal Diameter (Inches)	Coated or Cathodically Protected	Uncoated & Unprotected
Under 14	0.180	0.251
14-16	0.219	0.282
18	0.250	0.313
20	0.281	0.344
22	0.312	0.375
24	0.344	0.407
26	0.375	0.438
28-30	0.406	0.469
32	0.438	0.501
34-36	0.469	0.532
38-42	0.500	0.563
48	0.563	0.626

D. Casing pipe joints shall be welded to form a leak-proof continuous casing.

E. The inside diameter of casing pipe shall be at least 2 inches greater than the largest outside diameter of the carrier pipe joints or couplings for carrier pipe less than 6 inches in diameter, and at least 4 inches greater than the largest outside diameter of the carrier pipe joints for carrier pipe 6 inches and over in diameter, unless otherwise shown on the Plans.

F. The steel casing pipe shall be of smooth interior and shall be placed accurately to line and grade, allowing for the encased pipe thickness and supports under each length of encased pipe.

3.00 EXECUTION

3.01 GENERAL EXCAVATION

A. Excavation shall be performed by any practicable method consistent with the integrity and protection of the work and neighboring structures, workmen, and the public. Topsoil shall be separately removed and stockpiled for reuse.

B. All excavation, except where necessary to tunnel, bore or jack under roads, railroads, tree roots and other obstructions within the limits indicated on the Plans, may be open cut from the surface. Tunneling or boring under trees shall be considered as incidental to construction and will not be considered as cause for request for additional payment.

C. Foreign material or unsuitable foundation material encountered such as wood, boulders, etc., which obstruct the excavation, shall be removed. Such materials found at the bottom of the excavation shall be removed and the foundation restored with approved materials.

D. If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be filled with selected material solidly tamped into place, in not more than 6-inch layers to the satisfaction of the ENGINEER, before the construction work proceeds. At the direction of the ENGINEER, the excess excavation may be filled with 2000 psi concrete at the CONTRACTOR's expense.

E. The excavation shall be kept dry during the work. Where water is encountered in the excavation, it shall be removed by pumping or well points. All necessary precautions shall be taken to prevent damage to existing wells and to completed or partially completed structures. The CONTRACTOR shall be responsible for all damages caused by him due to inadequate or improper protection.

F. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction areas, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental the Contract work.

G. Any excavation not backfilled at the end of each day must be clearly marked and surrounded by appropriate safety fencing as directed by the ENGINEER. If directed by the ENGINEER, the CONTRACTOR shall cover the open excavation with a steel plate and light the excavated area.

3.02 EXCAVATION FOR SEWERS AND WATER MAINS

A. Trenches shall be excavated to the depth required with allowance for bedding the pipe. The trench shall be cut wider and deeper at each pipe joint location to provide for properly completing the pipe joint and to relieve the joint of all loadings.

B. The width of the trench at the top of a rigid pipe shall be sufficient to allow the pipe to be laid and jointed properly and shall provide for a minimum net clearance of 6 inches and a maximum net clearance of 12 inches on each side of the barrel of the pipe and to allow the backfill to be placed and properly compacted.

C. The width of trench at the top of a flexible pipe backfill when using concrete bedding shall be sufficient to allow the pipe to be laid and jointed properly with the minimum net clearance of 12 inches and a maximum net clearance of 18 inches on each side of the barrel of the pipe.

D. Where the conditions of the ground require or where the work is in close proximity of existing structures, the sides of excavation shall be securely held by bracing and/or sheeting which may be removed in units when the level of the backfill has reached a point where it is safe to pull the sheeting without disturbing the protected feature. No sheeting, bracing, or other timber shall be left in the excavation upon the completion of the main or other structures, except with the specific review and direction of the ENGINEER.

E. Other underground mains, sewers or structures encountered in the excavation shall be adequately supported during the CONTRACTOR's operations, and before backfilling, shall be given permanent support as directed by the ENGINEER to meet the standards or requirements of the owning utility or agency.

F. Water, sewer, gas and other utility services disturbed by the CONTRACTOR in his operations shall be repaired or replaced in a manner equal to the original condition by the CONTRACTOR at his own expense. Where these services are encountered and are undamaged, they shall be supported and/or protected by the CONTRACTOR at his expense against later settlement and/or damage after backfill. The CONTRACTOR shall consult the agency or the utility firm having jurisdiction over any duct line, gas main, etc., which may cross the excavation to determine method of supporting such duct or pipe.

G. All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve manhole covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean, or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed except as otherwise provided for herein on a temporary basis.

3.03 EXCAVATION FOR STRUCTURES

A. Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction and for practicable construction methods to be followed.

B. Requirements for excavation of sewers and water mains shall also apply to this Section.

3.04 EXCAVATION FOR PAVED SURFACES

A. In excavating around manholes and catch basins or inlets, care shall be exercised to avoid removing the casings and pushing dirt into the structures. Dirt pushed into manholes, catch basins or inlets by the CONTRACTOR's operations shall be immediately removed so that the dirt will not be carried into the sewer by the flow of sewage or storm water.

B. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction area, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in the judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.

3.05 ROCK EXCAVATION

A. Rock excavation shall consist of excavating igneous, metamorphic and sedimentary rock which cannot be excavated without continuous drilling and blasting or drilling and splitting to fracture the rock. Blasting shall be permitted only after it has been shown that other methods of excavation are impractical. All rock excavation shall be carried to a minimum depth of 8 inches below the pipe or manhole bottom and to the bottom of all footings. The width of the rock excavation shall not exceed the diameter of the pipe plus 12 inches on either side or the edge of the foundation footing.

B. When the use of explosives is necessary for the progression of the work, the CONTRACTOR shall comply with all laws, ordinances and applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property. A person competent and experienced in the use of explosives shall be employed to supervise the work. The CONTRACTOR shall schedule all blasting for a definite hour of the day and shall so notify all residents and businesses in the area as to the scheduled day and hour for such blasting operations. Explosive materials shall not be stockpiled and stored in residential areas. Explosives and initiating devices shall not be carried in the same vehicle.

C. Suitable weighted plank coverings or timber mats shall be provided to confine all materials lifted by blasting within the limits of the excavation of trench. Excessive blasting or overshooting shall not be permitted. Any material outside of the authorized excavation cross section which may be shattered or loosened shall be removed at the CONTRACTOR's expense. The CONTRACTOR shall be responsible for all damage resulting from the use of explosives.

3.06 PIPE BORING AND JACKING

A. The CONTRACTOR shall obtain all necessary permits for jacking the encasing pipe under channels, highways and/or railroads and shall notify the governmental agency and/or company having jurisdiction 48 hrs before work at any crossing is started. The CONTRACTOR shall pay all costs for an inspector and/or flagmen required by a railroad or governmental agency.

B. A suitable approach trench shall be opened, adjacent to the toe of the slope of the embankment. The approach trench shall be long enough to accommodate the length of pipe units to be placed, and wide enough to provide sufficient working room. Guide timbers or rails for keeping the pipe on-line and grade shall be installed in the bottom of the trench and heavy timber backstop supports installed at the rear of the trench to take the thrust of the jacks. A timber bearing a "pushing frame" shall be built and furnished to fit or match the end of the pipe to be jacked, so that the pressure of the jacks will be evenly distributed over the end of the pipe. Two (2) hydraulic jacks of sufficient power shall be used to apply pushing or jacking pressure. For firm ground, excavation shall be carried on from inside the pipe, not to exceed twelve (12) inches ahead of the lead pipe. For unstable ground, the lead pipe shall precede the auger. Excavation at the top and sides shall be accurately cut to line and grade. Adjoining sections of steel pipe shall be welded. Pipe shall be jacked on successive shifts until completed to guard against the "freezing of the line" due to settlement and compaction of surrounding soil.

C. The sheeting of pits along any road will be required if the leading edge of all work pits will be closer to the pavement edge than the shoulder point or ten (10) ft, which ever distance is greater, or on curb and gutter sections, at least five (5) ft from back of curb.

D. Upon completion of the installation of the steel pipe encasement, the contractor shall furnish and install a bolted style casing spacer as described below on the carrier pipe. Casing spacers shall be placed a maximum of seven (7) feet apart along the length of the carrier pipe with one casing spacer within 2-1/2 feet of each side of a pipe joint and the rest evenly spaced. Wood skids are not an acceptable method of supporting the carrier pipe.

1. Casing spacers for carrier pipes from 4" - 24" shall be made of a molded, segmented high density polyethylene plastic with 304 stainless steel connecting nuts and bolts. Minimum spacer width shall be 5.2" for carrier pipes from 4" - 12" and 7.0" for carrier pipes 14" - 24". Each casing spacer shall have at least six (6) integrally molded skids extending 1" beyond the bell or mechanical joint of the carrier pipe. The casing spacers shall be equal to the PSI Ranger as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

2. Casing spacers for carrier pipes larger than 24" shall be a PVC fusion bonded coated (10-16 mils) steel shell (minimum 14 gauge steel) with a 90 mil PVC inner liner and 2" wide 30% glass reinforced polyester runners (minimum compressive strength = 18,000 psi) (polyethylene is not an acceptable runner material) attached by 3/8" coated steel studs welded to the steel shell. All bolts and nuts used to fasten the shell to the carrier pipe shall be cadmium plated steel. Where riser are required under the runners they shall be a minimum 10 gauge steel welded to the shell and coated as specified for the shell (epoxy is not an acceptable coating for the shell riser). The casing spacers shall be equal to the PSI Model C as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas.

E. Boring shall be performed by accepted and recognized methods which will provide adequate safety and protection at all times to workmen employed in the work and to inspectors and others involved in the construction.

F. If voids should develop around the outside of the encasing pipe, grouting or other methods approved by the ENGINEER shall be employed to fill such voids.

G. After the pipes are tested satisfactorily, the remaining space between the carrier pipe and the encasing pipe shall be pressure grouted or otherwise filled with concrete. The carrier pipe shall be adequately braced to prevent floating or movement of the pipe.

3.07 SHORING, SHEETING AND BRACING

A. Where sheet piling, shoring, sheeting, bracing, or other supports are necessary, they shall be furnished, placed, maintained, and except as shown or specified otherwise, removed by the CONTRACTOR.

B. All sheet piling, shoring, sheeting and bracing shall be designed by a professional engineer engaged by the CONTRACTOR with demonstrated competence and experience in such work. The sheeting system shall be designed to prevent bottom failure and hydrostatic uplift within the excavation. Provision shall also be made in the design for lateral pressures due to side slope and construction equipment or other surcharge loads, as applicable.

C. The CONTRACTOR shall provide to the ENGINEER for his review, design calculation and arrangement drawings of the sheeting system prior to ordering any materials for bracing, sheeting, etc., and prior to the commencement of the excavation.

D. All materials, except as otherwise specified, used for sheeting and sheet piling, lagging, braces, shores, and stringers, or waling strips shall be of approved quality and dimensions throughout.

E. Materials for sheeting systems shall be furnished and driven or set in place by the CONTRACTOR, where necessary or wherever ordered by the ENGINEER, whether the same is or is not considered necessary by the CONTRACTOR. If, in the opinion of the ENGINEER, the materials furnished by the CONTRACTOR are not of proper quality or sufficient size or not properly placed to ensure the safety of the work or of adjacent structures and property, the CONTRACTOR shall, upon notice from the ENGINEER to that effect, forthwith procure, furnish and set in place or drive other and satisfactory materials, or place the material in a satisfactory manner; and if he shall fail or neglect to do so, the ENGINEER may order all or any part of the work to be stopped until such materials so used are furnished and placed; and the CONTRACTOR shall not be entitled to claim, demand, or receive any compensation for larger size or better quality or different disposal of materials ordered by the ENGINEER, nor any compensation for allowance of any kind whatsoever for or on account of any damage or delay resulting from such stoppage of work.

F. Steel sheet piling may be either new or used. It shall be of adequate strength, straight and properly braced. Steel sheet piling shall be of the interlocking type. Friction in the interlocks shall not be assumed to contribute to the strength of the sheet piling.

G. The design, planning, installation and removal, if required, of all sheet piling, shoring, sheeting, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

H. Steel sheet piling for the excavation shall be driven straight and in-line. The piling shall be supported above ground, before driving, by a guide frame at least 20 ft high which will keep the piling accurately in the required position and vertical. Each piece of piling shall be driven only a few feet at a time and driving shall proceed continuously around the perimeter so that the piles shall reach their full penetration together.

I. Walers and bracing shall be supplied and installed as required to complete the sheeting system. Walers and braces shall be of adequate strength for the load imposed. Splices in walers shall develop the full strength of the member in bending, shear, and axial compression.

J. If bracing members are to be removed during construction, the timing and procedure for removal shall not induce excessive stresses in the permanent structures or in steel sheet piling and bracing members.

K. If the construction sequence of structures requires the transfer of bracing to the completed portions of any structure, the CONTRACTOR shall secure written acceptance of the ENGINEER prior to the installation of such bracing.

L. In trenching operations the use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench racing will not be permitted. The use of a traveling shield for sewer construction shall require that the device be approved for use by a professional engineer. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe.

M. The neglect, failure, or refusal of the ENGINEER to order the use of sheeting, or sheet piling or steel, or to order the same to be left in place, or the giving or failure to give of any order or directions as to the manner or methods of driving or placing sheeting, sheet piling, bracing, shores, etc., shall not in any way relieve the CONTRACTOR of any or all obligations under this Contract. Sheeting left in place shall be cut off one (1) ft below existing grade.

N. The rules of the OSHA and the State Department of Labor with respect to excavation and construction shall at all times be strictly observed.

3.08 GENERAL BACKFILLING

A. For all areas, unless otherwise noted, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum density.

B. Under pavements, curb, paved driveways, and sidewalks, and where pipe is within a one on one influence of pavement, compaction testing shall be performed by an independent testing laboratory. Testing shall be performed at intervals of one test per lift per 50 feet of trench or as determined necessary by the ENGINEER.

C. In residential developments, all backfill within the road corridor shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be as such to obtain 95% of the maximum unit density as determined at the optimum moisture content. For purposes of this section, the road corridor is defined as front of house to front of house, including right-of-way and adjacent easements and setbacks.

3.09 BACKFILLING FOR SEWERS AND WATER MAINS

A. Backfilling shall consist of placement of the prescribed materials from a level 12 inches above the crown of the pipe. Placement shall be as follows:

1. Under gravel driveways, gravel roads and shoulders, the backfill shall be granular material which shall be solidly compacted by mechanical tamps in layers of not more than 12 inches loose thickness with backfilling carried up to within 12 inches of finished grade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.

2. Under pavements, curb, paved driveways, and sidewalks, the backfill shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content. After a period of about 60 days or less, if the backfill compaction is satisfactory to the ENGINEER, to provide for any slight settlement, the CONTRACTOR shall retrim neatly any broken edges of pavement and replace the top surface of the backfill within the pavement area with pavement surface equal to that surface which was removed. The pavement shall be replaced in accordance with the standard specifications of the agency having jurisdiction.

3. Backfill around lift stations, or buried underground structures shall be granular material compacted in 12-inch lifts. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.

4. For all other areas, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum unit density as determined at the optimum moisture content.

3.10 FILLING AND BACKFILLING FOR STRUCTURES

A. Embankments underlying structural footings, streets and drives, sidewalks and around structures shall be granular material meeting the requirements of the Michigan Department of Transportation for granular material compacted to 95% density.

B. In all other areas, material required for embankments and backfilling shall be soil or soil-rock mixture free of organic and other deleterious matter and shall contain no more than 15% rocks or lumps larger than 2-1/2 inches in the greatest dimension, compacted to 90% density.

C. Under all interior and exterior floor slabs, an 8-inch thick granular cushion shall be placed. This material shall be clean mineral aggregate meeting the following gradation requirements:

Passing the No. 4 Sieve	100%
Passing the No. 200 Sieve	0-3%

D. Where embankment material is placed to achieve a new surface elevation, the top 4 inches shall be approved topsoil either salvaged from the site or hauled in by the CONTRACTOR.

3.11 FILLING AND BACKFILLING FOR PAVED SURFACES

A. Embankments, including sand cushions and granular fills, shall be placed in successive layers not more than 6 inches in depth the full width of the cross section, each layer to be thoroughly compacted by means of vibratory compactors or by an approved pneumatic-tired roller or combination thereof, as required by the ENGINEER. Each layer shall be compacted to not less than 95% of the maximum unit density as determined at the optimum moisture content. All parts of the embankment shall be uniformly compacted and the CONTRACTOR shall so direct all earthmoving equipment used in the work so that the same shall be attained. Embankment or fill outside the limits of the subgrade where sand or gravel is not required shall be made with suitable material which is free from perishable organic matter, rubbish, stones, broken concrete, roots, or other foreign materials, at no additional compensation. Before any embankments are begin, the base shall be made firm and cleared of topsoil, sod or other perishable material. The sides of the embankment shall be neatly and evenly dressed to the slope shown on the Plans, or such other slope as the ENGINEER may direct.

B. Upon completion of the placing of the curbs, and after the concrete has cured sufficiently, forms shall be removed and the excavated space behind the curb shall be backfilled with a good quality of surface soil, free of rubbish, stone, broken concrete, roots or other foreign material. Where adequate acceptable material for backfill behind the curb is not available, granular fill conforming to 2003 MDOT 8.02.06, Class II, shall be used. Where the area behind the curb is in cut, it shall be trimmed from the top of the curb on the slope shown on the Plans. If the area is in embankment or fill, an earth berm shall be placed immediately adjacent to the top of the curb and then the embankment of fill shall be finished to the slope shown on the Plans. All trimming and finishing shall be done in a neat, workmanlike manner. All excess concrete and debris shall be removed from the excavation behind the curb line before backfilling begins.

C. In construction of non-rigid pavements, backfilling back of curb and gutter shall be completed before placement and compaction of the base course of the roadway.

3.12 PREPARATION OF SUBGRADE FOR ROADWAY SURFACES

A. The bottom of the excavation for the pavement or top of the fill shall be known as the pavement subgrade and shall be smoothed, trimmed and compacted to the required line, grade and cross section to receive the road metal. It shall be thoroughly compacted by rolling with a roller of approved type weighing not less than 8 tons. The subgrade shall be compacted to at least 95% of the maximum density as designated by the test method AASHTO T-180. Inaccessible areas, where rolling is not practical, shall be thoroughly compacted by mechanical tampers capable of striking a blow equivalent to at least 250 foot-pounds per square foot. The subgrade thus formed shall be maintained in a smooth and compacted condition until the pavement has been placed. No base course, surfacing, curb, or curb and gutter, shall be placed until the subgrade has been reviewed by the ENGINEER. The subgrade shall be finished in an acceptable condition at least one day in advance of the pavement construction at all times. Six inches of compacted depth of granular material shall be used where uncompactable soil is encountered. The granular fill shall conform to the 2003 MDOT 9.02.08., Class II, compacted to 95% of its density.

B. Immediately prior to placing the pavement, the subgrade shall be tested for conformity with the cross section shown on the Plans by means of an approved template riding on the curb and gutter sections or on side forms. If necessary, materials shall be removed or added, as required, to bring all portions of the subgrade to the correct elevation. Corrected portions shall then be thoroughly compacted and again tested with the template. Pavement material shall not be placed at any portion of the subgrade which has not been tested for correct elevation.

C. The finished subgrade shall be maintained in a smooth and compacted condition until the pavement is placed. No storage piles of fine or coarse aggregate shall be placed directly upon the finished subgrade. Should the subgrade become rutted or disturbed in any manner, it shall be reshaped and recompacted.

3.13 GRADING

A. The CONTRACTOR shall grade the site to achieve the elevations as shown on the Plans. All disturbed areas beyond the grading limits shall be restored to prior condition.

B. Surplus excavated material not needed for embankment shall be disposed of by the CONTRACTOR. Headwalls, culverts, drains, sewers and appurtenances filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, repaired, or replaced at his expense.

C. All temporary earth changes shall be in conformance with the Soil and Erosion Control Act.

3.14 RESTORATION

A. Headwalls, culverts, and drainage systems filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, relaid or rebuilt with new materials to a condition equal to the original state, and of thickness equal to the original structure and to the original line and grade at the CONTRACTOR's expense.

B. Where the excavation is located beside a ditch and/or where an existing ditch is filled or disturbed in the CONTRACTOR's operations, the CONTRACTOR shall clean, repair, or replace the ditch with properly pitched bottom and side slopes and of section and capacity not less than the original section.

C. Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.

D. The CONTRACTOR shall remove excess dirt and other construction material from the site of the work and leave the site in a condition equal to its original state.

E. The final condition of the streets and roadways shall be subject to the approval of the governmental body having jurisdiction thereof, as well as review by the ENGINEER.

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COSTCO
FINAL SITE PLAN
PITTSFIELD TOWNSHIP STANDARD NOTES/DETAILS
EARTHWORK

31

JOB No. 10046

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PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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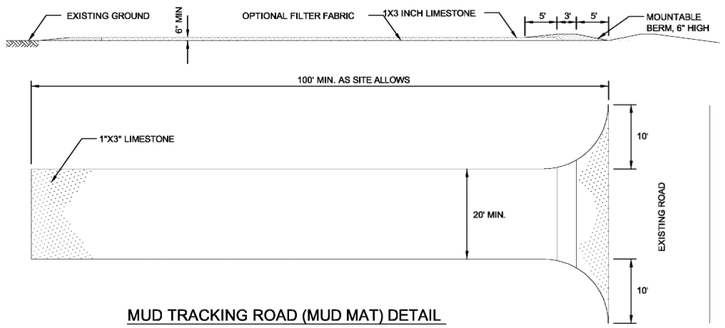


MUD TRACKING ROAD (MUD MAT) DETAIL

PITTSFIELD CHARTER TOWNSHIP
SOIL EROSION AND SEDIMENTATION CONTROL NOTES

GENERAL

1. The contractor shall implement and maintain the soil erosion control measures as shown on the plans at all times during construction on this project. Any modifications or additions to the soil erosion control measures due to construction or changed conditions, shall be complied with as required or directed by the owner, project engineer or Pittsfield Township.
2. All soil erosion and sedimentation control work shall conform to the permit requirements of Pittsfield Township and the laws of the State of Michigan.
3. A NPDES construction activity permit is required for all sites greater than 5 acres.
4. Daily inspections shall be made by the contractor. Periodic inspections may be made by the owner/project engineer/Township to determine the effectiveness of erosion and sedimentation control measures. Any necessary corrections shall be made without delay.
5. Erosion and sedimentation from work on the site shall be contained on the site and not be allowed to collect on any off-site areas or in waterways.
6. All mud/dirt tracked onto roads from the site due to construction, shall be promptly removed by the contractor.
7. Restoration of all disturbed areas, including placement of topsoil, seed, fertilizer and mulch and/or sod shall be done within 5 days of the completion of final grade.
8. Construction operations shall be scheduled and performed so that preventative soil erosion control measures are in place prior to excavation in critical areas and temporary stabilization measures are in place immediately following backfilling operations.
9. Special precautions will be taken in the use of construction equipment to prevent situations that promote erosion.
10. Proper dust control shall be maintained during construction by use of water trucks and/or chloride as required.
11. The contractor shall be responsible for maintaining all temporary soil erosion control measures and removal of some upon authorized completion of project. Completion of project will not be authorized until all site work, home building, road work and utility construction is complete and all soils are stabilized.
12. The contractor shall not grade in existing wetland or conservation areas to be protected. Silt fence shall be installed and maintained adjacent to existing wetland and conservation areas to prevent grading, erosion and sedimentation into them.
13. Tree protection fencing must remain intact until restoration of the site is complete.

SEQUENCE OF CONSTRUCTION

1. Install sediment fence and tree protection fencing prior to any grading operation.
2. Install mud-tracking pad.
3. Construct temporary sediment/detention basin.
4. Place topsoil, fertilizer, seed and mulch over the entire detention basin area.
5. Rough grade site, stockpile topsoil and begin building construction.
6. Install storm drainage system including riprap and parking lot inlet filters and detention basin standpipe.
7. Maintain erosion and sedimentation control measures, as required.
8. Install sanitary sewer and water systems.
9. Bring pavement areas to sub-base grade, place sub-base and bituminous pavement.
10. Install franchised utilities.
11. Finish grade, redistribute topsoil, seed and mulch all disturbed areas.
12. Remove any accumulated sediment within the detention basin and replace clean washed stone around standpipe.
13. Complete construction of site.
14. Insure all soil is stabilized. Remove all temporary soil erosion control measures.

SEEDING/SOD

1. Seed or sod in accordance with project specifications.
2. All areas of disturbed earth that are not to be paved or sodded shall have 4 inches of topsoil, seed, fertilizer and mulch.
3. Immediately after seeding, mulch all seeded areas with unweathered small grain straw (preferably wheat) or hay spread. Spread uniformly at the rate of 1 ½ to 2 tons or 100 pounds (2 to 3 bales) per 1,000 square foot. This mulch should be anchored with a disc-type mulch-anchoring tool.
4. Any disturbed area not paved, seeded or mulched, sodded or built upon by November 15, is to be mulched in the manner as specified above, in order to provide soil erosion protection during the winter and early spring.
5. All erosion and sedimentation control prevention procedures and structures are to comply with the Standards and Specifications for soil erosion and sediment control of the Washtenaw County Soil Conservation District.
6. Drainage ditches and slopes steeper than 1:4 (25%) shall be stabilized with erosion control blankets.
7. Steep slopes that do not take upon initial seeding must be re-seeded and stabilized with erosion control blankets.
8. Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.

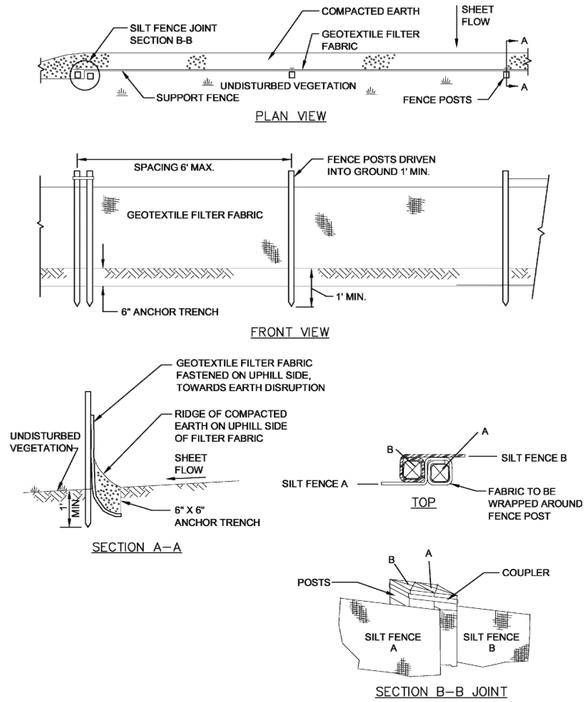
CATCH BASIN/MANHOLE PROTECTION

1. Protect storm sewer catch basins with Dandy Products Inc. or approved equivalent as follows:
a. Dandy Bag for 1040 storm covers.
b. Beaver Dam for all curb structures.
c. Dandy Sock over all detention pond outlet structures.

ROADS

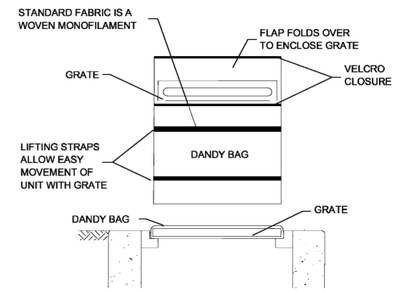
1. During construction, all roads shall be protected from unvegetated areas washing onto road surfaces by placement of silt fence behind curb or a 10 foot wide straw mulch bank behind the curb or other approved method and/or as shown on the plans.
2. During construction of any portion of the project, roads shall be maintained free of dirt, silt and construction debris.

Pittsfield SEC 9/22/2009

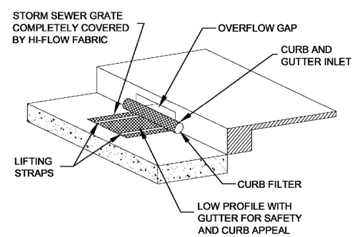


SILT FENCE

NOTE:
TO INSURE PROPER OPERATION REMOVE SILT, SEDIMENT, AND DEBRIS FROM THE SURFACE AND THE VICINITY OF THE UNIT WITH A SQUARE POINT SHOVEL OR STIFF BRISTLE BROOM AWAY FROM ENVIRONMENTALLY SENSITIVE AREAS AND WATERWAYS IN MANNER SATISFACTORY TO THE ENGINEER/INSPECTOR. REMOVE FINE MATERIAL FROM INSIDE DANDY BAG AS NEEDED. DISPOSE OF DANDY BAG NO LONGER IN USE AT AN APPROPRIATE RECYCLING OR SOLID WASTE FACILITY. TO INSPECT INLET, REMOVE DANDY BAG WITH GRATE INSIDE, INSPECT CATCH BASIN AND REPLACE DANDY BAG BACK INTO GRATE FRAME.



DANDY BAG



DANDY CURB BAG

DANDY BAG DISTRIBUTORS:
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MIRAFI CONSTRUCTION PRODUCTS
GREAT LAKES REGIONAL MANAGER
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708 867 8446
VOICE MAIL 888 795 0808 EXT. 1805
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jeff_rasche@rtusa.net

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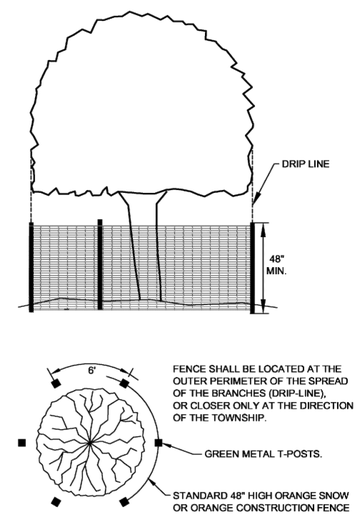

NOTES:
1. ALL TREES TO BE REMOVED WILL BE INDENTIFIED BY RED FLAGGING.
2. TREE PROTECTION FENCING IS TO BE ERECTED PRIOR TO ANY EARTHWORK OR CONSTRUCTION AND IS TO REMAIN IN PLACE UNTIL CONSTRUCTION AND GRADING IS COMPLETE.
3. ALL DEBRIS, FILL, EQUIPMENT OR MATERIAL IS TO BE KEPT CLEAR OF AREA WITHIN PROTECTIVE FENCE. NO CLEANING OF EQUIPMENT OR MATERIAL OR STORAGE OR DISPOSAL OF ANY MATERIAL WITHIN THE DRIP LINE OF ANY TREES TO BE SAVED.

TREE PROTECTION FENCE DETAIL
NOT TO SCALE

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SOIL EROSION CONTROL MEASURES

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PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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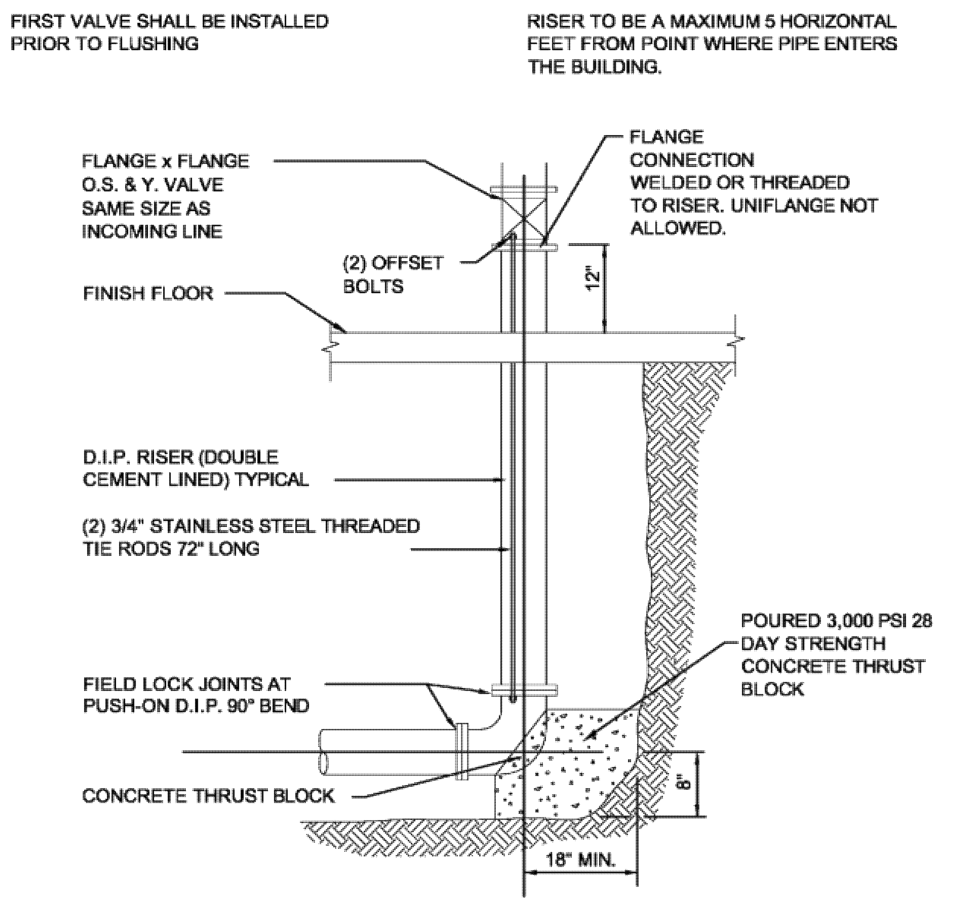
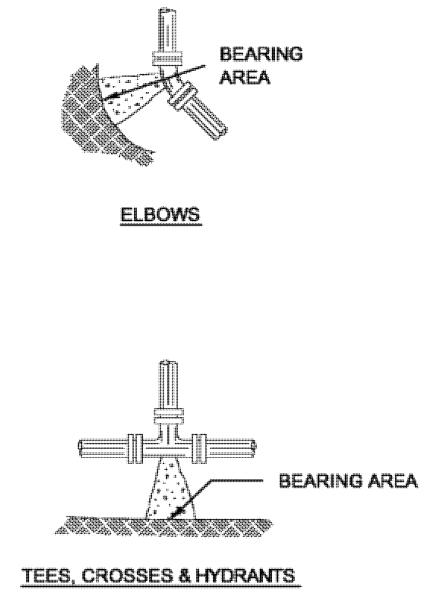


FIRE PROTECTION RISER DETAIL



ELBOWS					
PIPE DIA. INCHES		BEARING AREA SQUARE FEET 90°	45°	22 1/2°	11 1/4°
4		2.1	1.1	0.6	0.3
6		4.1	2.2	1.1	0.6
8		6.8	3.7	1.9	0.9
10		10.1	5.5	2.8	1.4
12		14.1	7.6	3.9	2.0
16		24.2	13.0	6.7	3.3
18		30.0	16.3	8.3	4.2
20		36.8	19.9	10.1	5.1

TEES, CROSSES & HYDRANTS		
PIPE DIA. INCHES		BEARING AREA SQUARE FEET
4		1.5
6		2.9
8		4.8
10		7.1
12		10.0
16		17.1
18		21.0
20		26.0

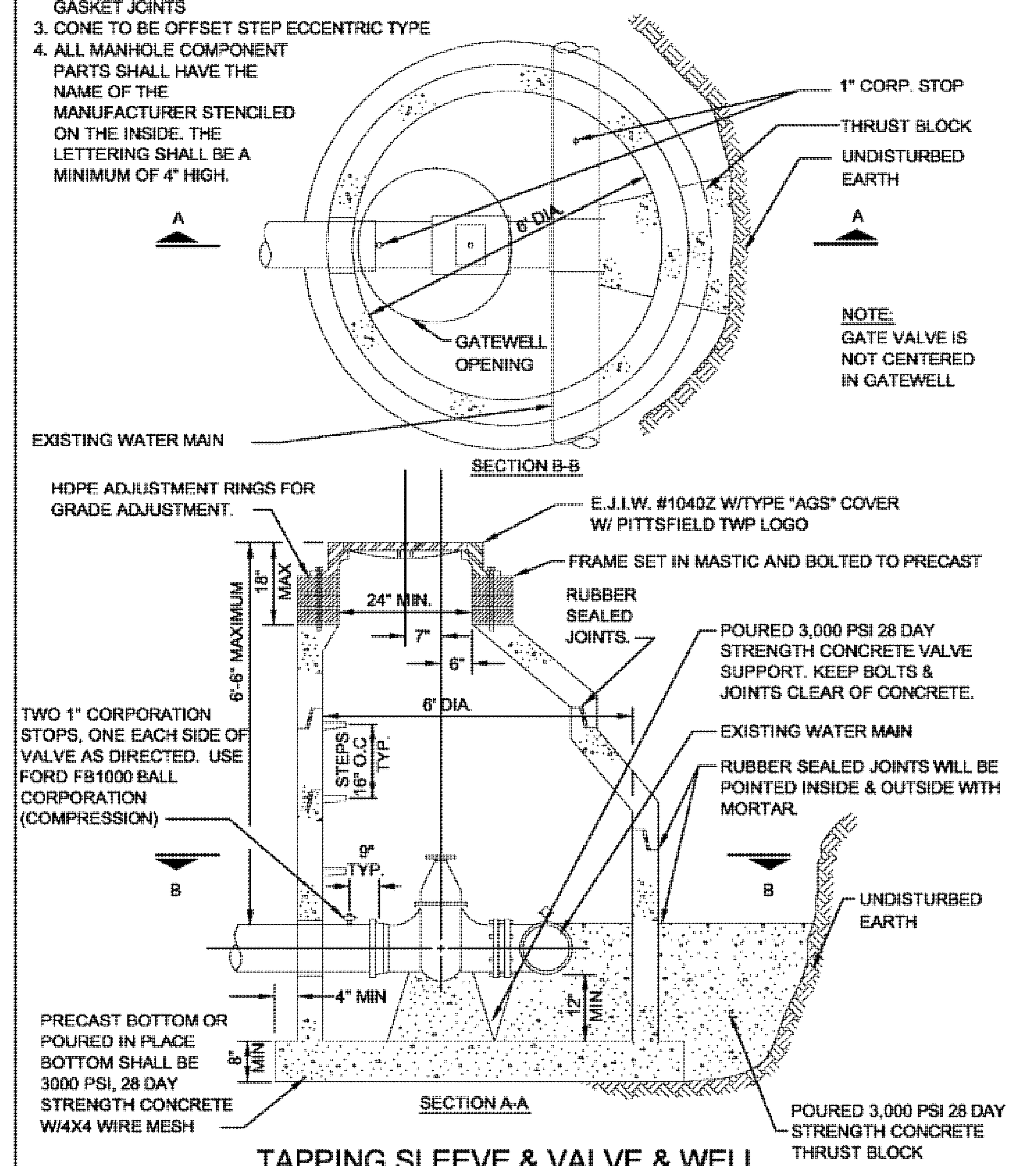
NOTES:
1. CONCRETE FOR ALL THRUST BLOCKS SHALL BE 3000 PSI, 28 DAY STRENGTH MIN.
2. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BOLTS, FITTINGS & JOINTS SHALL BE KEPT CLEAR OF CONCRETE
4. A BEARING CAPACITY OF 2000# PER FOOT WAS USED IN DETERMINING THE MINIMUM "BEARING AREAS" IN THE ABOVE TABLE
5. THE CROSS SECTION OF THE THRUST BLOCKS SHALL BE SQUARE
6. IN ADDITION TO THRUST BLOCKS, ALL PIPE JOINTS SHALL BE RESTRAINED WITH LOCKING GASKETS PER DIPRA'S STANDARDS.

SOIL CHARACTERISTICS	FACTOR
(A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY	0.33
(B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY	0.50
(C) LOOSE FINE SAND; FIRM INORGANIC SILT	0.67
(D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT SOFT CLAY	1.00

"BEARING AREA" x FACTOR = ACTUAL BEARING AREA
2.1 x .5 = 1.05 SQ. FT.
BASED UPON 150# TEST PRESSURE

THRUST BLOCK

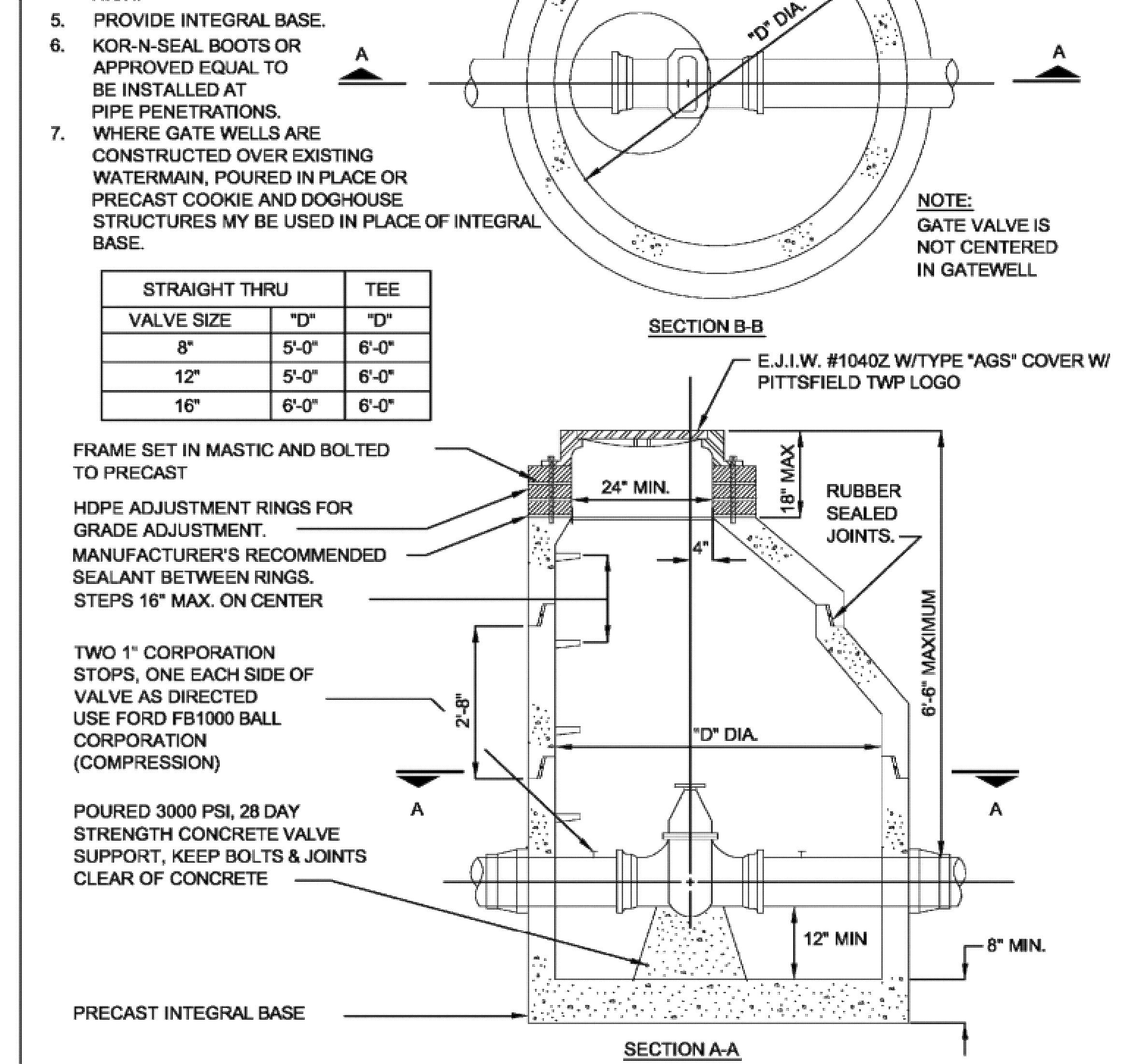
PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.



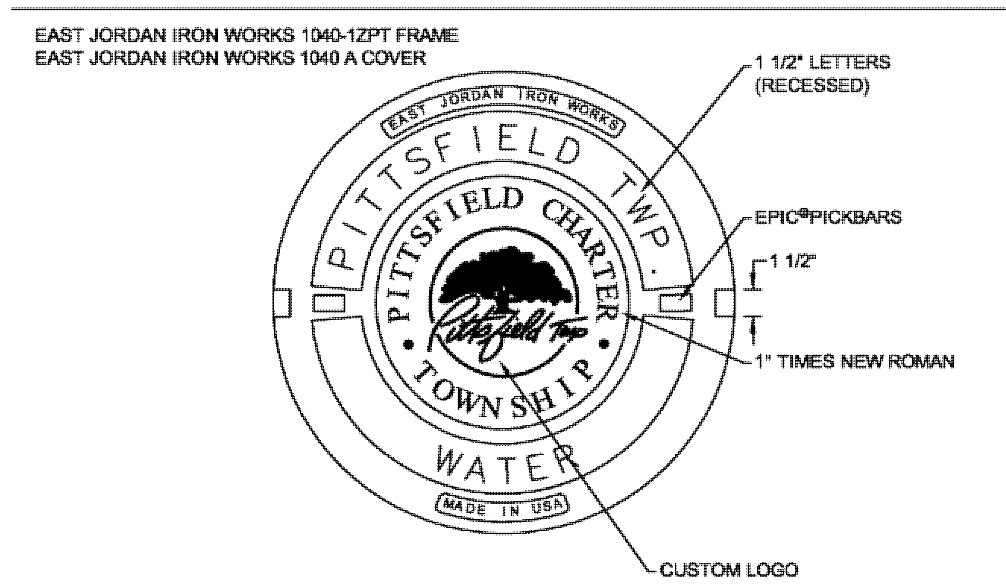
TAPPING SLEEVE & VALVE & WELL

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE.
6. KOR-N-SEAL BOOTS OR APPROVED EQUAL TO BE INSTALLED AT PIPE PENETRATIONS.
7. WHERE GATE WELLS ARE CONSTRUCTED OVER EXISTING WATERMAIN, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MY BE USED IN PLACE OF INTEGRAL BASE.

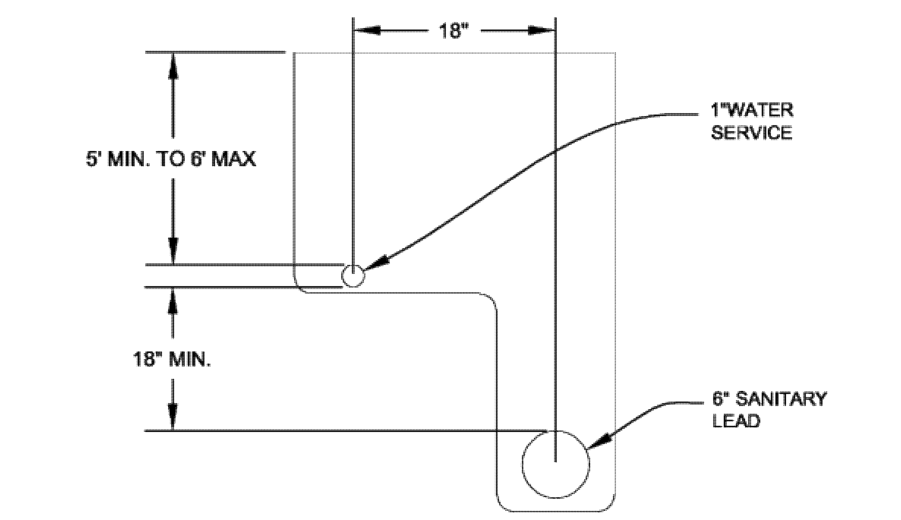
STRAIGHT THRU		TEE
VALVE SIZE	"D"	"D"
8"	5'-0"	6'-0"
12"	5'-0"	6'-0"
16"	6'-0"	6'-0"



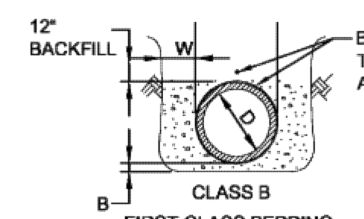
STANDARD GATE VALVE & WELL



COVER DETAIL



TYPICAL L TRENCH DETAIL HOUSE LEADS



FIRST CLASS BEDDING
ALL BEDDING TO BE 2NS SAND

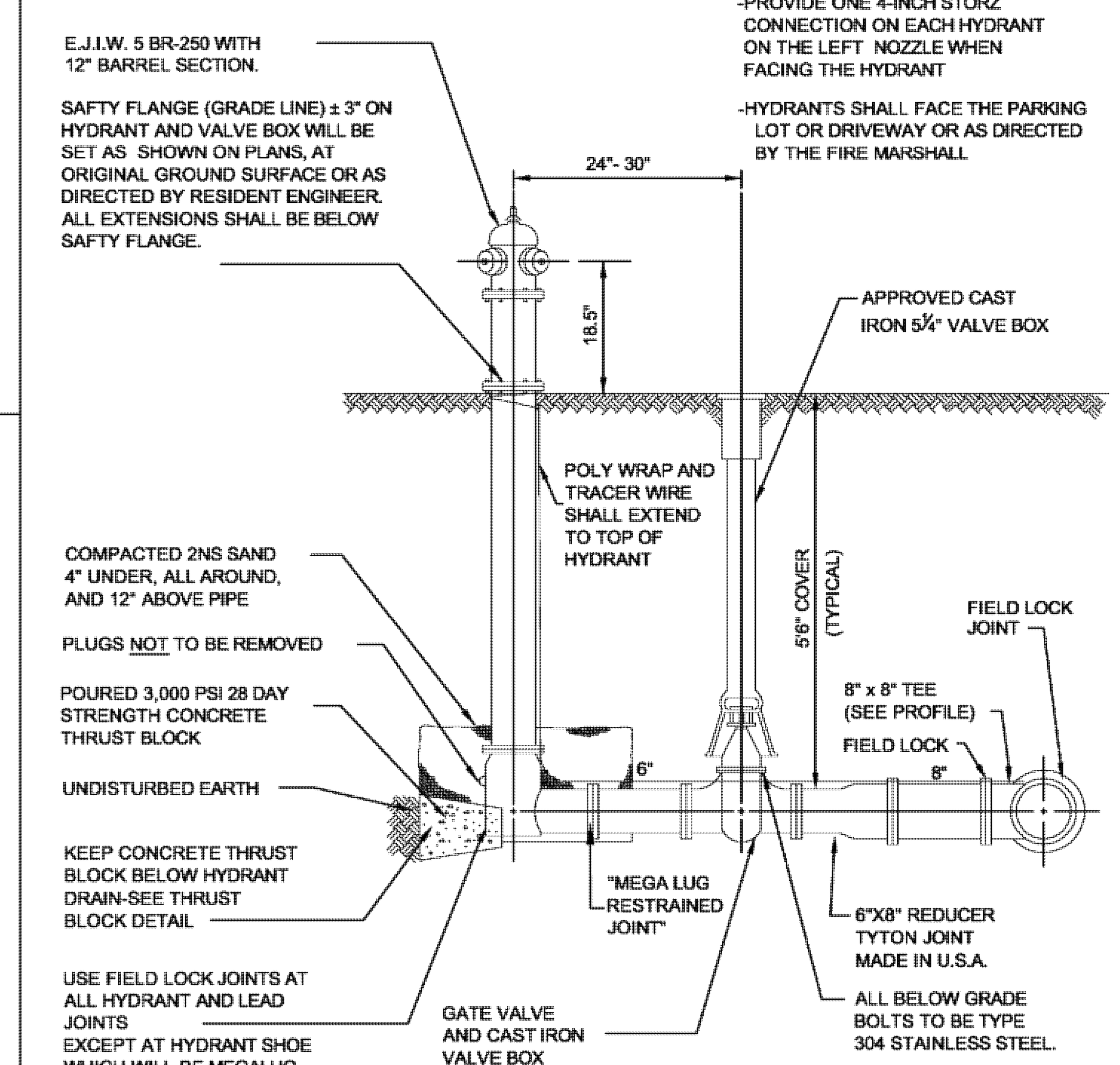
BLUE, 12 GAUGE SINGLE STRAND TRACER WIRE ATTACHED TO WATER MAIN PIPE MUST BE WRAPPED WITH POLLY WRAP AND SECURELY TAPED AT ENDS.

PIPE	D	W	B
PVC	0"-12"	12" MIN. 18" MAX.	4"
A-C,V.C.P.	0"-12"	6" MIN. 12" MAX.	4"
DIP	0"-24"	6" MIN. 12" MAX.	4"
A-C,CONC.	0"-24"	6" MIN. 12" MAX.	4"
CONC. DIP	24" +	6" MIN. 12" MAX.	4"

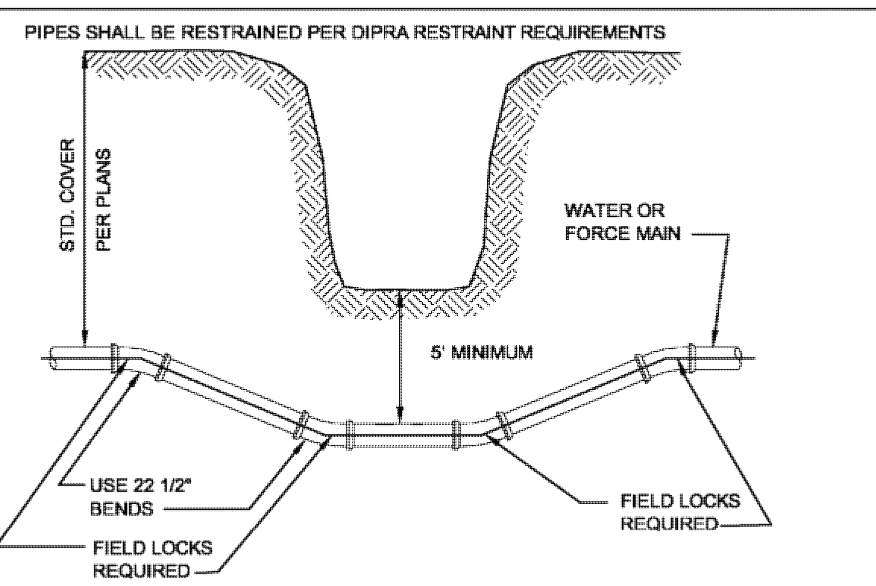
NOTES:
1. MINIMUM TRENCH WIDTH (SEE TABLE).
2. RECESS TRENCH TO RELIEVE THE BELL OF ALL LOAD. PIPE HAUNCHES SHALL BE COMPACTED.
3. 2NS BACKFILL TO DEPTH OF ONE FOOT ABOVE PIPE. TAMPED LAYERS NOT TO EXCEED 6" IN DEPTH. PLATE COMPACT ABOVE PIPE (ON 1st LIFT)
4. ALL PIPE TO BE PLACED AND JOINTED IN A DRY TRENCH AND LAID ACCURATELY TO LINE AND GRADE WITH BELLS UPHILL.
5. ALL CONCRETE ENCASEMENT AND CRADLING TO BE CLASS "A" CONCRETE.

BEDDING

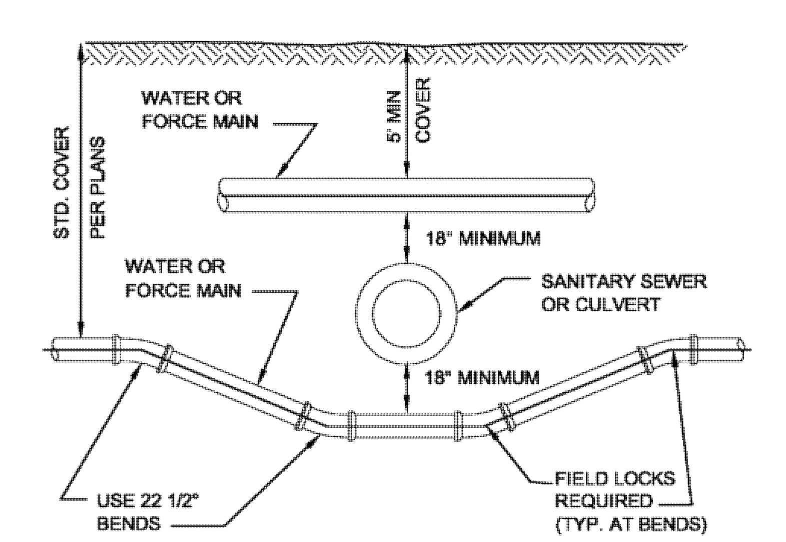
NOTES:
-PROVIDE ONE 4-INCH STORZ CONNECTION ON EACH HYDRANT ON THE LEFT NOZZLE WHEN FACING THE HYDRANT
-HYDRANTS SHALL FACE THE PARKING LOT OR DRIVEWAY OR AS DIRECTED BY THE FIRE MARSHALL



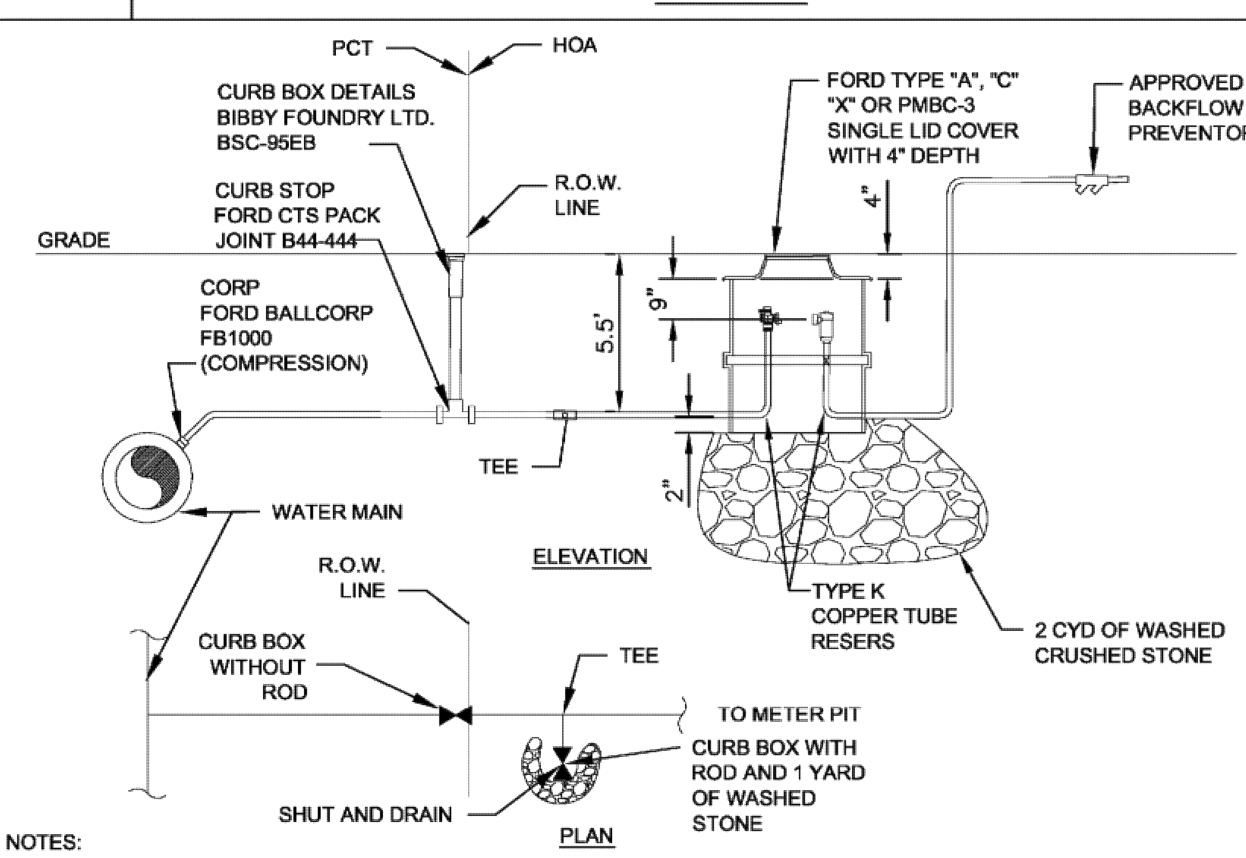
STANDARD FIRE HYDRANT



DITCH & STREAM CROSSING

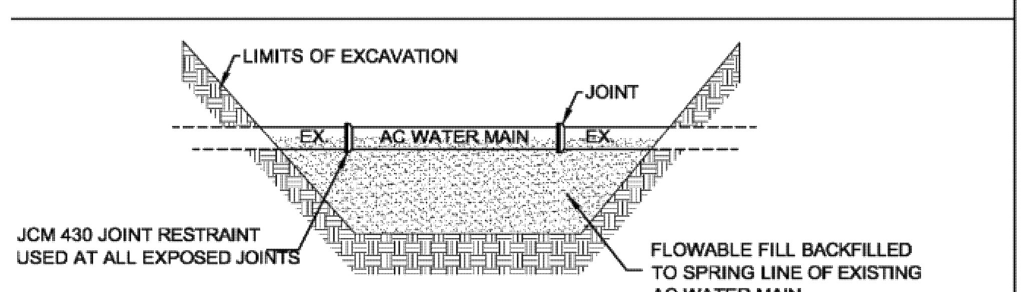


SEWER OR CULVERT CROSSING

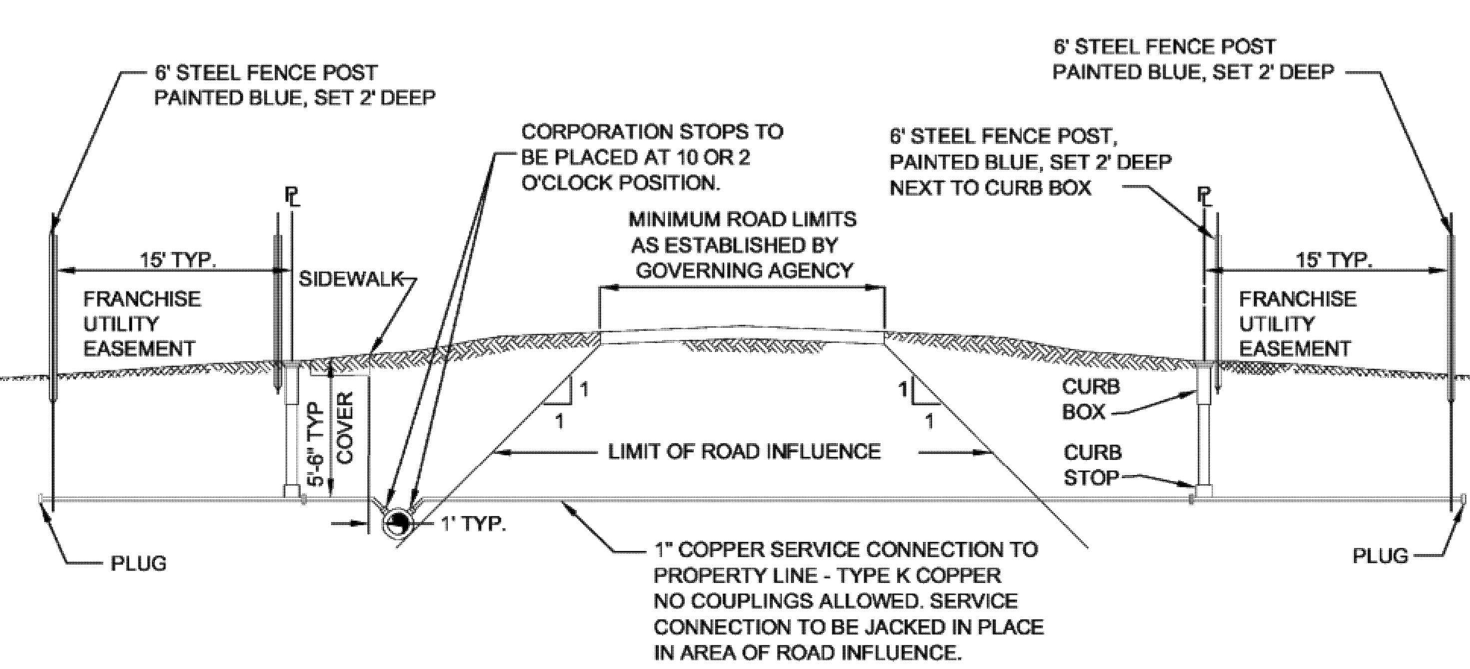


NOTES:
1. SADDLE MAY BE REQUIRED ON MAIN BASED ON LEAD SIZE, MAIN SIZE, AND MAIN PRESSURE
2. ALL WATER MAIN TAPS AND COMPONENT PARTS SHALL BE APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT PRIOR TO INSTALLATION.
3. INSTALLATION SHALL BE INSPECTED AND APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT.

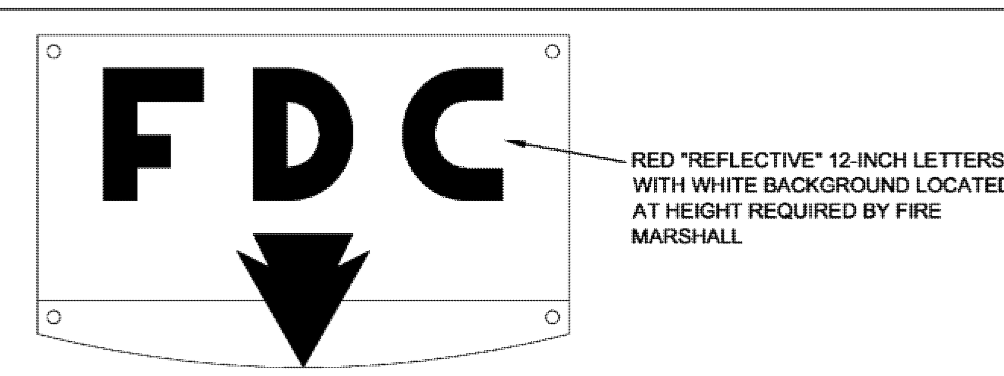
IRRIGATION METER PIT DETAIL



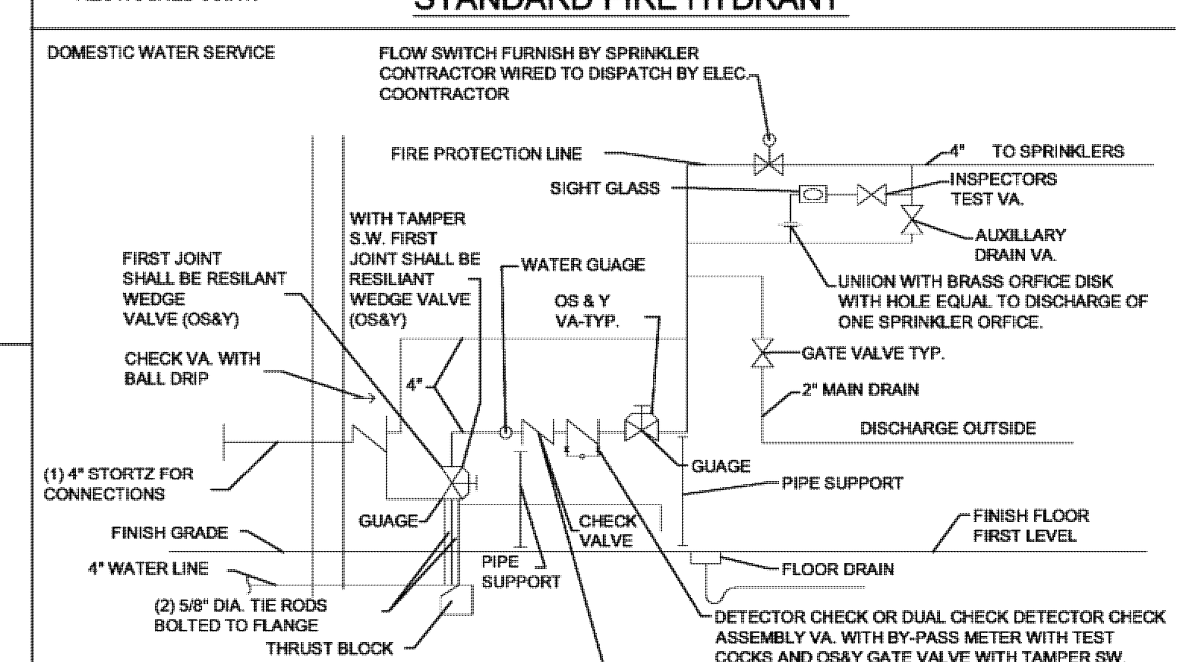
ASBESTOS CEMENT (AC) WATER MAIN



WATER MAIN CONNECTION



FIRE DEPARTMENT CONNECTION LABEL DETAIL



METER ROOM DETAIL

MIDWESTERN CONSULTING
Civil, Environmental and Transportation Engineers
Planners, Surveyors
Landscape Architects
3815 Plaza Drive
Ann Arbor, Michigan 48108
Phone: 734.995.0200
Fax 734.995.0599

CLIENT
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
PITTSFIELD TOWNSHIP STANDARD NOTES/DETAILS
WATER MAIN

33

JOB No. 10046
DATE: 6-23-11
SHEET 35 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH:
FINAL\10046DT3
FB#:

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, materials, and equipment required to construct a water main and necessary appurtenant work as herein specified. The water main shall be installed in the locations as shown on the Plans and shall meet all acceptance tests.

1.02 NOTIFICATION

A. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department at (734) 882-2110, 24 hours prior to flushing or chlorination of the water main.

B. CONTRACTOR shall schedule bacteriological testing with the ENGINEER 48 hours prior.

C. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department 48 hours prior to connecting to an existing water main.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, valves, hydrants and the B-1 Poly Pig. The Contractor shall submit a certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, Township name, current date, certification of pipe provided and letterhead of the certifying company.

1.04 TESTING

A. General

1. CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein. All tests shall be conducted under the supervision of the ENGINEER. All water mains, branches and valves shall be subject to cleaning with a poly-pig, hydrostatic pressure testing, disinfection and bacteriological testing. No acceptance tests shall be conducted until the water main has been installed and backfilled for not less than 30 days. A copy of all test results shall be furnished to the ENGINEER.

2. Hydrostatic pressure testing must be performed in accordance with ANSI/AWWA C600. Disinfection and bacteriological testing must be performed in accordance with ANSI/AWWA C651.

3. CONTRACTOR shall furnish all material and labor to provide for an acceptable full size blow-off to flush the poly-pigs out of the main at the far end of the project not connected to the existing system.

4. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair the rejected section and retest until it is within the specified allowance.

5. Only Pittsfield Township personnel or the CONTRACTOR under direct supervision of Pittsfield Township personnel may fill or flush lines.

B. Preparation

1. After the pipe has been laid and backfilled as specified, the CONTRACTOR shall fill the line, or a valve section thereof, to be tested with water in such a manner as to expel all air from the pipe. This may be done through fire hydrants at the high points; or, if no hydrant is available at such point, the CONTRACTOR shall make the taps necessary to accomplish the expulsion of all air. At the close of the test, all taps shall be satisfactorily plugged with brass plugs.

C. Sequence

1. All water mains connected to an existing water system shall be flushed, swabbed, chlorinated and bacteriological tested prior to pressure testing. The sequence for acceptance testing shall be:

a. Flushing with approved B-1 Poly-Pig
b. Chlorination
c. Flushing
d. Bacteriological Testing
e. Pressure Testing

2. Where mains can be totally isolated from the existing water system with airgaps, pressure testing shall precede chlorination and bacteriological testing. The sequence for acceptance testing shall be:

a. Pressure Testing
b. Connect to System
c. Flushing with approved B-1 Poly Pig
d. Chlorination
e. Flushing
f. Bacteriological Testing

3. If a hydrostatic pressure test fails, the chlorination and flushing process must be repeated after repairs to the system are completed.

D. Flushing

1. Mains shall be flushed with an approved B-1Polypig (swab) and clean potable water until the water runs clear under the supervision of Pittsfield Township personnel or the ENGINEER. When flushing mains prior to chlorination, all hydrant leads, operating stems and hydrant valve mechanisms shall be removed.

2. The CONTRACTOR shall clean and flush water mains in the following manner:

a. The contractor will insert a flexible polyurethane foam "swab" (2# per cu/ft density) complete with rear polyurethane drive seal, into the first section of pipe. The "swab" shall remain there until the pipeline construction is completed.

b. Cleaning and flushing shall be accomplished by propelling the "swab" down the pipeline to the exit point with potable water. Flushing shall continue until the water is completely clear.

c. If cleaning and flushing exit point is through a Fire Hydrant, (8" line or smaller) the CONTRACTOR shall remove the hydrant internal valve assembly to allow passage of the "swab"

E. Chlorination

1. All new mains and pipe or any existing mains contaminated by the CONTRACTOR shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal. The chlorinated water shall be allowed to stand in the mains for 24 hours. The end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and the mains flushed with potable water for bacteriological testing. No flushing shall take place between the two required bacteriological testing.

F. Bacteriological Testing

1. The Pittsfield Township Utilities Department will take bacteriological samples of the water in the mains for analysis at two different times. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken 24 hours later. Each sample will be incubated for 48 hours. No flushing shall be done during or between tests, unless supervised and approved by ENGINEER. Two sets of safe consecutive bacteriological samples, collected at least 24 hours apart, must be obtained before placing the water main in service.

2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or fire hydrants.

3. Bacteriological testing must begin on Mondays to allow Pittsfield Township personnel and the testing laboratory a full work week to conduct the testing.

G. Hydrostatic Pressure Testing

1. The CONTRACTOR shall pressure test sections of water main as sections of 2,000 feet or less unless otherwise authorized by the ENGINEER. When permitted to test lengths in excess of 2,000 feet, only the allowable leakage for 2,000 feet will be permitted.

2. All water mains shall be subjected to a hydrostatic pressure of 150 psi based on the elevation of the lowest point in the system. The main shall be maintained under the test pressure for a minimum continuous period of two (2) hours by pumping potable water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the main. No pipeline installed will be accepted until the leakage measured is less than 0.092 gallons per inch diameter of the pipe per 1 hour per 1,000 feet.

3. In the event that the leakage exceeds the specified amount, the main shall be carefully inspected for leaks and repaired as necessary. Any cracked or defective pipe, fittings, valves or hydrants discovered shall be removed and replaced with sound material and the test repeated to the satisfaction of the ENGINEER.

4. If the CONTRACTOR chooses to pressure test against an existing valve he assumes the responsibility of meeting the leakage requirements. The CONTRACTOR may at his discretion provide a physical break and cutting in sleeve for pressure testing.

5. Temporary connections (jumpers) between existing water mains and the newly constructed system for testing purposes, shall include a reduced zone backflow preventer to prevent backflow and possible contamination of the public water.

H. Material Tests

1. The CONTRACTOR shall have test of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of water main per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturers certificate of compliance to the specifications.

2.00 PRODUCTS

A. All products shall be consistent with the current component part submittal sheet posted on the Township website.

2.01 PIPE AND FITTINGS

A. Ductile-iron pipe water main shall meet all the requirements of the latest revision of ANSI/AWWA C151/A21.51. Pipe shall be furnished in eighteen-foot or twenty-foot lengths, unless otherwise required. All joints, to include joints for fittings, valves and hydrants, must be of the push on joint type and compatible tylon joint gaskets. Ductile iron pipe must be designed in accordance with the latest revision of ANSI/AWWA C150/A21.50 to meet requirements for Thickness Class 54.

B. Ductile iron pipe and fittings shall be double-cement lined with an approved bituminous seal coat in accordance with ANSI/AWWA C104/A21.4.

C. Ductile iron fittings shall meet all the requirements of the latest revision of ANSI/AWWA C110/A21.10 for full body fittings and ANSI/AWWA C153/A21.53 for compact fittings for a minimum working pressure of 250 psi and be of the push-on joint type. Plugs, where shown on the plans, shall be solid mechanical joint plug type.

D. Restrained mechanical joints of the wedge action type shall use a follower gland and shall include a restraining mechanism which, when activated, impart multiple wedging action against the pipe, increasing its resistance as the pressure increases. Twist off nuts shall be used to insure proper actuating of the restraining device. Restrained mechanical joints for ductile iron pipe shall be Megalug, Series 1100, or approved equal. Mechanical joints shall be in conformity with the requirements of the latest revision of the ANSI AWWA C111/A21.11. Bolts and nuts must be type 304 stainless steel.

E. Push-on joints shall meet all requirements of ANSI/AWWA C111/A21.11. Push-on joints shall consist of a ductile-iron bell provided with a recess to receive a circular molder rubber gasket to effect the joint seal. A rubber gasket and sufficient lubricant to assemble the joint shall be furnished with each joint. The lubricant shall have no deleterious effect upon the color, taste or odor of potable water and shall not be corrosive to either the pipe or gasket. Pipe furnished with push-on type joints shall be equal in strength and leak tightness to pipe furnished with mechanical joints as specified when installed under identical conditions, and shall meet all other requirements of these specifications. In addition to the above requirements, the gasket and lubricant shall conform to the latest revision of ANSI/AWWA C111/A21.11. When it is necessary to utilize a locking mechanism for a push-on joint upstream or downstream of a restrained mechanical joint, field-lok gaskets or equal shall be utilized and shall be used in conformance with DIPRA Standards for restraint distance from a restrained mechanical joint fitting.

F. All pipe and fittings shall be manufactured in the United States of America.

G. The ENGINEER shall witness the delivery and unloading of all pipe and collect the appropriate manufacturer's certificate of compliance per Section 1.04 of this Specification.

2.02 VALVES

A. All valves installed under this Specification shall conform to the applicable requirements of ANSI/AWWA C500, C504 and C509 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn to the right (clockwise) to open.

B. Resilient-Seated Gate Valves

1. Resilient seated gate valves shall conform to the applicable requirements of ANSI/AWWA C515. Valves shall have a minimum working pressure of 250 psi. The gate shall be ductile iron encased in a bonded synthetic rubber to form resilient seating surfaces. Stem shall be bronze with a non-rising design and double o-ring packing. Joints shall be push-on type.

2. Resilient Seated Gate Valves shall be manufactured by American Flow Control or Clow.

C. Tapping Sleeves and Valves

1. Tapping sleeves shall be full length of heavy-duty stainless steel construction designed for use with the type of pipe to be tapped. Tapping sleeve flange and body shall be type 304 stainless steel. Bolts and nuts shall be 304 stainless steel. Gasket shall be full circumferential SBR compounded for water service. Tapping sleeve shall contain a test plug to assure seal prior to tapping. Tapping sleeve shall be JCM Industries 432; Romac Industries SST, Ford FAST, Powerseal 3490AS; Dresser 630 or equal.

2. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

3. The tapping sleeves and valves shall be subjected to a hydrostatic pressure of 200 psi. The sleeves and valves shall be maintained under pressure for a minimum continuous period of 5 minutes by pumping potable water into the sleeve. Upon any visual leakage observed by the ENGINEER, the tapping sleeve and valve shall be removed and replaced, and the test repeated at the CONTRACTOR's expense to the satisfaction of the ENGINEER.

D. Corporation Stops

1. Corporation stops used for insertion into mains shall be ball valve type. All stops shall have bronze cast bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800. The outlet connection shall be of the compression type to receive copper service pipe.

E. Valve Boxes

1. Valves boxes shall be 5-1/4-inch and be of cast-iron construction. They shall be of three-piece, screw-type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The base shall not rest upon the valve assembly. Valve boxes shall be Tyler 6860 Item DD with number 6 base, or equal.

F. Valve Extensions

1. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem. The length of the extension stem shall reach within 6.5 feet of the ground surface. Details of the extension system and method of installation shall be approved by the ENGINEER prior to installation.

G. Post Indicators and Valves

1. Post indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating OPEN and SHUT. Post indicators shall open left.

2. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.

3. Post indicators and their corresponding valves must be made by the same manufacturer.

4. Bollards must be placed to protect post indicators, except as specified by the ENGINEER.

5. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

2.03 GATEWELLS

A. Gatewells shall conform to the latest revision of ASTM C478 for Precast Reinforced Concrete Manhole Sections. Section joints shall be rubber gasketed and shall conform to ASTM C990. Cone sections shall be eccentric, with an offset step configuration.

B. All gatewell components shall have the name of the manufacturer stenciled on the inside. The lettering shall be a minimum of 4-inches high.

C. Gatewells constructed over an existing water main shall have a doghouse mudded to an 8-inch thick cookie. All other gatewells shall have precast integral base sections.

D. Mortar for masonry or plastering outside of gatewells shall be made of one part of Portland Cement to two parts fine aggregate. Mortar materials and mixing shall correspond, in general, to those for concrete. All openings in gate wells shall be closed with brick and mortar in a manner that will make them watertight.

E. Gatewell steps shall be reinforced polypropylene coated steel. They shall be M.A. Industries models PS1-PF or PS1-B, or approved equal.

2.04 GATEWELL FRAMES AND COVERS

A. Gatewell frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitable notched for convenient removal of the cover.

B. Frames and covers shall be East Jordan Iron Works Model 1040Z frame with Type AGS cover. Each cover shall have the Pittsfield Township logo and the letters "PITTSFIELD TWP WATER" cast integrally into the cover.

C. All frames and covers shall be coated at the place of manufacturer with coal tar pitch varnish or other asphaltum coating approved by the ENGINEER.

2.05 GATEWELL CONNECTIONS

A. Water pipe to gate well connections shall be through a watertight flexible pipe-to-manhole connector, which shall be securely clamped into a core-drilled port. Pipe ports shall be core-drilled at the point of manufacturer and shall be accurately located within 1/2-inch of the proposed water main centerline. Flexible pipe-to-manhole connectors shall meet the requirements of ASTM C923 and shall be NPC, Kor-N-Seal, or equal.

B. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

2.06 GATEWELL ADJUSTMENTS

A. All final grade adjustment of gatewell cover and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by Ladtech, Inc., or approved equal. The adjustment rings shall be manufactured from polyethylene plastic meeting the requirements of ASTM D4976. Brick adjustments are not acceptable.

B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

C. Each adjustment ring shall be sealed with a 3/16 to 1/4-inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet the requirements of ASTM C990.

D. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead Trubolt concrete anchors, or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

E. When the depth of the gate well requires an adjustment greater than the maximum allowed, the CONTRACTOR shall provide additional pre-cast gate well barrel sections required to maintain acceptable chimney heights.

2.07 HYDRANTS

A. Fire hydrants shall comply with the latest revision of ANSI/AWWA C502. Hydrants shall be compression type to open with the pressure. They shall have a 5-1/4" valve opening and 6" mechanical joint inlet. Hydrants shall have two 3-1/2" (4.05" O.D.) pumper connections with National Standard 7-1/2 threads per inch. All hydrants shall have City of Ann Arbor standard thread pattern.

B. Fire hydrants shall have an inside barrel dimension of not less than 7.375" I.D. from top to bottom. The 1-1/8" pentagon operating nut shall open left (counter clockwise).

C. All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.

D. Hydrant shall be fully bronze mounted, including top of the operating stem where it passes through the double o-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of composition rubber and the cast iron valve clamps shall be packed with o-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.

E. Hydrant shall be designed for 150 psi working pressure and tested to 300 psi. Those portions of the hydrant above grade shall have two coats of red enamel. All unpainted surfaces shall have two coats of coal tar pitch varnish.

F. The hydrants shall be EJIW WaterMaster 5BR-250 with mechanical joint connections and break flange barrel with standard head.

G. Hydrant bolts located below grade shall be type 304 stainless steel

H. All hydrants shall have a 4" Harrington Integral Hydra-Storz (HIHS) adaptor. The HIHS shall meet the requirements of AWWA C502 regarding material and pressure testing. Storz nozzle shall have a brass metal face and hard anodized ramps and lugs. The aluminum finish shall be hardcoat anodized to Mil-A-8625f, type 3 dark gray. The adapter shall be made from forged or extruded 6061-T6 aluminum.

I. The blind cap shall have hard anodized aluminum Storz ramps and lugs, made of forged or extruded 6061-T6 aluminum. the cap shall be equipped with suction seal. The cap shall be connected to the adapter or the hydrant with 0.125 vinyl coated aircraft cable.

J. Fire hydrant extensions shall be manufactured by the hydrant manufacturer for use with the model hydrant being installed.

K. Hydrants adjacent to truck routes on commercial developments shall be protected by bollards.

2.08 SERVICE LEADS

A. Pipe for service leads 1-inch to 2-inch shall be soft annealed Type K copper. Service leads 4-inch to 8-inch shall be Class 54 Ductile Iron, Double cement lined.

B. Curb Stops

1. Curb stops used for service connections shall be ball valve type. All parts shall be cast from bronze. Both the inlet and outlet connections shall be of the compression type to receive copper service pipe. Curb stops shall be consistent with the most current shop drawing checklist posted on the Township website.

C. Curb Boxes

1. Curb boxes used for service connections shall be the "Arch" type. All curb boxes shall have an I.D. screw type adjustment and shall be furnished complete with cover, rod, and 27/32" point to flat pentagon bolt(s). All curb boxes shall be coated inside and out with a tar base enamel. The minimum bury shall be 5'-0" (60") and the maximum 6' (72"). All curb boxes shall be Ford model EA 1-60-40-54R or McDonald model 5601 or 5603. Curb boxes shall be consistent with the most current shop drawing checklist posted on the Township website.

D. Couplings

1. Couplings used for service connections shall be located outside the pavement and more than 10 feet from any building wherever possible. They shall have a three part union, and both connections shall be of the compression type to receive copper service pipe. All parts shall be cast from bronze.

2. All service connections between two copper service pipes (two-inch or less in diameter) located under the pavement or within 10 feet of a building shall be connected using wrought copper, solder-sweat type couplings conforming to ASME B16.18 or ASME B16.22. Fittings shall bear made in USA labels. Joining of copper piping shall be a solder-sweat connection using lead free Silfos. The use of 95-5, Tin-Antimony or equivalent solders will not be allowed.

2.09 TRACER WIRE

A. Tracer wire to be used on open cut pipe shall be AWG #12 single strand copper with blue 30 mil HDPE insulation. Connections shall be made using 3M DBR-09964 wire connectors, or equal.

2.10 POLYETHYLENE ENCASEMENT

A. All ductile iron pipe and fittings must be polyethylene encased. In addition, the initial 24-inches of copper service lead must be encased from the corporation stop. Polyethylene encasement must be manufactured in accordance with the requirements of the latest revision of ANSI/AWWA C105/A21.5.

B. Polyethylene Encasement shall be black linear low-density polyethylene with a minimum thickness of 8 mils.

C. The wrap shall overlap the joint by 12 inches to either side and be secured to the pipe with polyethylene adhesive tape.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill shall conform to the Earthwork specification.

3.02 PIPE INSTALLATION

A. The installation of ductile iron water main must conform to the requirements of ANSI/AWWA C600.

B. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.

C. Before lowering in the trench, and while suspended, each pipe and fitting shall be inspected for defects. Defective, damaged or unsound pipe shall immediately be removed from the construction site. The interior of each pipe shall be inspected for cleanness and cleared of all dirt and foreign matter before being lowered into the trench.

D. In handling and placing ductile iron pipe and fittings, no metal shall be used in contact with the inside of the pipe to fit or support the pipe. The pipe shall be moved only through the use of belt slings or automatic release type pipe tongs. Care shall be taken not to injure the pipe or pipe coating, and no damaged or imperfect pipe shall be used in the work except that minor damage to pipe coating may be repaired subject to the review of the ENGINEER.

E. Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying. After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe; the pipe shoved into position and brought to a true alignment. It will then be secured with sand backfill tamped under and on each side of the pipe, except at bell holes. No earth or other foreign matter shall be allowed to enter the joint space.

F. All excavation and backfill above the pipe shall conform to specifications under Earthwork and as shown on the Drawings.

G. A minimum of 18-inches vertical clearance shall be provided between the water main and any existing underground facility, unless otherwise approved by the ENGINEER. Whenever a main is installed under any existing utility line such as gas, buried electric power, telephone line, sewer or water, provisions shall be made to properly support or distribute any concentrated load to avoid settlement and possible failure of either main. Such provisions shall consist of concrete bedding of the main, complete concrete encasement, or some other method as shown on the plans. Water mains passing under sewers, in addition, shall be protected by providing:

1. A vertical separation of at least 18-inches between the bottom of the sewer and the top of the water main.

2. Adequate structural support for the sewer to prevent excessive deflection of joints and settlement of the sewer about the water main; i.e., a concrete saddle under the pipe with a span length extending to undistributed earth bearing.

H. Water mains shall be installed at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsoil treatment system. The distance shall be measured edge to edge.

I. In assembly of push-on or shove type joints, the bell socket recess and the gasket shall be wiped clean and the gasket placed properly in position. A thin film of lubricant shall then be applied to the surface of the gasket to come into contact with the entering pipe. The plain end of the entering pipe shall be cleaned and then entered and forced home to the base of the socket.

J. Where necessary to cut pipe, cutting shall be done with approved tools and cut ends of pipe shall be square and regular. Cutting shall be done in a manner to avoid damage to lining and coating. Minor damage may be repaired subject to review of the ENGINEER.

K. To prevent trench water from entering the pipe, joints, which for any reason may not be completed as the pipe is laid, shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed, as shall the end of the last pipe laid whenever work is not in progress.

L. Each pipe shall be laid accurately to the line and grade shown on the Plans. Wherever deflections at joints are required by changes in grade or alignment or to plumb valve stems, the deflection at any bell and spigot joint shall not exceed that which will cause the spigot end of pipe to be away from home in the bell of the adjacent pipe a distance of 1/4 inch at the point of greatest opening.

M. The deflection at any mechanical joint shall not exceed three-quarters of the maximum deflection recommended by the manufacturer or 3 degrees, whichever is more conservative of the joint used.

N. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.

O. Pipe shall be laid at depths to provide minimum cover of 6'-0" over the top of the pipe unless otherwise noted on the Drawings or elsewhere in these specifications.

3.03 GATE VALVES AND WELLS

A. All pre-cast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.

B. Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main, and unless otherwise directed by the Township ENGINEER, all gate valves shall be set with stems plumb. At each side of gate valve, the CONTRACTOR shall furnish and install a 1-inch corporation stop on the main as shown on the Standard Details.

C. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem.

3.04 HYDRANTS

A. Fire hydrants shall be constructed in accordance with the details shown on the plans. Finish grade level to center of nozzle caps shall measure between 24 and 30 inches. A maximum of one hydrant barrel extension and one operating stem extension may be used to accommodate changes in grade. Under no conditions shall extended hydrant have more than one coupling in the operating stem. Pumper connections shall point toward the street.

B. Fire hydrants shall be installed with barrel vertical and properly based. Concrete thrust blocks shall be placed behind the hydrant, tee, and every bend. Care should be taken to insure the drain holes on the hydrant are not plugged by the thrust blocks. Hydrant shall be set in 1 yard of coarse gravel for drainage purposes. If ground water is encountered, the drain hole shall be plugged as directed by the manufacturer. The backfill shall be sand thoroughly tamped around the hydrant and valve box in 1 ft layers.

C. Fire hydrant and gate valve shall be set apart 24 inches. Gate valves and valve box shall be as specified under the valve paragraphs of this section.

D. Hydrant leads shall have a minimum of 5.5 feet of cover in all areas, including crossings through ditch sections.

E. Hydrants shall be carefully plumbed, braced and backfilled so they remain plumb.

F. All grade, facing, and vertical alignment adjustment of hydrants shall be completed prior to pressure testing and charging of the hydrants.

G. All hydrants shall be cleaned and painted with a rust inhibitive, oil base paint such as "rustoleum" or approved equal to the Township's color code prior to acceptance.

H. The lubricant reservoirs in all hydrants having such construction shall be filled with a lubricant acceptable to the Michigan Department of Environmental Quality and recommended by the hydrant manufacturer.

I. Backfilling around fire hydrants shall be carefully tamped sand in 12-inch layers from the centerline of the lead main to a height of 1-foot below finished grade.

J. CONTRACTOR shall place burlap sack or equivalent material over the hydrant nozzles after installation.

K. Fire hydrant nozzles shall be aligned as required by the Township Fire Marshal.

L. Fire hydrant extensions shall be provided as necessary so that the safety flange is located at or above surface grade.

3.05 TRACER WIRE

A. Tracer wire shall be installed along the top of all water mains. For directional drilling, the tracer wire shall be installed at the same time as the pipe. For open cut construction, the tracer wire shall be installed at a height of not more than 6 inches above the main line pipe or service leads. Wire shall be extended to all hydrants, blow-offs, dead ends, service leads and post indicator valves. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to the wire during construction and subsequent activities. Wire shall be trimmed to finish grade following completion of the landscaping.

B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner. For service leads and offsets of more than 20 feet in length, or installed by directional drilling method, a splice may be utilized to make the connection at the main. The tracer wire shall then be installed and terminated in an approved manner.

C. Tracer wire terminations shall be made by one of the following methods:

1. Tracer wire shall be terminated at hydrants by tying off the wire at the head flange, leaving excess material for future trimming following landscape activities.

2. Terminations at valve/curb boxes, post indicators, valves and blow-offs shall be made with 2 wraps of wire at grade around the box or pipe, leaving excess material for future trimming following landscaping.

3. Gatewell terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.

4. Terminations at existing water mains without tracer wire shall be made at the nearest hydrant or gate well as outlined above. If no hydrant or gatewell is available, an upper section of valve box shall be installed with the tracer wire stubbed up inside

D. When connections are made to existing water mains which do not have tracer wire, the following method most applicable to field conditions shall be used.

1. When connection is made at/near a valve or hydrant, the connection shall be made in the same manner as the termination at said structures in Item C(2) above.

2. When connection takes place in a gatewell, the same procedure shall be used as in termination at a gatewell (see Item C(3) above).

3. If no valve or hydrant is available, the upper section only of a valve box shall be set with the tracer wire stubbed up inside.

3.06 POLYETHYLENE ENCASEMENT

A. The polyethylene encasement must be installed in accordance with the specifications and requirements of ANSI/AWWA C105/A21.5. For open cut applications a single wrap is required, and for directional drill applications a double wrap is required.

B. The polyethylene encasement must be taped and overlapped at pipe joints and must be taped in a spiral configuration along the length of the pipe.

3.07 CONNECTION TO EXISTING MAINS

A. All connections to existing water mains shall be made at the locations as shown on the plans.

B. All valves shall be operated by the Pittsfield Township Utilities Department.

C. Prior to beginning construction of the final connections, the CONTRACTOR shall provide sequence of all final connections to the existing system and coordinate a meeting between the ENGINEER, OWNER and CONTRACTOR in the field to review the procedure.

D. When making a dry connection to an existing main, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing valves, and the water from the existing main shall then be pumped out or removed by other means so the connection may be made in the dry. After the connection has been acceptably made, the portion of the new line to the nearest valve shall be satisfactorily tested and disinfected, along with the drained portion of the existing water main, before the isolated existing main is placed back in service, except as the ENGINEER may otherwise direct. In as much as residents served by this isolated main will be temporarily out of water during this period, the work shall be executed as rapidly as possible, and the time of, and the procedure in, making such connections shall be subject to the review of the ENGINEER. Such work may be required to be done at night in order to minimize inconvenience of water users. The CONTRACTOR shall not be entitled to any additional compensation because of night work or other special requirements in work under this section.

E. The CONTRACTOR shall make particular effort, prior to bidding, to ascertain whether or not valves in the existing mains to be connected to the new mains are so located as to provide isolation. If valves are not found to be adequate, then the CONTRACTOR shall utilize other means to make the connections with a minimum of interruption to service.

F. When making a wet tap connection to an existing main, a tapping sleeve designed for the type of pipe being tapped shall be utilized and the tap shall be made in accordance with the manufacturer of the tapping equipment.

G. Wherever adapters are required to properly connect the pipe with existing pipe or other material or manufacturer, the nominal I.D. of adapters shall be the same size as the nominal diameter of pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer for connection to fittings.

3.08 BEDDING

A. Ductile iron pipes shall be fully enclosed in polywrap and laid on a compacted sand cushion, 4 inches thick. Sand shall conform to fine aggregate 2NS as defined in 2003 MDOT, Section 902.

B. 2NS sand bedding material shall be placed around and above the main to a height of 12 inches above the main.

C. Sand shall be compacted on top of the 12-inches of sand above the pipe to not less than 95 percent of the maximum unit density as determined at optimum moisture content.

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COSTCO
FINAL SITE PLAN
PITTSFIELD TOWNSHIP STANDARD NOTES/DETAILS
WATER MAIN

34

JOB No. **10046**

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

DATE: 6-23-11
SHEET 36 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
TECH:
FINAL\10046DT3
FB#:

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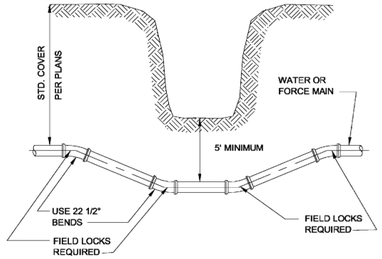
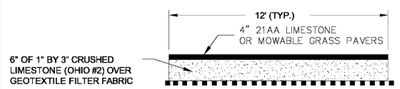
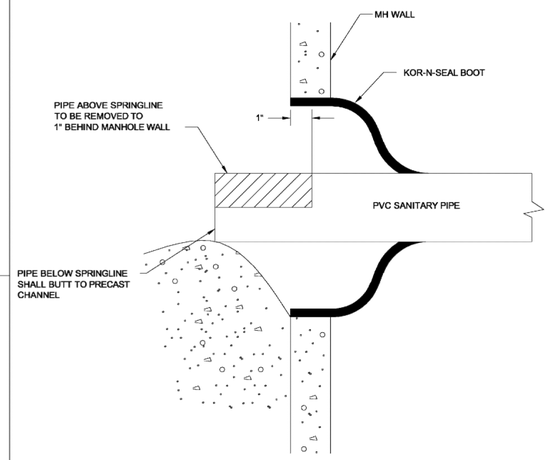


DITCH & STREAM CROSSING



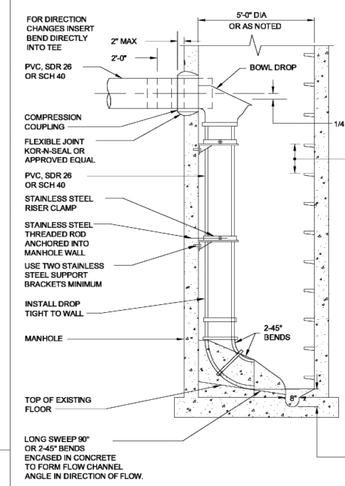
SANITARY SEWER ACCESS PATH

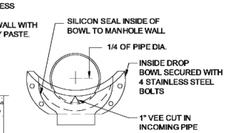


SANITARY PIPE PENETRATION

NOTES:

1. SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN, INC STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS OR EQUAL.
2. ATTACH THE DROP BOWL & EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH 3/8" x 3 3/4" RAMSET/RED HEAD BOLTS HELD INPLACE WITH 2 STAGE EPOXY PASTE.





DROP BOWL MOUNTING POSITION

DROP SHALL BE NO CLOSER THAN 18" FROM STEP

SIZE

LINE	LINE
4"	4"
6"	6"
8"	8"
10"	8"

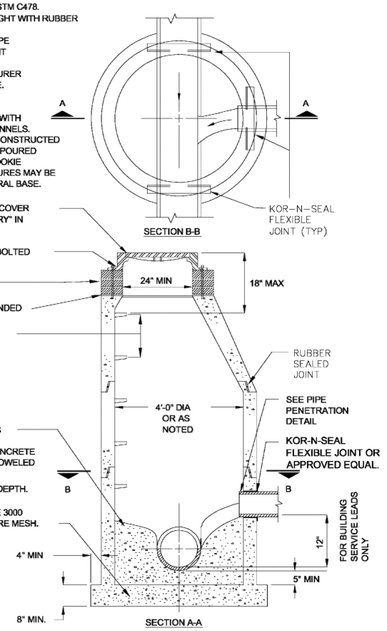
MH DIA.	MAX. DROPS
4'	2'-6"
5'	4'-6"
5'	2'-8"
6'	3'-6"

NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

INTERIOR DROP SANITARY MANHOLE

PRE-CAST CONCRETE MANHOLE

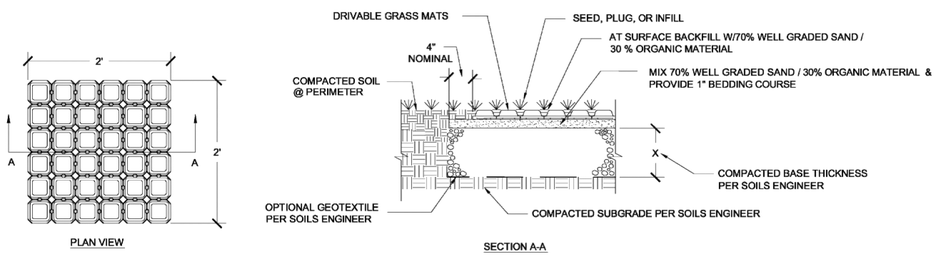
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE WITH PRECAST CONCRETE CHANNELS.
6. WHERE MANHOLES ARE CONSTRUCTED OVER EXISTING SEWERS, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MAY BE USED IN PLACE OF INTEGRAL BASE.



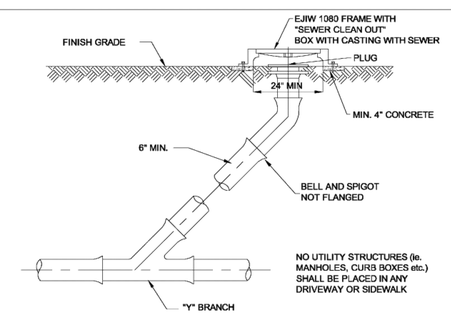
NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

SANITARY MANHOLE

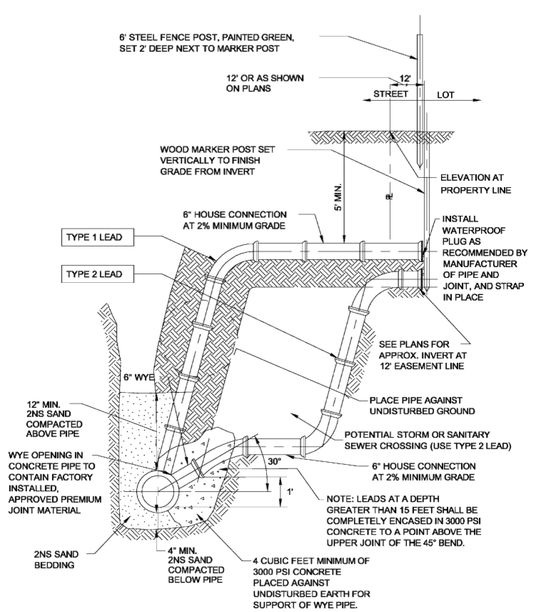
NOTE:
FOR STORMWATER MANAGEMENT APPLICATIONS INCLUDING STORAGE AND INFILTRATION, ALTERNATE INFILLS, BASE MATERIAL, AND DRAINAGE MAY BE REQUIRED



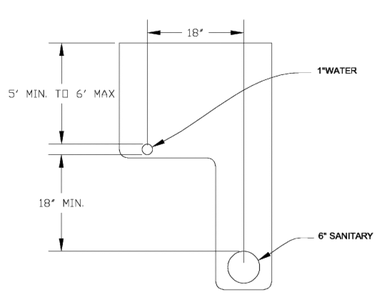
TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



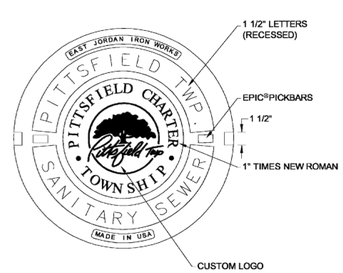
SANITARY SEWER CLEANOUT



SANITARY SEWER SERVICE & RISER CONNECTION DETAIL

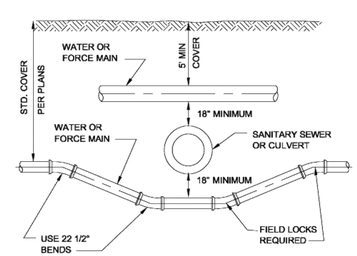


TYPICAL L TRENCH DETAIL HOUSE LEADS



EAST JORDAN IRON WORKS 1040-12PT FRAME
EAST JORDAN IRON WORKS 1040 AGS COVER

COVER DETAIL



SEWER OR CULVERT CROSSING

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COSTCO
FINAL SITE PLAN
PITTSFIELD TOWNSHIP STANDARD NOTES/DETAILS
SANITARY SEWER

35

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

DATE: 6-23-11
SHEET 37 OF 64
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SANITARY SEWER AND MANHOLES

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, tools, equipment and materials to construct all sanitary sewers, manholes and necessary appurtenant work as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

1.02 TESTING

A. General

1. The CONTRACTOR shall furnish all equip\-ment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed and has been installed for not less than 30 days.

2. The CONTRACTOR may desire to make an air test prior to backfill for his own purposes but the line acceptance tests shall be conducted after backfilling or extensions.

3. All sewer lines shall be televised while running enough water through the line to be visible at the next downstream manhole.

4. All sewer lines shall be checked for alignment.

5. All manholes shall be tested for leakage. All PVC lines shall be tested for deflection.

6. Sewer pipe 30 inches and smaller shall be air tested. Sewer pipe larger than 30 inches shall be tested by either infiltration or exfiltration and shall be tested in lengths of 1600 feet or less.

7. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair rejected section and retest until it is within specified allowance.

B. Test for Leakage - Air Test

1. Section 33-95 (pg 30-6) 2004-Ten State Standards.

2. After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs inflated to 35 psig internal pressure. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing.

3. There shall be three (3) hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.

4. There shall be a 0-30 psig gauge for reading the internal pressure of the line being tested. Calibrations from the 1-10 psig range shall be in tenths of lbs (not ounces) and this 0-10 portion shall cover 90% of the complete dial range.

5. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the third hose shall be disconnected.

6. The portion of line being tested shall be accepted if the portion under test meets the following conditions.

a. DI, and RCP Pipes

(1) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

Pipe	Min. Holding Time Seconds/100 ft. Pipe
4-inch	18
6-inch	42
8-inch	72
10-inch	90
12-inch	108
15-inch	126
18-inch	144
21-inch	180
24-inch	216
27-inch	252
30-inch	288

(2) In areas where ground water is known to exist, the CONTRACTOR shall install a 1/2-inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the lbs of pressure that will be added to all readings. For example, if the height of water is 11-1/2 ft, then the added pressure will be 5 psig. This makes the 3.5 psig to be 8.5 psig, and the 2.5 psig to be 7.5 psig. The 1 lb allowable drop and the timing remains the same.

a. PVC Pipe

(1) The time requirement for the pressure to decrease from 3.5 to 3.O psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than that shown in the following table:

(inches)	Pipe Size (seconds)	Holding Time (seconds)	Minimum Holding Time
	4-inch	0.190xL	113
	6-inch	0.427xL	170
	8-inch	0.760xL	227
	10-inch	1.187xL	283
	12-inch	1.709xL	340
	15-inch	2.671xL	425
	18-inch	3.846xL	512

(2) If any section of the sewer fails to meet this requirement, the CONTRACTOR shall perform a television inspection of the faulty section and repair or replace at his own expense all defective materials and/or workmanship to the satisfaction of the ENGINEER. The test procedure shall be repeated until the results are acceptable.

C. Test for Infiltration

1. Sewer pipe over 18 inches shall be tested to measure the infiltration of ground water. If the measured leakage exceeds 100 gallons per inch diameter per mile of pipe per 24 hr period, the CONTRACTOR shall locate the points of excessive leakage and make the necessary repairs at his own expense.

2. In the event the line does not pass the infiltration test as stated above, the test shall be repeated after suitable repairs have been completed.

D. Test for Exfiltration

1. Where the ground water provides less than a 2 ft head on the sewer, an exfiltration test shall be conducted by filling the sewer with water to a 4 ft head or 4 ft above the ground water level, whichever is greater. The allowable water loss shall be 100 gal/in./mi/day as calculated above for infiltration.

2. After the sewer has been filled with water, 4 hrs time shall be allowed for water absorption by the pipe before exfiltration tests are initiated.

3. For the purpose of establishing the 4 ft test head, the head shall be measured from the center of the sewer pipe at the midpoint of the test section length. This procedure shall be used for both infiltration and exfiltration tests.

E. Test for Manhole Leakage

1. All manholes shall be tested for leakage by using plugs on inleting-outleting sewers, and filling the manholes with water to the top of the man\-hole. Four hours shall be allowed for water absorption by the manhole before testing is initiated. Allowable exfiltration for 48-inch diameter manholes shall be 2 gallons per foot of depth per day.

F. Test for Alignment

1. All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

G. Test for Deflection of PVC Pipe

1. PVC pipe sewers shall be installed in such a manner that the initial deflection of the conduit shall conform to the latest revision of ASTM D-3034.

2. Deflection of PVC pipe shall be tested by pulling a rigid pig or equivalent through the pipe. The pig shall be constructed in accordance with the following table of maximum outside diameters and shall be submitted to the ENGINEER for review before testing is initiated.

Pipe I.D.	Pig O.D.
6 inches	5.33 inches
8 inches	7.11 inches
10 inches	8.87 inches
12 inches	10.55 inches
15 inches	12.90 inches
18 inches	15.74 inches

3. The pig shall be drawn by hand through the pipe from manhole to manhole. Any portion of pipe through which the pig passes freely shall be deemed to have passed the deflection test. Sections of pipe through which the pig does not pass shall be located, un\-covered and the pipe zone bedding improved and backfilled by the CONTRACTOR at his own expense. The pipe shall then be retested before acceptance is granted.

H. Material Tests

1. The CONTRACTOR shall have tests of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the Specifications.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, and valves. The Contractor shall submit certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company.

2.00 PRODUCTS

2.01 SEWER PIPE

A. Pipe for sewer 24-inch diameter and smaller shall be polyvinyl chloride (PVC). Pipe for 30-inch diameter and larger shall be PVC truss pipe. Ductile iron pipe and reinforced concrete pipe shall be used as specified by the ENGINEER.

B. Pipe for service leads 4 though 8 inches in diameter shall be polyvinyl chloride (PVC).

C. Reinforced concrete pipe shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Pro\-posal.

D. PVC pipe 4 inches through 15 inches in diameter shall meet or exceed all of the requirements of the current ASTM D-3034 SDR-26 polyvinyl chloride sewer pipe and fittings. 18-inch diameter PVC pipe shall meet or exceed all the requirements of the current ASTM F-794 SDR 26 polyvinyl chloride sewer pipe and fittings. Samples of pipe and physical and chemical data sheets shall be submitted to the ENGINEER for review. Approval shall be obtained before pipe is purchased.

E. If the sewer pipe is greater than 15 feet deep PVC pipe shall be SDR 21.

F. Truss pipe shall meet or exceed all of the requirements of the current ASTM D2680.

G. Ductile iron pipe shall meet or exceed all the requirements of ANSI A21.50 with a cement lining.

2.02 SEWER PIPE FITTINGS

A. Fittings shall be of the same material as the pipe, and in no case shall the walls be thinner than that of the pipe furnished.

B. Wye and tee fittings for PVC pipe shall be reviewed by the ENGINEER before purchasing.

C. The dry fit of all fittings must be snug. If the fit is such that it is loose, the pipe or fitting will be rejected as faulty and of improper size.

2.03 SEWER PIPE JOINTS

A. Concrete pipe joints shall be made of a resilient material conforming to the latest revision of ASTM Designation C443. Proper lubricant shall be furnished by the joint manufacturer.

B. Concrete pipe for use with rubber joints shall be smooth and precisely formed to provide a uniform annular space for joint materials.

C. PVC pipe shall be jointed with ring gusseted bell ends. (ASTM-D3212) Jointing materials shall be applied to the bell end of the pipe at the point of manufacture in such a manner that a tight uniform joint will be achieved and such that when the joint is made up in the field, the joint material will not roll or tear from the pipe. A proper joint lubricant shall be furnished by the pipe manufacturer.

2.04 REINFORCED CONCRETE MANHOLES

A. Manholes shall conform to the current ASTM specifications for precast reinforced concrete manhole sections, serial designation C478. Manhole section joints shall conform to ASTM C990-96. Cone sections shall be straight side type, with an offset step configuration.

B. All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4-inches high.

C. Manholes constructed over an existing sewer line shall have a doghouse mudded to an 8-inch thick cookie. The bottom of the existing pipe shall be the channel. All other manholes shall have precast integral base sections with pre-formed concrete channels.

D. All channels shall be constructed to the full flow depth of the pipe.

2.05 MORTAR FOR MANHOLES

A. Mortar for plastering manholes shall be made of one part Portland cement and two parts fine aggregate.

2.06 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each cover shall be marked with the Pittsfield Township logo and the letters, PITTSFIELD TWP SANITARY SEWER integrally cast into the cover.

B. Covers shall be of the "self-sealing" design having a continuous gasket glued in a machined groove and a concealed pickhole. Frames and covers shall be East Jordan 1040Z, with Type AGS cover.

C. All manhole frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER.

2.07 MANHOLE STEPS

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF or PS1-B, or approved equal.

2.08 MANHOLE CONNECTIONS

A. Sewer pipe (6-inch to 24-inch) to manhole connections shall be through: 1) a flexible rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacturer and shall be accurately located within 1/2-inch of proposed sewer centerline (Kor-N-Seal); or, 2) a self-adjusting mechanical pipe to manhole seal which provides a resilient flexible and infiltration-proof joint (Res-seal); or, 3) a flexible rubber wedge firmly rammed into a rubber gasket which is cast into the manhole (Press Wedge II), or equal. All flexible pipe to manhole connections shall be installed per the manufacturers specifications.

B. Neoprene rubber for the manhole boot shall meet ASTM Specification C443 and shall have a minimum thickness of 3/8-inch. Pipe clamp bands shall be of corrosion-resistant steel.

C. Sewer pipe over 24 inches to manhole connections shall be in accordance with details shown on the Plan.

2.09 SANITARY MANHOLE ADJUSTMENTS

A. All final grade adjustment of manhole covers and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by LADTECH, INC. or approved equal. The adjustment rings shall be manufactured from polyethylene plastic as identified in ASTM Designation D 1248.

B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

C. Each adjustment ring shall be sealed with a 3/16 to ¼ inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet ASTM specification C-990.

D. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead concrete anchors or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

2.10 MANHOLE DROPS

A. Manhole drop connections shall be interior drops using the drop bowl as produced by Reliner-Duran Inc. or approved equal.

B. Drop bowl model A-4" shall be used for all lines up through full 6-inch inlets. Drop bowl model A-6" shall be used for all 8-inch inlets. Drop bowl model B-8" shall be used for all 10-inch inlets. Lines larger than 10 inches shall be as directed by the ENGINEER.

C. The force line hood shall be attached on models A-4" and A-6" when the incoming line is from a force main or the slope is 3 percent or greater.

D. The drop pipe shall be secured to the manhole wall with Reliner-Duran, Inc. stainless steel adjustable clamping brackets or approved equal.

E. The drop bowl and each clamping bracket shall be attached to the manhole wall with 3/8-inch x 3 3/4-inch bolts.

F. The incoming pipe shall be trimmed such that it protrudes 2 inches into the manhole .

G. A 1-inch V shaped notch shall be cut into the bottom edge of the incoming pipe.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill above a line 12 inches above the crown of the pipe shall conform to Section 2.04, Earthwork, of these Specifications.

3.02 BEDDING

A. Reference Section 33.83a of 10 State Standards.

B. Reference Section 33.83b of 10 State Standards.

C. Ductile iron, and concrete pipes shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 3 inches for 24-inch and smaller pipe and not less than 4 inches for pipe larger than 24-inch conforming to Class B bedding as shown on the Plans. Where shown on the Plans or required by the ENGINEER, concrete encasement or concrete cradle shall be used.

D. PVC pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4 inches conforming to Class B bedding as shown on the Plans. Where shown on the Plans, or where the pipe passes under a road with less than 4 ft of cover, the pipes shall be encased.

E. For all pipes, compacted granular material shall be placed at the sides of the pipe and cover not less than 12 inches above the crown of the pipe.

F. "Granular Material" shall be class 2NS sand, pea gravel or crushed stone conforming to ASTM C33 Size No. 67 placed in not more than 6-inch layers and com\-pacted to not less than 95% standard density for PVC and 90% standard density for reinforced concrete.

G. Pea gravel or crushed stone used for bedding shall be separated from the sand backfill with a non-woven geotextile fabric. The fabric shall be Amoco 4551, or approved equal.

3.03 PIPE INSTALLATION

A. Installation of PVC pipe shall be in confor\-mance with ASTM D2321-89.

B. All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress shall be kept dry; and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.

C. All joints shall be made up in accordance with the manufacturer's instructions using materials and equipment especially prepared for the type of joint to be used.

D. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by levels, laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.

E. The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities, or structures. Any change in location or alignment of piping which may be found more feasible or practicable as the work progresses shall be made by the CONTRACTOR, as the ENGINEER may direct.

F. All pipe and fittings shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the PVC pipe will be considered cause for rejection.

G. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within two pipe lengths behind pipe laying.

H. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing cutter or similar tool may be used to cut PVC pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

I. After cutting bell and spigot or socket pipe, a stop mark shall be made with a pencil or crayon using dimensions as shown by the manufacturer's instructions or by using another pipe in the field as a guide.

J. Breaks in pipe or joints shall be repaired to the satisfaction of the ENGINEER and at the expense of the CONTRACTOR.

3.04 CONNECTIONS TO EXISTING MANHOLES AND OTHER RIGID STRUCTURES

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cut into the manhole.

B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.

C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be clamped into the cored hole and used to make the connection.

D. For connections to existing fiberglass manholes, a hole shall be cored into the manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be installed using fiberglass reinforced pipe stubout for Kor-N-Seal boot sealing surface.

3.05 STREAM AND RIVER CROSSING

A. Whenever a pipe is required to cross a stream or river, all work shall be in accordance with the provisions of Act 346, the Inland Lakes and Streams Act of 1962, and the rules and regulations promulgated thereunder. Stream crossings and all restoration required shall be completed within five days of the construction.

B. The CONTRACTOR shall utilize such con\-struction methods as are feasible and practicable to divert or stop stream flow to lay the pipe in the dry. Pipe shall be ductile iron, mechanical joint, or compression gasket joint pipe with joints at transition to other types of sewer pipe encased with no less than 1 cu yd of concrete, placed at a minimum of 6 inches thickness around the pipe. After the sewer is properly laid, jointed and encased, the stream-channel shall be cleaned of dirt and debris resulting from the CONTRACTOR's operations.

C. After the crossing is made, heavy riprap and sodding shall be placed to protect the banks from corrosion as shown on the Plans.

PCT July 2008

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COSTCO
FINAL SITE PLAN
PITTSFIELD TOWNSHIP STANDARD NOTES/DETAILS
SANITARY SEWER

36

JOB No. **10046**

REVISIONS:	REV. DATE	
PER TWP. REVIEW	7-22-11	CADD: WAJ
PER TWP. & OWNER REVIEW	8-22-11	ENG: JAF
PER TWP. REVIEW	9-9-11	PM: DMB
		TECH:
		FINAL\10046DT3
		FB#:

DATE: 6-23-11

STORM SEWER AND DRAINAGE STRUCTURES

1.00 GENERAL

1.01 DESCRIPTION

A. Furnish all labor, tools, equipment and materials to construct all storm sewers, and drainage structures as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

1.02 TESTING

A. General

1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed or just prior to placing the line in service providing the sewer pipe has been installed for not less than 30 days.

B. Test for Alignment

1. All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

C. Material Tests

1. The CONTRACTOR shall have tests of pipe strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the Specifications.

D. Submittals

1. The CONTRACTOR shall submit shop drawings, or data sheets for all castings, steps and manholes.

2. The CONTRACTOR shall submit certification letters for all pipes. All letters must contain the following: Contractors name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company.

2.00 PRODUCTS

2.01 PIPE

A. Reinforced concrete pipe and manhole tees shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Proposal.

B. Concrete pipe shall have tongue and groove gasketed premium joints.

C. Corrugated steel pipe shall meet the requirements of AASHO M-190 for coated pipe latest revision. Minimum gage thickness shall be as shown on the Plans.

2.02 REINFORCED CONCRETE MANHOLES

A. Manholes shall conform to the current ASTM Specifications for precast reinforced concrete Manhole Sections, serial designation C478. Manhole section joints shall conform to ASTM Designation C990. All cones shall be eccentric with an offset step configuration. Concrete adjustment rings or riser rings shall not be used for adjusting the height of the structure.

B. All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4 inches high.

2.03 MORTAR FOR MANHOLES

A. Mortar for plastering manholes and drainage structures shall be made of one part Portland cement and two parts fine aggregate.

2.04 BRICK AND BLOCK

A. Brick for brick and mortar structures shall conform to the current ASTM Specification C32. Block for block and mortar structures shall conform to the current ASTM Specification C135.

B. The concrete block masonry used to construct manhole and catch basin walls shall be solid curved blocks with the inside and outside surfaces curved to the required radii. The blocks shall have tongue and groove or other approved type of joint at the ends so that the units interlock to form a strong, rigid structure. Curved blocks shall have the inside and outside surfaces parallel.

C. The block shall not exceed 18 inches in length or 8 inches in depth (height). No block shall be less than 6 inches in width (thickness). All blocks in one structure shall be of the same height dimension. The blocks shall be designed for length so that only full-length or half-length blocks are required to lay the circular wall of any one course.

D. Blocks intended for use in the cones or tops of manholes and catch basins shall have such shape as may be required to form the structure as shown on the Plans with inside and outside joint not to exceed 1/4-inch in thickness.

2.05 STRUCTURE FRAMES AND COVERS

A. Structures frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each solid manhole cover shall be marked Storm Sewer with letters integrally cast into the cover.

B. Covers shall be as follows:

1. For use on manholes: East Jordan 1040Z, with Type B cover, or equal.

2. For use on drainage structures in paved areas: East Jordan 1040Z, with Type M1 cover, or equal.

3. For use on drainage structures in curbed areas: East Jordan 7045 or 7065, or equal.

4. For use on drainage structures in landscaped areas: East Jordan 1040Z, with Type 02 Beehive grate, or equal.

C. All frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER

2.06 MANHOLE STEPS

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF for precast manholes, PS1-B for block manholes, or equal.

2.07 DRAINAGE STRUCTURES

A. All manholes and catch basins shall be precast unless otherwise specified.

B. Manhole and catch basin bottoms shall be concrete and top of slab shall have a troweled finish.

C. Upon approval by the ENGINEER, the manhole and catch basin walls may be constructed of concrete block masonry or concrete manhole pipe conforming to the requirements of the specifications previously listed. Construction shall be in accordance with the details for Catch Basin and Storm Sewer Manhole shown on the Plans.

D. A plaster coat of mortar 1/2-inch in thickness shall be applied to the inside and outside surface of all manholes and catch basins constructed with concrete block masonry or sewer brick. The inside coat of mortar shall be applied in a smooth, neat workmanlike manner.

E. Final adjustment of the top of manholes and catch basins, so that the manhole or catch basin cover is at finished elevations as shown on the Plans or meets the finished surface, may be accomplished with sewer brick conforming to the previously listed Specifications. The total height of brick for this purpose shall not exceed 9 inches. The total chimney height shall not exceed 18 inches.

F. All block and brick masonry units shall be laid in a full bed of mortar. The inside joints of the block masonry construction shall be tooled in a neat and workmanlike manner.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill 12 inches above the crown of pipe shall conform to Section 2.04, Earthwork of these specifications.

B. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within four pipe lengths behind pipe laying.

3.02 BEDDING

A. Concrete pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4 inches. Where indicated on the Plans or required by the ENGINEER, concrete encasement or cradle shall be used.

B. For all pipes, compacted aggregate material shall be placed at the sides of the pipe in 12-inch lifts and cover not less than 12 inches above the crown of the pipe.

C. "Granular Material" shall be MDOT class II, placed in not more than 6-inch layers and compacted to not less than 90% standard density.

3.03 PIPE INSTALLATION

A. All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress, shall be kept dry, and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.

B. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.

C. The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities or structures. Any change in location or alignment of piping, which may be found more feasible or practicable as the work progresses, shall be made by the CONTRACTOR, as the ENGINEER may direct.

D. All pipe shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the concrete pipe will be considered cause for rejection.

E. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine toothsaw, tubing cutter or similar tool may be used to cut concrete pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

F. Breaks in pipe or joints shall be repaired to the satisfaction of the ENGINEER and at the expense of the CONTRACTOR.

3.04 CONNECTIONS TO EXISTING MANHOLES

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cored into the manhole.

B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.

C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut out shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration. The formed area shall then be filled with concrete.

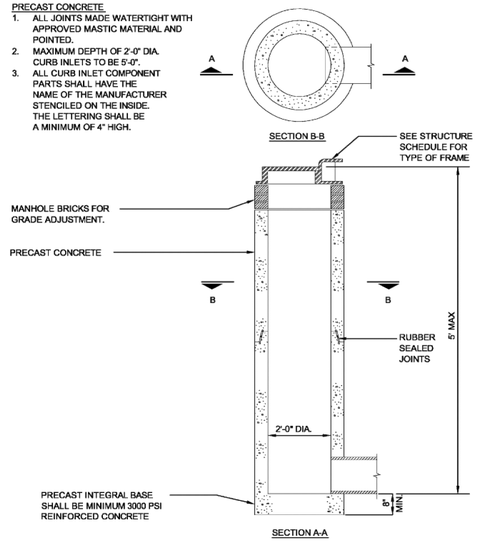
D. Closure of the manhole wall shall be made watertight using concrete.

3.05 ANIMAL GRATES

A. Animal grates shall be required on all endsections greater than 12-inch diameter.

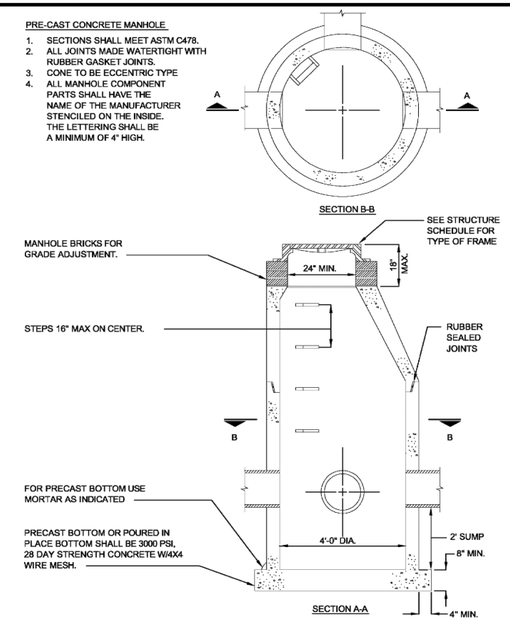
PCT February 2008

PRECAST CONCRETE
1. ALL JOINTS MADE WATERTIGHT WITH APPROVED MASTIC MATERIAL AND POINTED.
2. MAXIMUM DEPTH OF 2'-0" DIA. CURB INLETS TO BE 5'-0".
3. ALL CURB INLET COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.



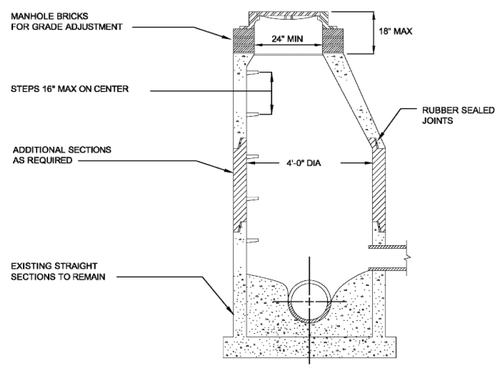
2' DIAMETER INLET

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS.
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.



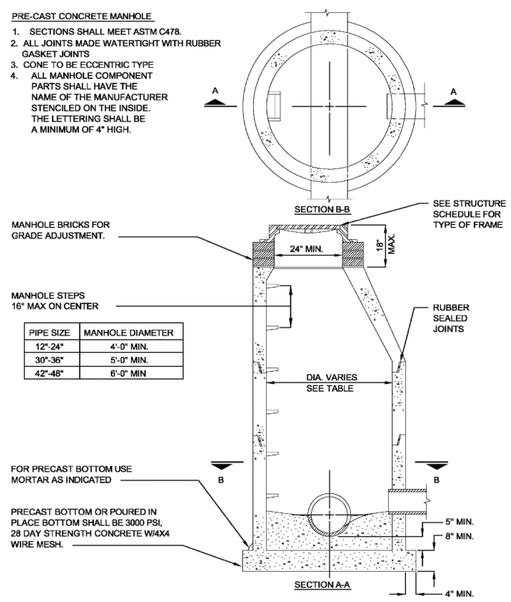
4' DIAMETER CATCH BASIN

NOTES:
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. REMOVE CONE, ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE
4. ADD MANHOLE STEPS AS NECESSARY
5. ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT



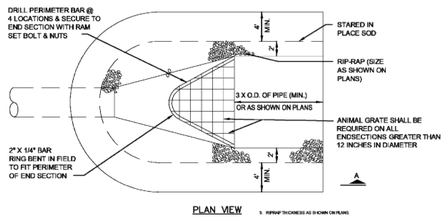
MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.



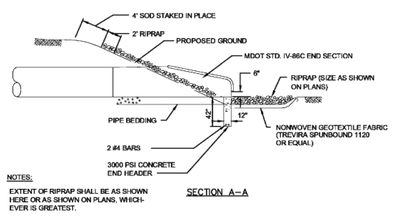
PIPE SIZE	MANHOLE DIAMETER
12"-24"	4'-0" MIN.
30"-36"	5'-0" MIN.
42"-48"	6'-0" MIN

STORM SEWER MANHOLE



PLAN VIEW

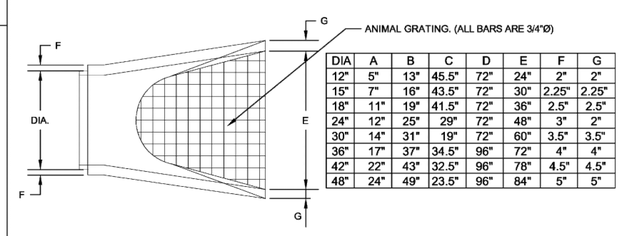
3. RIPRAP THICKNESS AS SHOWN ON PLANS.



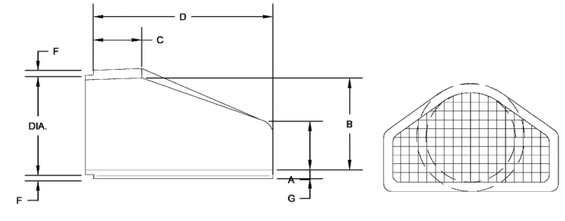
NOTES:
EXTENT OF RIPRAP SHALL BE AS SHOWN HERE OR AS SHOWN ON PLANS, WHICHEVER IS GREATEST.

SECTION A–A

END SECTION AND RIPRAP DETAIL



DIA	A	B	C	D	E	F	G
12"	5"	13"	45.5"	72"	24"	2"	2"
15"	7"	16"	43.5"	72"	30"	2.25"	2.25"
18"	11"	19"	41.5"	72"	36"	2.5"	2.5"
24"	12"	25"	29"	72"	48"	3"	2"
30"	14"	31"	19"	72"	60"	3.5"	3.5"
36"	17"	37"	34.5"	96"	72"	4"	4"
42"	22"	43"	32.5"	96"	78"	4.5"	4.5"
48"	24"	49"	23.5"	96"	84"	5"	5"



NOTE:
FLARED END SECTIONS SHALL BE MANUFACTURED TO THE CLASS SPECIFICATIONS AS THE PIPE ITSELF.

STANDARD END SECTIONS FOR PRECAST CONCRETE

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COSTCO
FINAL SITE PLAN
PITTSFIELD TOWNSHIP STANDARD NOTES/DETAILS
STORM SEWER

37

DATE: 6-23-11
SHEET 39 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FILE: FINAL\10046013

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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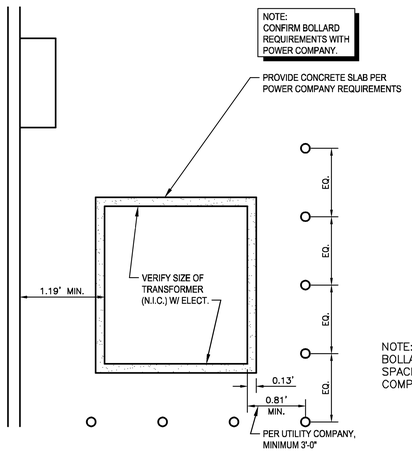
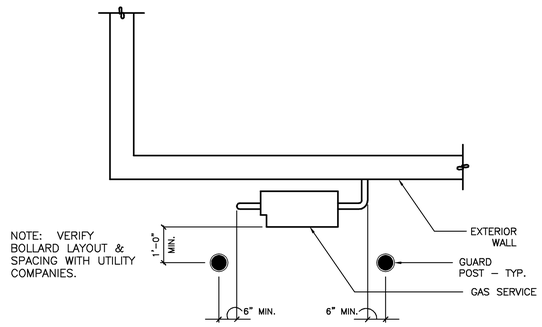


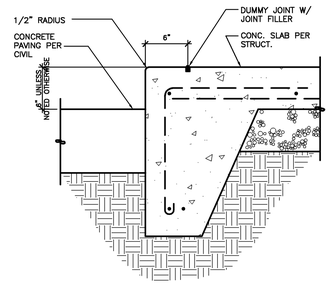
BOLLARDS AT TRANSFORMER

NOT TO SCALE



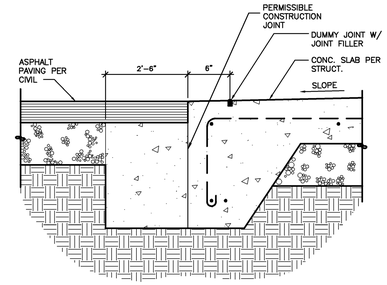
BOLLARDS AT GAS SERVICE

NOT TO SCALE



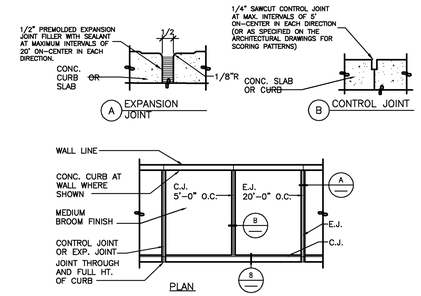
EDGE OF SIDEWALK

NOT TO SCALE



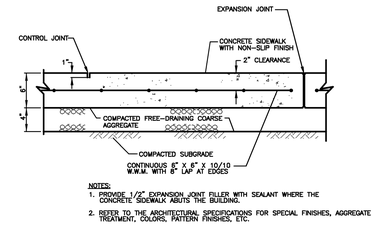
FLUSH CURB DETAIL

NOT TO SCALE



SIDEWALK JOINT LAYOUTS

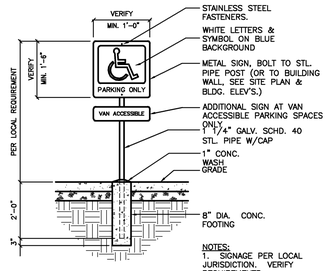
NOT TO SCALE



NOTES:
1. PROVIDE 1/2" EXPANSION JOINT FILLER WITH SEALANT WHERE THE CONCRETE SIDEWALK ABUTS THE BUILDING.
2. REFER TO THE ARCHITECTURAL SPECIFICATIONS FOR SPECIAL FINISHES, AGGREGATE TREATMENT, COLORS, PATTERN FINISHES, ETC.

TYPICAL CONCRETE SIDEWALK

NOT TO SCALE



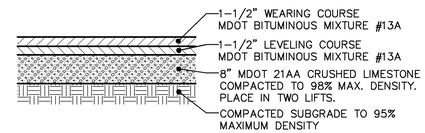
NOTES:
1. SIGNAGE PER LOCAL JURISDICTION. VERIFY REQUIREMENTS.
2. PROVIDE SIGN AT EACH HANDICAPPED ACCESSIBLE PARKING STALL.

ADA ACCESSIBLE PARKING SIGN

NOT TO SCALE

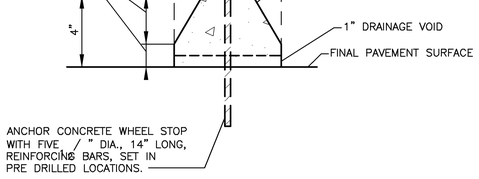
Paving Notes:

1. THE PAVEMENT SUBGRADE SHALL BE PREPARED AS FOLLOWS:
   a. APPROVED FILL FOR THE SUBGRADE SHALL BE PLACED WHERE REQUIRED IN MAXIMUM 10", LOOSE LIFTS AND COMPACTED TO AT LEAST 95% OF ITS MODIFIED PROCTOR MAXIMUM DRY DENSITY PER ASSTM D-1557
   b. THE SUBGRADE SHALL BE PROOFROLLED WITH A MINIMUM 10 TON ROLLER. ANY SOFT AND YIELDING AREAS SHALL BE OVEREXCAVATED TO A FIRM AND COMPETENT MATERIAL AND BACKFILLED AS DESCRIBED ABOVE.
   c. AFTER PROOFROLING, THE SUBGRADE SAHLL BE GRADED AND SHAPED AS REQUIRED TO CONSTRUCT THE PAVEMENT AREAS IN CONFORMANCE WITH THE GRADES, LINES AND THICKNESSES SHOWN ON THE DRAWINGS. THE SUBGRADE SHALL PROVIDE A FIRM AND UNYIELDING FOUNDATION WITH NO SUDDEN, SHARP OR ABRUPT CHANGES OR BREAKS IN GRADES. NO STANDING WATER OR EXCESS MOISTURE SHALL BE PRESENT. ALL SOFT AND YIELDING AREAS SHALL BE OVEREXCAVATED TO A FIRM AND COMPETENT MATERIAL AND BACKFILLED AS DESCRIBED IN THE SPECIFICATIONS.
2. THE FINAL ASPHALT PAVEMENT SECTION DESIGN AND CONCRETE PAVEMENT SECTION DESIGN IS CONTINGENT UPON THE RECOMMENDATIONS OF THE FINAL GEOTECHNICAL REPORT.
3. STABILIZE GROUND WHEREVER THE EXPOSED SUBGRADE SHOWS SIGNS OF MINOR RUTTING OR DEFLECTION IN ACCORDANCE WITH RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER.
4. TYPICAL BUTT JOINT AT PAVEMENT RESTORATION LOCATIONS, WHERE APPLICABLE: APPLY BITUMINOUS TACK COAT TO EXISTING PAVEMENT SAWCUT FACES PRIOR TO ASPHALT RESTORATION PAVING; APPLY 4" W. BITUMINOUS SEALANT AT SURFACE JOINT.



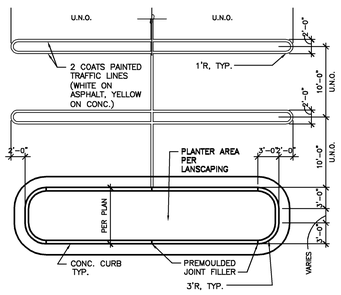
BITUMINOUS PAVEMENT DETAIL

NOT TO SCALE



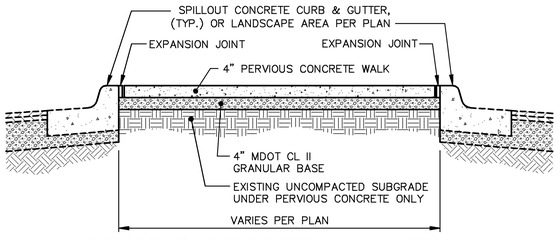
CONCRETE WHEEL STOP

NOT TO SCALE



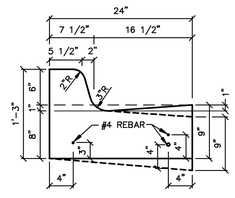
LANDSCAPE ISLAND CURBS

NOT TO SCALE



PERVIOUS CONCRETE WALK DETAIL

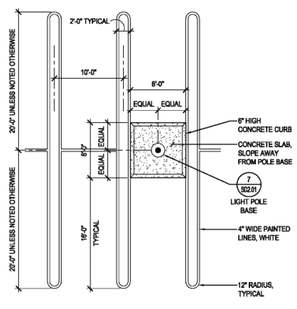
NOT TO SCALE



24" STANDARD CURB & GUTTER

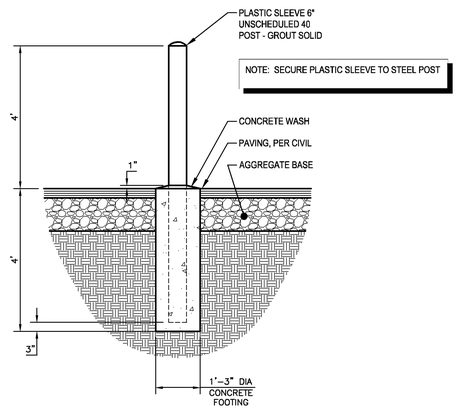
24" STANDARD CURB W/SPILLOUT GUTTER

NOT TO SCALE



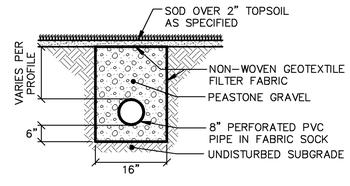
ISLAND AT LIGHT POLE BASE

NOT TO SCALE



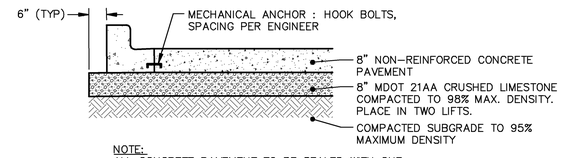
TYPICAL EXTERIOR BOLLARD

NOT TO SCALE



INFILTRATION TRENCH DETAIL

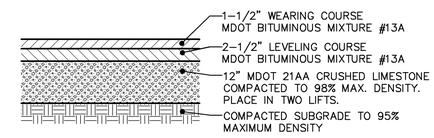
NOT TO SCALE



NOTE:
ALL CONCRETE PAVEMENT TO BE SEALED WITH ONE APPLICATION OF A TRANSPARENT CURING COMPOUND APPLIED AT A RATE OF 1 gal. per 200 sq. ft.

HEAVY DUTY CONCRETE PAVEMENT DETAIL

NOT TO SCALE



HEAVY DUTY BITUMINOUS PAVEMENT DETAIL

NOT TO SCALE

MIDWESTERN CONSULTING
Civil, Environmental and Transportation Engineers
Planners, Surveyors, Landscape Architects
3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200
Fax: 734.995.0599

CLIENT
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
MISCELLANEOUS DETAILS

38

DATE: 6-23-11
SHEET 40 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
QC: TCK
FINAL\10046D14
FB#

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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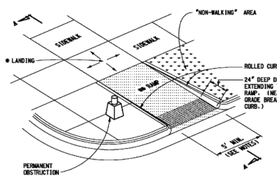
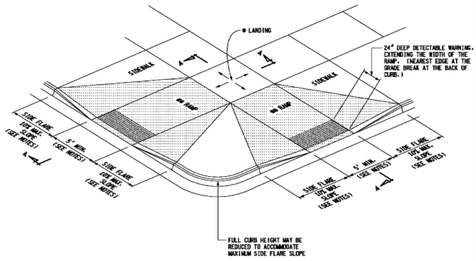
* MAXIMUM LANDING SLOPE IN ANY DIRECTION IS 2.0%. MINIMUM LANDING DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM CROSS SLOPE ON RAMP IS THE SAME AS THAT FOR SIDEWALK (2.0%). RUNNING SLOPE 5% - 7% (8.3% MAXIMUM) SEE NOTES.



SIDEWALK RAMP TYPE R
(ROLLED SIDES)



SIDEWALK RAMP TYPE F
(FLARED SIDES, TWO RAMPS SHOWN)

MDOT Michigan Department of Transportation
PREPARED BY DESIGN DIVISION
DRAWN BY: R.L.T.
CHECKED BY: R.L.T.

DEPARTMENT DIRECTOR
Kirk T. Steudle
APPROVED BY: John C. Friend
ENGINEER OF DELIVERY
APPROVED BY: Paul A. Van Buren
ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

9-10-2010	7-26-2010	R-28-G	SHEET
T.S.E.A. APPROVAL	PLAN DATE		1 OF 7

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL SIGNED COPY APPROVED FOR PUBLICATION. IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.

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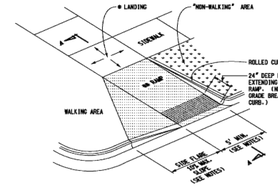
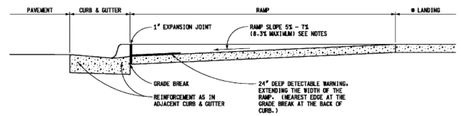
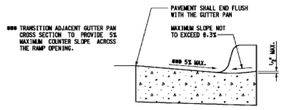
** MAXIMUM CROSS SLOPE ON RAMP IS THE SAME AS THAT FOR SIDEWALK (2.0%). RUNNING SLOPE 5% - 7% (8.3% MAXIMUM) SEE NOTES.



SIDEWALK RAMP TYPE RF
(ROLLED / FLARED SIDES)



SECTION A-A



SECTION THROUGH CURB CUT
(TYPICAL ALL RAMP TYPES)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

9-10-2010	7-26-2010	R-28-G	SHEET
T.S.E.A. APPROVAL	PLAN DATE		2 OF 7

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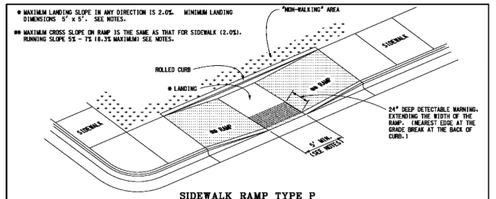
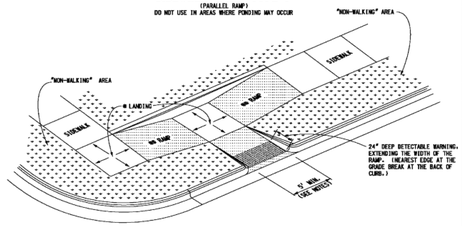
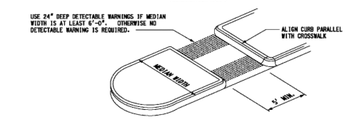


SIDEWALK RAMP TYPE P
(PARALLEL RAMP)
DO NOT USE IN AREAS WHERE PONDING MAY OCCUR



SIDEWALK RAMP TYPE C
(COMBINATION RAMP)



SIDEWALK RAMP TYPE M
(MEDIAN ISLAND)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

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T.S.E.A. APPROVAL	PLAN DATE		3 OF 7

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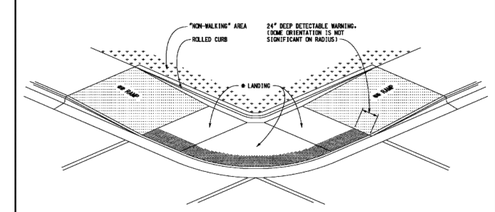

SIDEWALK RAMP TYPE D
(DEPRESSED CORNER)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

9-10-2010	7-26-2010	R-28-G	SHEET
T.S.E.A. APPROVAL	PLAN DATE		4 OF 7

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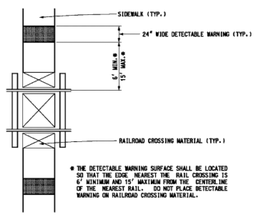
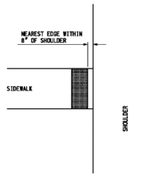


SIDEWALK RAMP TYPE RR
(DETECTABLE WARNING AT RAILROAD CROSSING)



SIDEWALK RAMP TYPE FS
(DETECTABLE WARNING AT FLUSH SHOULDER OR ROADWAY)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

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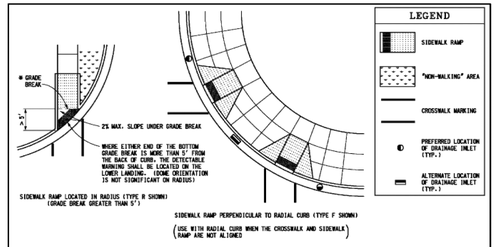

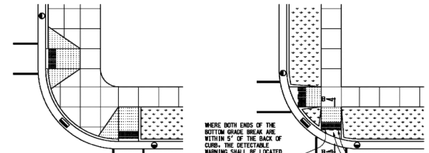

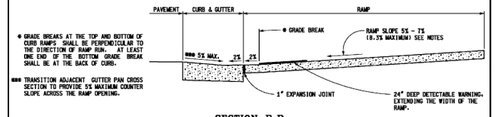

SECTION B-B
SIDEWALK RAMP ORIENTATION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

9-10-2010	7-26-2010	R-28-G	SHEET
T.S.E.A. APPROVAL	PLAN DATE		6 OF 7

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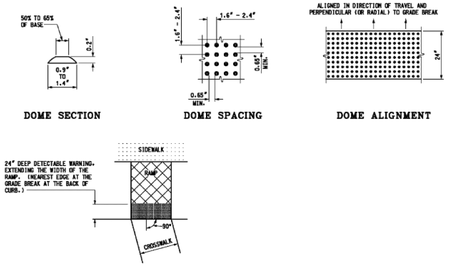


DETECTABLE WARNING DETAILS

NOTES:

DETAILS SPECIFIED ON THIS PLAN APPLY TO ALL CONSTRUCTION, RECONSTRUCTION, OR ALTERATION OF STREETS, CURBS, OR SIDEWALKS BY ALL PUBLIC AGENCIES AND BY ALL PRIVATE ORGANIZATIONS CONSTRUCTING FACILITIES FOR PUBLIC USE.

SIDEWALK RAMPS ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

RAMPS SHALL BE PROVIDED AT ALL CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT WALK LOCATIONS IN MID-BLOCK IN THE VICINITIES OF HOSPITALS, MEDICAL CENTERS, AND LARGE ATHLETIC FACILITIES.

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOMING, TRANSVERSE TO THE SLOPE OF RAMP.

SIDEWALK SHALL BE RAMPED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE WALK.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP, FREE OF SAGS AND SHORT GRADE CHANGES. WHERE CONDITIONS PERMIT, IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.

RAMP WIDTH SHALL BE INCREASED, IF NECESSARY, TO ACCOMMODATE SIDEWALK SNOW REMOVAL EQUIPMENT NORMALLY USED BY THE MUNICIPALITY.

PROVIDE LANDINGS WHERE PEDESTRIAN TURNING MOVEMENTS ARE REQUIRED.

WHEN 5' MINIMUM DIMENSIONS ARE NOT FEASIBLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND LANDING DIMENSION TO NOT LESS THAN 4' x 4'.

FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2%. FOR ALTERATIONS TO EXISTING ROADWAYS, THE CROSS SLOPE MAY BE TRANSITIONED TO MEET AN EXISTING ROADWAY GRADE. THE CROSS SLOPE TRANSITION SHALL BE APPLIED UNIFORMLY OVER THE FULL LENGTH OF THE RAMP.

THE MAXIMUM RUNNING SLOPE OF 8.3% IS RELATIVE TO A FLAT (0%) REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH.

DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS. THE LOCATION OF THE RAMP SHOULD TAKE PRECEDENCE OVER THE LOCATION OF THE DRAINAGE STRUCTURE. WHERE EXISTING DRAINAGE STRUCTURES ARE LOCATED IN THE RAMP PATH OF TRAVEL, USE A MANUFACTURER'S ADA COMPLIANT GRATE. OPENINGS SHALL NOT BE GREATER THAN ½". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

TRANSITION THE GUTTER PAN CROSS SECTION SUCH THAT THE COUNTER SLOPE IN THE DIRECTION OF RAMP TRAVEL IS NOT GREATER THAN 5%. MAINTAIN THE NORMAL GUTTER PAN CROSS SECTION ACROSS DRAINAGE STRUCTURES.

THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

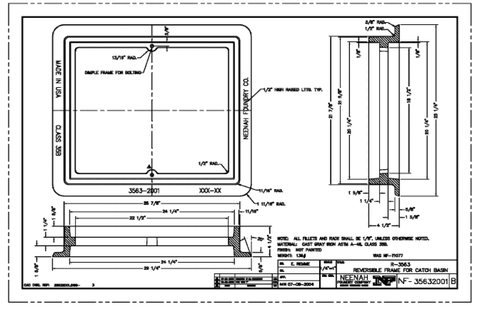
CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC OUTSIDE OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES, WITH A SLOPE OF 10% MAXIMUM, MEASURED ALONG THE CURB LINE, SHALL BE PROVIDED WHERE A CIRCULATION PATH CROSSES THE SIDEWALK RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE EDGES OF A SIDEWALK RAMP ARE PROTECTED BY LANDSCAPING OR OTHER BARRIERS TO TRAVEL BY WHEELCHAIR USERS OR PEDESTRIANS ACROSS THE EDGE OF THE SIDEWALK RAMP.

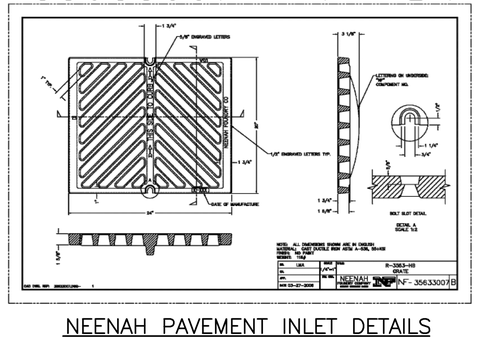
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

9-10-2010	7-26-2010	R-28-G	SHEET
T.S.E.A. APPROVAL	PLAN DATE		7 OF 7

35632001— 3 B4



35633007— 1 B4



NEENAH PAVEMENT INLET DETAILS
NOT TO SCALE

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MIDWESTERN CONSULTING
Civil, Environmental and Transportation Engineers
Landscape Architects
3815 Plaza Drive
Ann Arbor, Michigan 48108
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COSTCO
FINAL SITE PLAN
MDOT SIDEWALK AND MISCELLANEOUS DETAILS

39

DATE: 6-23-11
SHEET 41 OF 64
CADD: WAJ
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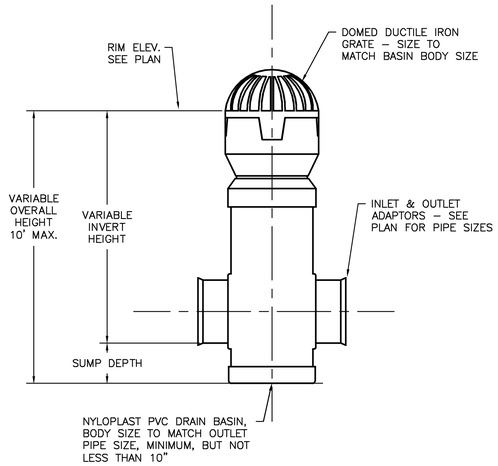
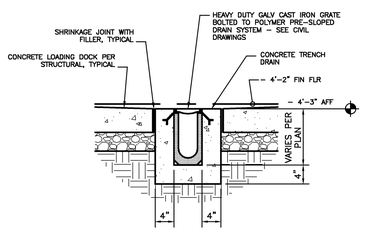
PER TWP. REVIEW	9-9-11



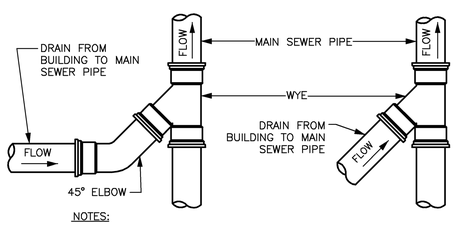
YARD DRAIN DETAIL

NOT TO SCALE



TRENCH DRAIN DETAIL

NOT TO SCALE

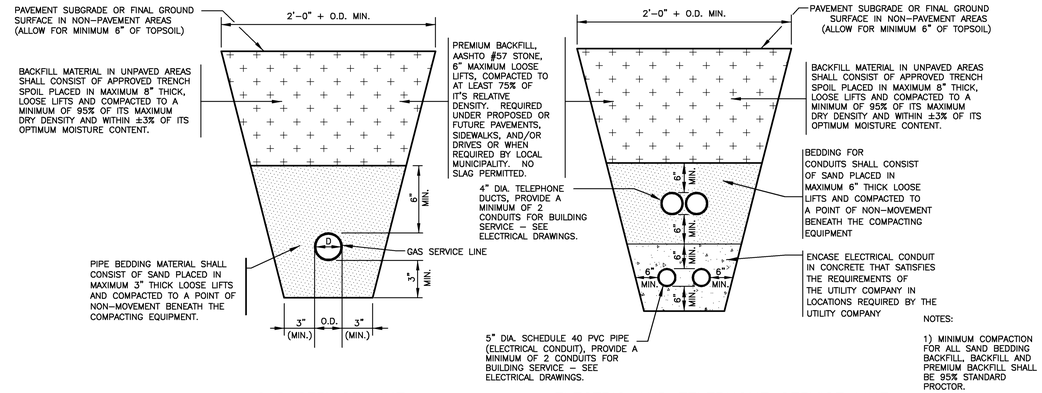


NOTES:

1. THESE DETAILS APPLY TO STORM SEWER CONNECTIONS WITH APPROPRIATE CHANGES TO WYE AND PIPE SIZES.

TYPICAL WYE CONNECTIONS

NOT TO SCALE



GAS SERVICE LINE

ELECTRIC AND TELEPHONE SERVICE LINE

NOTES:

1) MINIMUM COMPACTION FOR ALL SAND BEDDING BACKFILL, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTOR.

ABBREVIATIONS

D = INSIDE DIAMETER
O.D. = OUTSIDE DIAMETER
MIN. = MINIMUM

COVER REQUIREMENTS

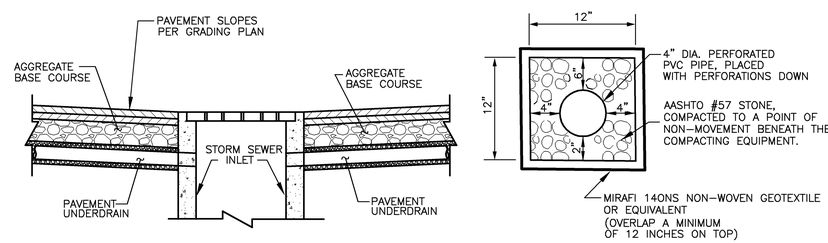
UTILITY	MINIMUM COVER REQUIRED*
STORM SEWER	3.0 FT.
SANITARY SEWER	4.5 FT.
WATER PIPING	5.5 FT.
GAS LINE	3.0 FT.
TELEPHONE LINE	3.0 FT.
ELECTRIC LINE	3.0 FT.

* DEPTH AS MEASURED FROM TOP OF PIPE TO FINAL GROUND SURFACE, UNLESS INDICATED OTHERWISE.

TYPICAL UTILITY TRENCH DETAILS

NOT TO SCALE

1. ALL MATERIALS EXCAVATED FROM THE UTILITY TRENCH SHALL BE STOCKPILED A MINIMUM SUFFICIENT DISTANCE FROM ALL TRENCHES TO PREVENT SLIDES OR CAVE-INS.
2. ALL BACKFILL MATERIALS SHALL BE APPROVED BY THE OWNER OR HIS REPRESENTATIVE BEFORE BEING PLACED.
3. THE AASHTO #57 STONE AND SAND SHALL SATISFY THE REQUIREMENTS OF TEXAS DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIALS SPECIFICATIONS.
4. THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT FOR THE BACKFILL MATERIALS SHALL BE DETERMINED BY ASTM D1557.
5. THE CONTRACTOR SHALL CONSTRUCT THE UTILITY TRENCHES AND PROVIDE ADEQUATE SHORING (WHERE NECESSARY) IN CONFORMANCE WITH THE LATEST REQUIREMENTS FOR CONSTRUCTION STANDARD FOR EXCAVATIONS (29 CFR PART 1926.650-.652 SUBPART P) PROMULGATED BY OSHA.
6. THE TELEPHONE AND ELECTRIC CONDUIT WILL NOT SHARE THE SAME UTILITY TRENCH WHERE THEY ARE SEPARATED AT THE MANHOLE/VAULT LOCATIONS.
7. REFER TO UTILITY AGENCY STANDARD DETAILS AND NOTES FOR ADDITIONAL REQUIREMENTS. IN THE EVENT TRENCH REQUIREMENTS OF THE UTILITY AGENCY DIFFER FROM THOSE SHOWN ABOVE, USE THE MORE RESTRICTIVE OF THE CONFLICTING CRITERIA.



SECTION

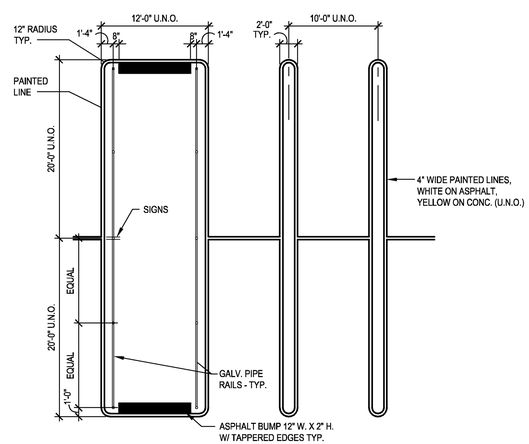
PAVEMENT UNDERDRAIN DETAIL

NOTES:

1. PAVEMENT UNDERDRAINS SHALL EXTEND OUT A MINIMUM OF 10 FEET FROM ALL SIDES OF INLETS BELOW PAVEMENT.
2. THE AASHTO #57 STONE SHALL SATISFY THE REQUIREMENTS OF THE STATE DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS.

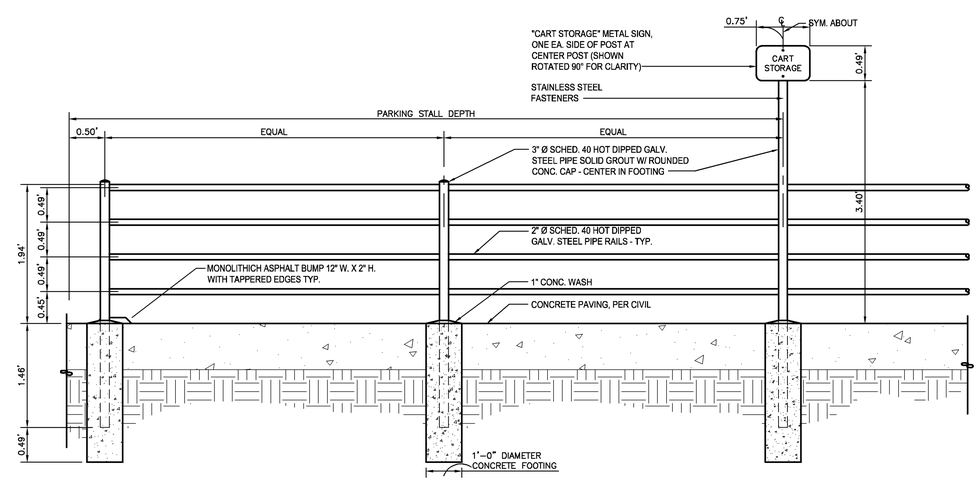
DRAIANGE REQUIREMENTS AT INLETS

NOT TO SCALE



CART CORRAL AND TYPICAL PARKING STALL

NOT TO SCALE



CART STORAGE

NOT TO SCALE

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COSTCO
FINAL SITE PLAN
MISCELLANEOUS DETAILS

40

DATE: 6-23-11
SHEET 42 OF 64

JOB No. 10046

REVISIONS:	REV. DATE	
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11	CADD: WAJ
PER TWP. REVIEW	7-22-11	ENG: JAF
PER TWP. & OWNER REVIEW	8-22-11	PM:
PER TWP. REVIEW	9-9-11	QC: DMB
		FINAL \10046\014

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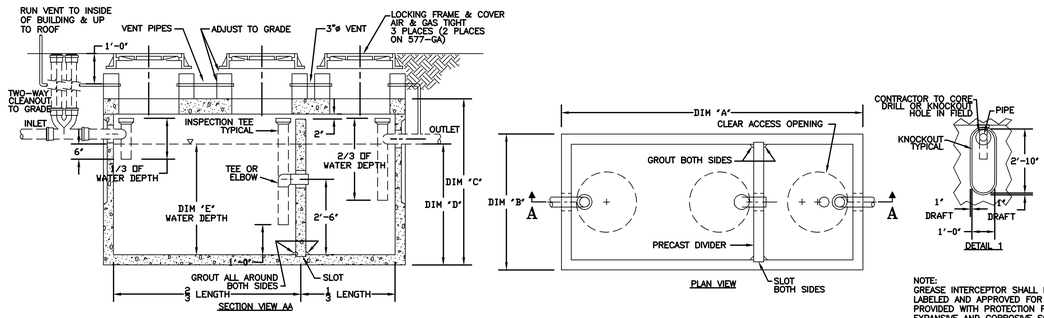


NOTES:
1. CONCRETE: 28 DAY COMPRESSIVE STRENGTH F'C = 4500 PSI
2. REBAR: ASTM A-615 GRADE 60
3. MESH: ASTM A-185 GRADE 65
4. DESIGN: ACI-318-02 BUILDING CODE
   ASTM C-857 "MINIMUM STRUCTURAL DESIGN LOADING FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES"
5. LOADS: H-20 TRUCK WHEEL W/ 30% IMPACT PER AASHTO
6. FILL W/ CLEAN WATER PRIOR TO START-UP OF SYSTEM
7. CONTRACTOR TO SUPPLY & INSTALL ALL PIPING & SAMPLING TEES
8. GREY WATER ONLY. BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER
9. INTERCEPTOR SHALL BE APPROVED BY ALL AUTHORITIES HAVING JURISDICTION AND SHALL BE PDI APPROVED.

	GI-1	GI-2
GALLON CAPACITY	1500	1000
UV CO. MODEL NO.	5106-GA	4484-GA
DIM "A"	11'-2"	9'-0"
DIM "B"	5'-8"	5'-0"
DIM "C"	7'-2"	7'-2"
DIM "D"	4'-3"	4'-2"
WATER DEPTH DIM "E"	3'-11"	3'-10"

NOTE:
GREASE INTERCEPTOR SHALL BE LISTED AND LABELED AND APPROVED FOR HEAVY TRAFFIC AND PROVIDED WITH PROTECTION FOR HIGHLY EXPANSIVE AND CORROSIVE SOILS.

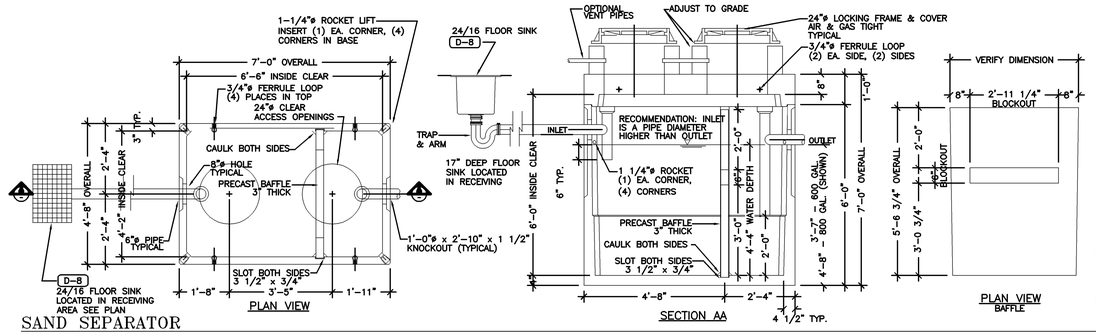
SEWER

MANHOLE COVERS SHALL BE LABELED "SEWER"

GREASE INTERCEPTOR DETAIL GI-1,2

SCALE: NONE

19



STRUCTURAL NOTES:
1. CONCRETE: DAY COMPRESSIVE STRENGTH F'C = 4500 PSI
2. REBAR: ASTM A-615 GRADE 60
3. MESH: ASTM A-185 GRADE 65
4. DESIGN: ACI-318-99 BUILDING CODE
5. LOADS: H-20 TRUCK WHEEL P = 16.0 KIP
   ASTM C-856 "MINIMUM STRUCTURAL DESIGN LOADING FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES"
   30% IMPACT FOR LESS THAN 3 FT. SOIL COVER

GENERAL NOTES:
1. CONTRACTOR TO VERIFY ALL BLOCKOUT SIZES AND LOCATIONS DO ALL GROUTING & EPOXY OF VAULTS, HOLES AND SEAMS SUPPLY & INSTALL ALL PIPING & ELECTRICAL DO ALL PAINTING
2. OUTLET PIPE CAN BE ADJUSTED TO INCREASE OR DECREASE GALLON CAPACITY

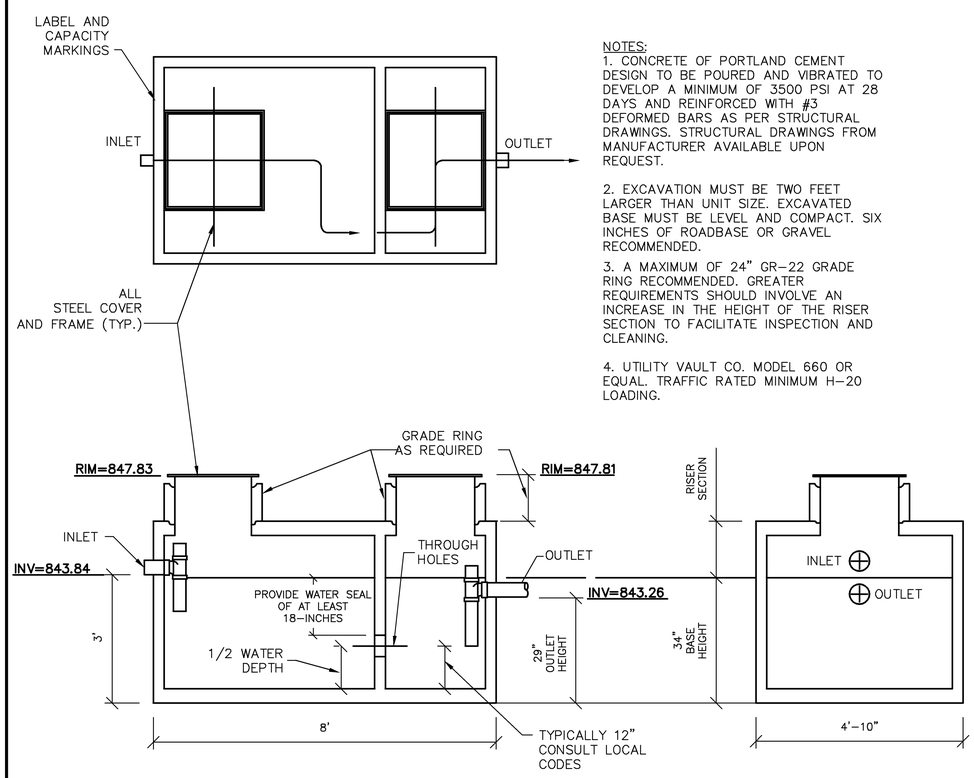
SHIPPING WEIGHT:
TOP SECTION = 3,245 LBS
BASE SECTION = 7,595 LBS
BAFFLE = 775 LBS
TOTAL WEIGHT = 11,615 LBS

INSERTS:
TOP SECTION = (4) 3/4" ø FERRULE LOOP
BASE SECTION = (4) 1-1/4"ø ROCKET

SAND SEPARATOR

SCALE: NONE

27



NOTES:
1. CONCRETE OF PORTLAND CEMENT DESIGN TO BE POURED AND VIBRATED TO DEVELOP A MINIMUM OF 3500 PSI AT 28 DAYS AND REINFORCED WITH #3 DEFORMED BARS AS PER STRUCTURAL DRAWINGS. STRUCTURAL DRAWINGS FROM MANUFACTURER AVAILABLE UPON REQUEST.

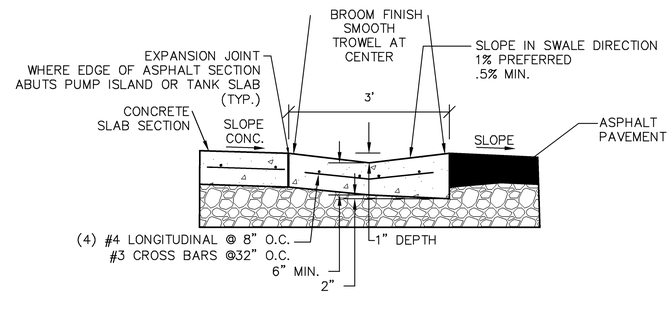
2. EXCAVATION MUST BE TWO FEET LARGER THAN UNIT SIZE. EXCAVATED BASE MUST BE LEVEL AND COMPACT. SIX INCHES OF ROADBASE OR GRAVEL RECOMMENDED.

3. A MAXIMUM OF 24" GR-22 GRADE RING RECOMMENDED. GREATER REQUIREMENTS SHOULD INVOLVE AN INCREASE IN THE HEIGHT OF THE RISER SECTION TO FACILITATE INSPECTION AND CLEANING.

4. UTILITY VAULT CO. MODEL 660 OR EQUAL. TRAFFIC RATED MINIMUM H-20 LOADING.

OIL/WATER SEPARATOR DETAIL AND NOTES (R-32)

NOT TO SCALE

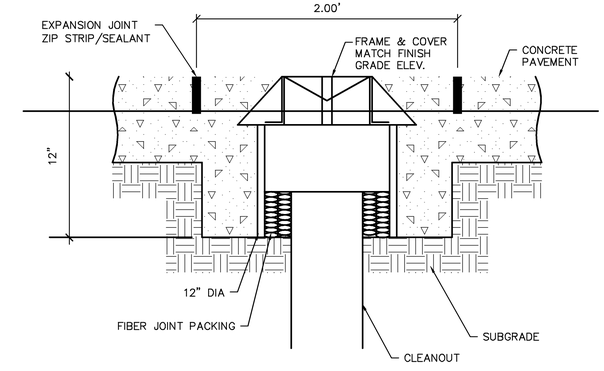


CONCRETE SWALE DETAIL

NOT TO SCALE

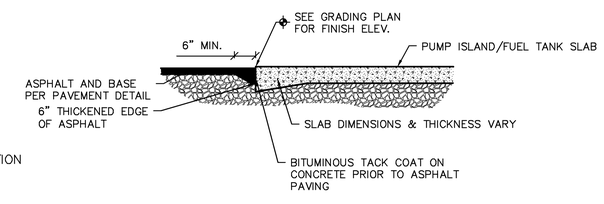
GENERAL NOTES:

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE MICHIGAN DEPARTMENT OF TRANSPORTATION.
2. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION CONFERENCE WITH THE CITY'S ENGINEERING REPRESENTATIVE A MINIMUM OF 3 WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION.
3. CONTRACTOR SHALL CONTACT UTILITY LOCATION SERVICE 3 DAYS PRIOR TO STARTING CONSTRUCTION.
4. ALL WORK MUST BE INSPECTED BY A REPRESENTATIVE OF THE MUNICIPALITY. CONTRACTOR SHALL CALL AT LEAST 24 HOURS IN ADVANCE FOR MUNICIPAL INSPECTION AS FOLLOWS:
   A. PLACEMENT OF TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES.
   B. PLACEMENT AND BACKFILLING OF UNDERGROUND UTILITIES, STORM SEWER AND SANITARY SEWER.
   C. ROADWAY GRADING AT:
      1. COMPLETION OF SUBGRADE
      2. COMPLETION OF CRUSHED SURFACE
   D. POURING OF CURB/GUTTER AND SIDEWALK
   E. ASPHALT PAVING IN PROGRESS
   F. OVERALL INSPECTION FOR FINISHED WORK
5. ALL TESTING REQUIRED FOR THE IMPROVEMENTS SHALL BE THE RESPONSIBILITY OF THE OWNER AND SHALL BE IN CONFORMANCE WITH THE MUNICIPAL DEVELOPMENT STANDARDS.
6. CONTRACTOR SHALL RESTORE ALL PRIVATE AND PUBLIC PROPERTY DISRUPTED BY THE PROJECT IMMEDIATELY AFTER CONSTRUCTION.
7. THE CONTRACTOR SHALL INFORM THE ENGINEER AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION OF ANY PROPOSED CHANGES IN PLAN PRIOR TO CONSTRUCTION OF THAT CHANGE. THE CONTRACTOR SHALL KEEP RECORD OF DEVIATIONS AND FORWARD TO THE ENGINEER AND PITTSFIELD TOWNSHIP.
8. TRAFFIC CONTROL TO BE MAINTAINED IN ACCORDANCE WITH THE MICHIGAN DEPARTMENT OF TRANSPORTATION AND PITTSFIELD TOWNSHIP.
9. A COPY OF THESE APPROVED PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.



TYPICAL CLEANOUT DETAIL

NOT TO SCALE



TYPICAL JOINT SECTION AT CONCRETE AND ASPHALT PAVEMENT

NOT TO SCALE

NOTE:
GAS STATION NOTES AND DETAILS PER CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
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COSTCO
FINAL SITE PLAN
GAS STATION DETAILS AND NOTES

41

DATE: 6-23-11
SHEET 43 OF 64
CADD: SGF
ENG: JAF
PM: DMB
FILE: FINAL\10046GAS2

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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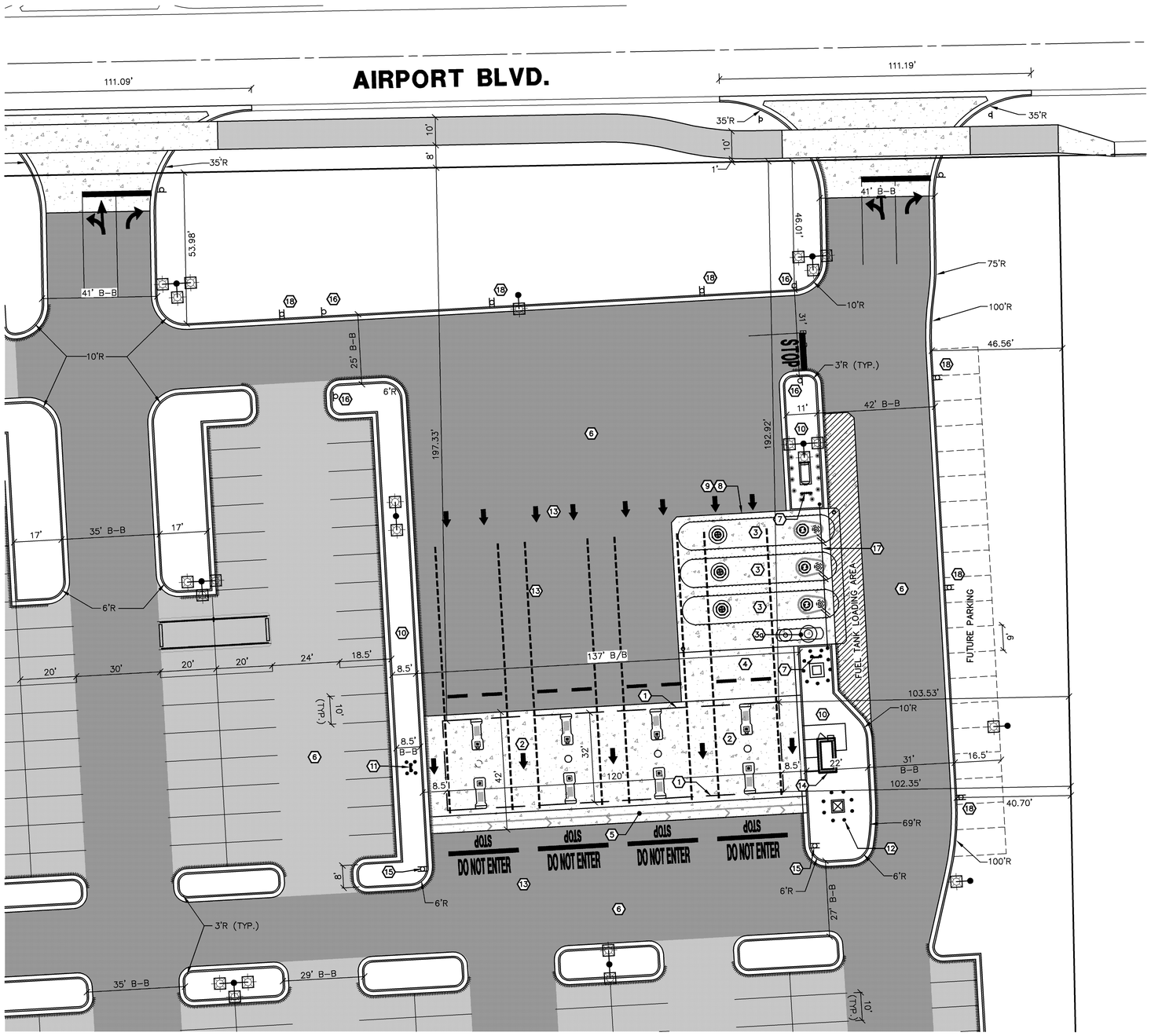

SCALE: 1" = 20'

0 20 40 60

Know what's below. Call before you dig.

LEGEND

- BITUMINOUS PAVEMENT
- HEAVY DUTY BITUMINOUS PAVEMENT
- CONCRETE PAVEMENT
- IMPERVIOUS CONCRETE SIDEWALK
- (#) SITE PLAN CONSTRUCTION NOTE

SITE PLAN CONSTRUCTION NOTES:

1. 32'x120' PUMP ISLAND CANOPY WITH 8 MPD'S.
2. 42.0' WIDE REINFORCED CONCRETE DRIVE, INCLUDING 3' CONCRETE PAVED CHANNEL SLAB.
3. (3) 30,000 GALLON UNDERGROUND GASOLINE STORAGE TANKS PER TANK PLANS.
   a. (1) 1,500 GALLON UNDERGROUND GASOLINE STORAGE TANK PER TANK PLANS.
4. 7" REINFORCED CONCRETE DRIVE SLAB ABOVE UNDERGROUND GASOLINE STORAGE TANK. SEE CONCRETE SLAB DETAIL ON SHEET 41. REFER TO SOILS REPORT FOR TANK HOLE EXCAVATION NOTES/REQUIREMENTS.
5. CONCRETE GUTTER SWALE PER DETAIL ON SHEET 41.
6. ASPHALT PAVEMENT PER DETAIL ON SHEET 38.
7. NEW STORAGE TANK VENT STACK AND BOLLARDS PER TANK DRAWINGS.
8. SEE SHEET 43 GRADING PLAN FOR SLAB GRADES AND JOINT PLACEMENT.
9. SEE SPECIFICATIONS FOR TANK HOLE EXCAVATION AND SHORING REQUIREMENTS.
10. LANDSCAPED AREA. SEE LANDSCAPE PLANS PREPARED BY OTHERS.
11. EMERGENCY SHUTOFF (ESO) SWITCH AND BOLLARDS.
12. CONCRETE TRANSFORMER PAD WITH BOLLARDS, SEE ELECTRICAL PLANS.
13. PAVEMENT MARKINGS: SEE SHEET 46 FOR DETAILS.
14. EMERGENCY SHUTOFF (ESO) SWITCH, MOUNTED ON KIOSK (SEE ARCHITECTURAL PLANS).
15. "STOP"/"DO NOT ENTER" SIGNS.
16. "MEMBERS ONLY / ENTER HERE" SIGNS.
17. BARRIER CHAIN SUSPENDED BETWEEN POSTS ON EITHER SIDE OF UNDERGROUND STORAGE TANKS.
18. "NO PARKING FIRE LANE" SIGNS, DOUBLE SIDED.

GAS STATION SITE PLAN NOTES:

1. THE CONTRACTOR SHALL CHECK EXISTING GRADES, DIMENSIONS AND INVERTS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
2. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES, INCLUDING IRRIGATION LINES, TAKING CARE TO PROTECT UTILITIES THAT ARE TO REMAIN, AND RELOCATING EXISTING UTILITIES AS INDICATED, OR AS NECESSARY FOR CONSTRUCTION.
3. PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING PAVEMENT AND NEW PAVEMENT. FIELD ADJUSTMENT OF FINAL GRADES MAY BE NECESSARY. INSTALL ALL UTILITIES, INCLUDING IRRIGATION SLEEVES, PRIOR TO INSTALLATION OF PAVED SURFACES.
4. THE CONTRACTOR SHALL PROTECT ALL TREES TO REMAIN IN ACCORDANCE WITH REQUIREMENTS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.
5. ALL DAMAGE TO EXISTING PAVEMENT TO REMAIN WHICH RESULTS FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH LIKE MATERIALS AT THE CONTRACTOR'S EXPENSE.
6. SITE DIMENSIONS AND/OR COORDINATES SHOWN ARE TO THE BACK OF CURB OR EDGE OF PAVEMENT, UNLESS OTHERWISE NOTED.
7. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND LOCATIONS OF UTILITY SERVICE ENTRANCES, BUILDING DRAINS, ROOF DRAINS, DOORS AND EXIT FEATURES.
8. LIMITS OF COSTCO STORE WORK SHALL INCLUDE ALL GAS STATION CONCRETE DRIVES, STRUCTURES, EQUIPMENT, TANKS, SIGNAGE AND PAVEMENT MARKINGS.

NOTE:
GAS STATION NOTES AND DETAILS PER
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
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CINCINNATI, MI 45242

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COSTCO
FINAL SITE PLAN
GAS STATION – SITE PLAN

42

DATE: 6-23-11
SHEET 44 OF 64
CADD: SGF
ENG: JAF
PM: DMB
FILE: FINAL\10046GAS1
PB#:

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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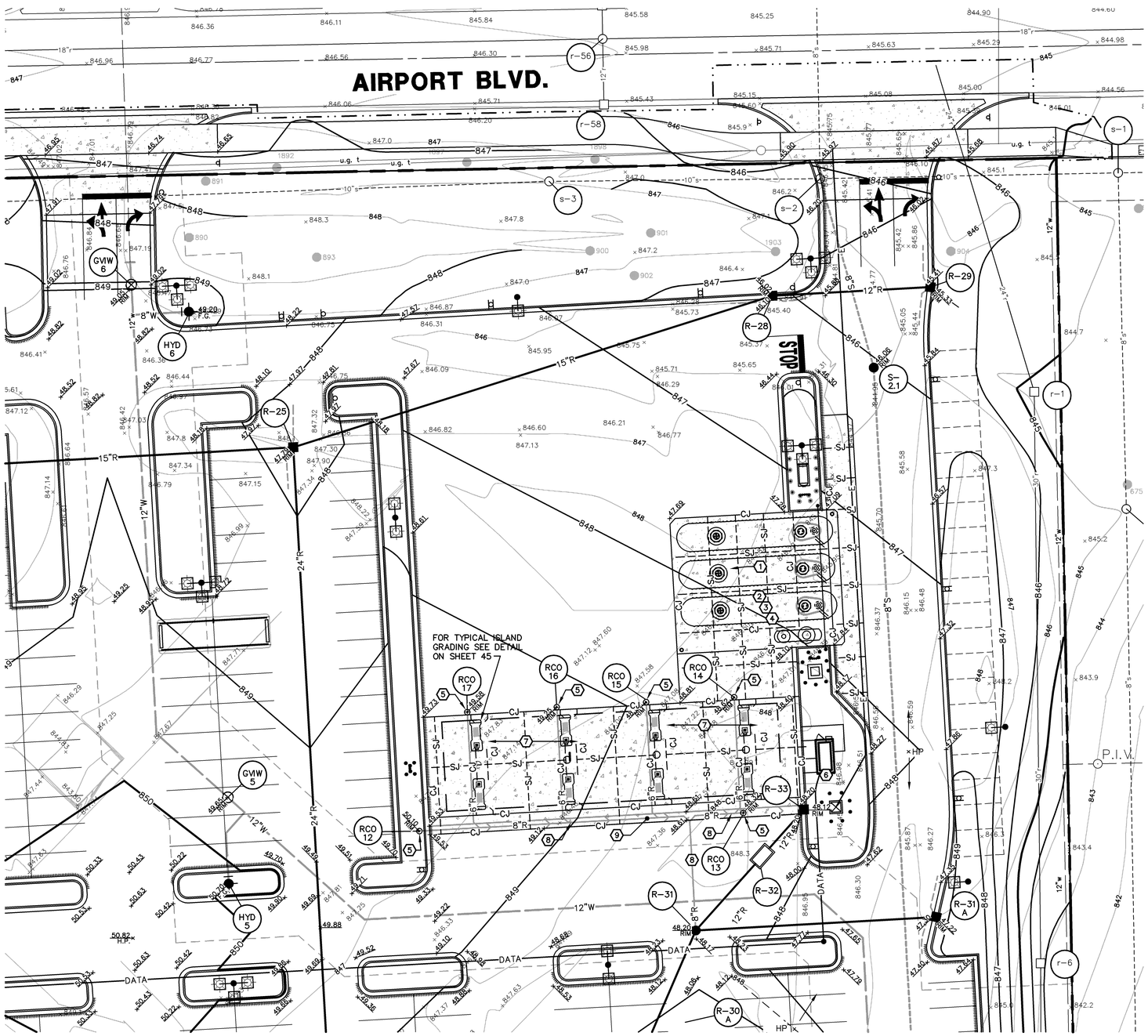

LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
36.60	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
P.I.V.	POST INDICATOR VALVE
	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	END SECTION
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	SIGN
	SINGLE TREE
CJ	CONSTRUCTION JOINT
SJ	SAWCUT SHRINKAGE JOINT

SCALE: 1" = 20'

0 20 40 60

Know what's below. Call before you dig.

GRADING/UTILITY PLAN CONSTRUCTION NOTES:

1. ELEVATE CONCRETE SLAB AT MANHOLE OPENINGS PER DETAIL ON SHEET 44 (TYPICAL).
2. COMPACT BOTTOM SURFACE OF TANK HOLE TO 90% MAXIMUM DENSITY. SEE SOILS REPORT FOR ALL REQUIREMENTS/ RECOMMENDATIONS ON TANK HOLE EXCAVATION, SLOPING, DEWATERING, ETC.
3. TANK EXCAVATION WITH SIDE SLOPES PER SOILS ENGINEER RECOMMENDATIONS.
4. CONTRACTOR TO INSTALL SHORING OF TANK HOLE EXCAVATION PER SOILS REPORT. EXACT LIMITS/EXTENT OF SHORING TO BE DETERMINED BY SOILS ENGINEER.
5. CLEAN OUT – PER DETAIL ON SHEET 41.
6. 6'x12' CONTROLLER ENCLOSURE AND CONCRETE PAD PER ARCHITECTURAL PLANS. SEE LANDSCAPE PLAN/DETAILS FOR PLANTING AT ENCLOSURE.
7. 6" PVC @ 1.00% MINIMUM FOR ROOF DRAIN CONNECTION. CONNECT TO NEW 8" STORM LINE.
8. 8" PVC @ 1.00% CONNECT TO NEW STORM MANHOLE R-30.
9. CONCRETE GUTTER SWALE PER DETAIL ON SHEET 41.

GAS STATION GRADING/UTILITY PLAN NOTES:

1. ALL PROPOSED GRADES SHOWN ARE EDGE OF METAL, RIM ELEVATION ALONG AT GUTTER POINT OF CURB OR TOP OF PAVEMENT, UNLESS OTHERWISE NOTED.
2. WHERE NOT EXPLICITLY DEFINED BY A SPOT ELEVATION, PAVEMENT AND CURB ELEVATIONS SHALL PRODUCE THE PROPOSED SLOPES AS SHOWN AND PROVIDE POSITIVE DRAINAGE TO INLETS.
3. THE CONTRACTOR SHALL STRICTLY ADHERE TO THE EROSION CONTROL PLAN PREPARED FOR THIS PROJECT. ALL AREAS NOT PAVED SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PLAN, UNLESS NOTED OTHERWISE.
4. EARTHWORK SHALL INCLUDE CLEARING AND GRUBBING, STRIPPING AND STOCKPILING TOPSOIL, MASS GRADING, EXCAVATION, FILLING, UNDERCUT AND REPLACEMENT, IF REQUIRED, AND COMPACTION.
5. CONTRACTOR TO REFILL UNDERCUT AREAS WITH SUITABLE MATERIAL AND COMPACTION AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
6. PLACE TOPSOIL OVER THE SUBGRADE OF UNPAVED, DISTURBED AREAS TO DEPTH(S) INDICATED ON THE LANDSCAPE DRAWINGS.
7. FINAL PAVEMENT SLOPES SHALL BE A MINIMUM OF 1% AND A MAXIMUM OF 2% UNLESS INDICATED OTHERWISE. FINAL PAVEMENT SLOPES ACROSS HANDICAP PARKING STALLS AND ADJOINING ACCESS AISLES SHALL BE MAXIMUM 2%.
8. ALL UNPAVED SURFACE SLOPES SHALL BE AS INDICATED ON THE PLANS.
9. ALL EXCESS SOIL MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE INDICATED AND SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
10. PETROLEUM RESISTANT GASKETS SHALL BE USED IN AREAS WHERE PETROLEUM PRODUCTS HAVE BEEN STORED OR WILL BE STORED (I.E. FUELING STATION AREA)

NOTE:
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CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
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CINCINNATI, MI 45242

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COSTCO
FINAL SITE PLAN
GAS STATION – GRADING AND UTILITY PLAN

43

DATE: 6-23-11
SHEET 45 OF 64
CADD: SGF
ENG: JAF
PM: DMB
PROJECT: FINAL \10046GAS1
FB#:

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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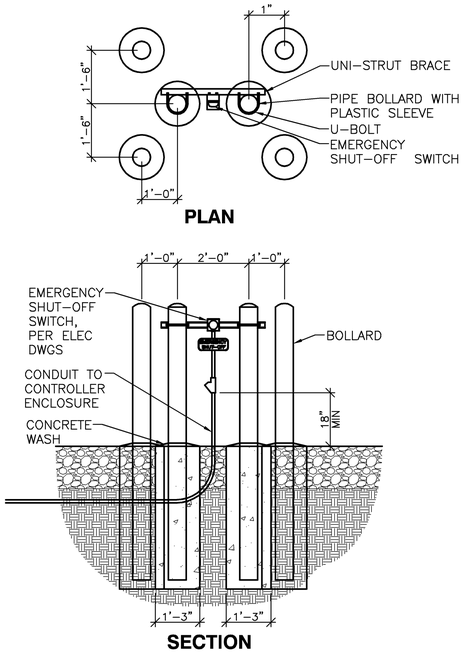


EMERGENCY SHUT-OFF SWITCH

NOT TO SCALE

SLAB CONCRETE SPECIFICATIONS

1.) UNLESS OTHERWISE NOTED ON THESE DRAWINGS:
   a. CONCRETE – REGULAR WEIGHT HARD ROCK CONCRETE (150 LBS/CU FT)
   b. CEMENT – TYPE II, SULFATE RESISTANT
   c. AGGREGATES – ASTM C33, (MAXIMUM SIZE ¾ INCHES)
   d. 28 DAY CONCRETE STRENGTH (fc):
      4,000 PSI – SLAB (DESIGN BASED ON 2,000 PSI NO SPECIAL INSPECTION REQUIRED)
   e. SLUMP – 3"+1" = 4" MAXIMUM AT POINT OF PLACEMENT
   f. SHRINKAGE – 0.05% MAXIMUM
   g. ENTRAINED AIR RANGE 4%–6%.

2.) CONCRETE SHALL BE NORMAL WEIGHT WITH A MIX OF 1: 2 ½ : 3 ½, WITH A MAXIMUM 7 ½ GALLONS OF WATER PER SACK.

3.) REINFORCING STEEL FOR TANK SLABS BE #4 BARS @ 18" O.C. EACH WAY. SUMP CAGES SHALL BE #3 REBAR TOP AND BOTTOM.

4.) MAINTAIN CONCRETE IN A MOIST CONDITION FOR AT LEAST 7 DAYS AFTER PLACEMENT.

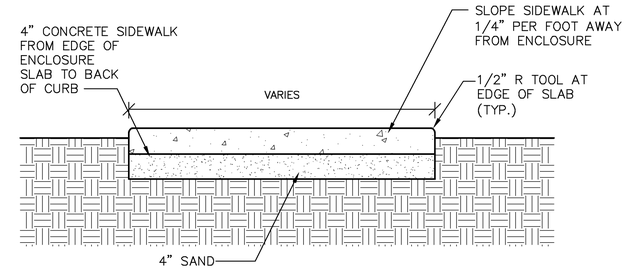
5.) PLACE CONCRETE DIRECTLY FROM TRUCK INTO FORMS. DO NOT PUMP CONCRETE UNLESS SPECIAL INSPECTION, BY CONCRETE TESTING SERVICE, IS PROVIDED.

6.) SUBMIT MIX DESIGNS, WITH STRENGTH AND SHRINKAGE TEST RESULTS, TO OWNER'S ENGINEER AT LEAST 7 DAYS BEFORE PLACING CONCRETE.

7.) CONSOLIDATE CONCRETE IN PLACE USING A MECHANICAL VIBRATOR.

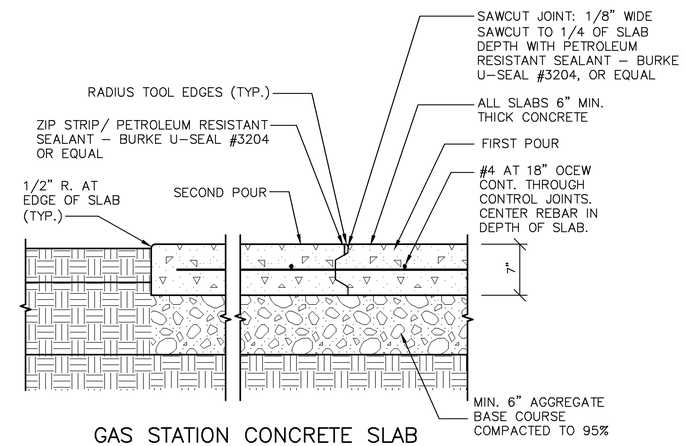
8.) BEFORE PLACING CONCRETE, SECURE REINFORCING STEEL, ANCHOR BOLTS, DOWELS, AND OTHER INSERTS IN POSITION TO PREVENT MOVEMENT.

9.) MATERIALS AND WORKMANSHIP SHALL CONFORM TO A.C.I. – 318 (SPECIFICATIONS OF THE DESIGN AND PLACEMENT OF CONCRETE)



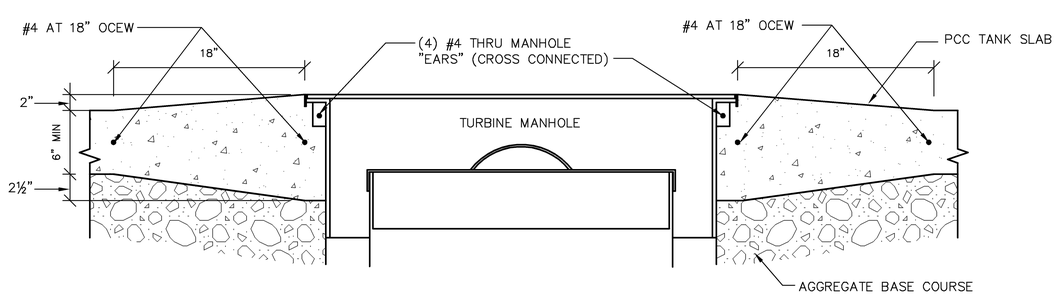
GAS STATION CONCRETE SIDEWALK

NOT TO SCALE



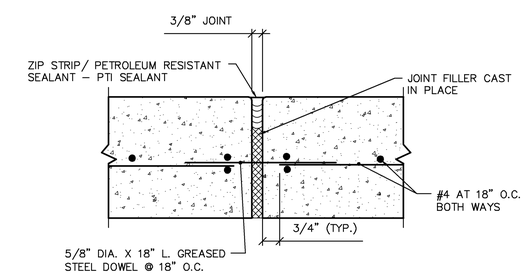
GAS STATION CONCRETE SLAB
SECTION AND SLAB CONTROL JOINT

NOT TO SCALE



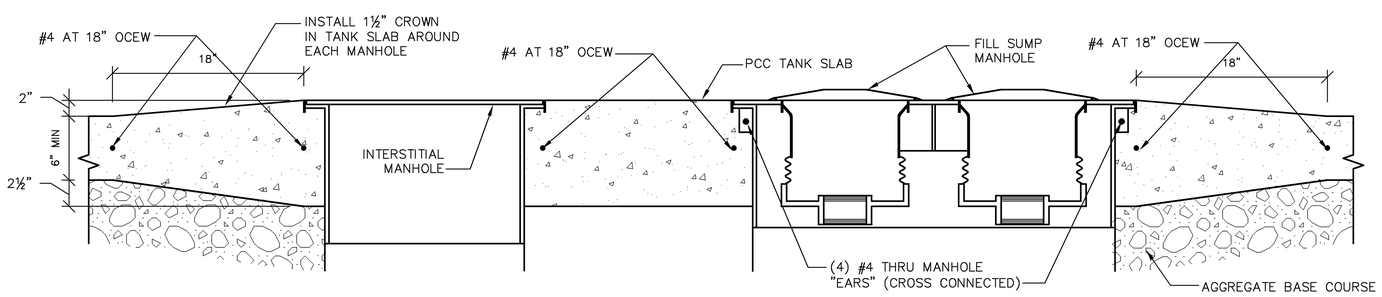
SECTION OF TURBINE COLLAR DETAIL

NOT TO SCALE



EXPANSION JOINT (TYPICAL)

NOT TO SCALE



SECTION OF FILL COLLAR DETAIL

NOT TO SCALE

NOTE:
GAS STATION NOTES AND DETAILS PER
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
4274 GLENDALE MILFORD ROAD
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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
GAS STATION DETAILS

44

DATE: 6-23-11
SHEET 46 OF 64
CADD: SGF
ENG: JAF
PM: DMB
FILE: R:\10046ACAD\FINAL\10046GAS2

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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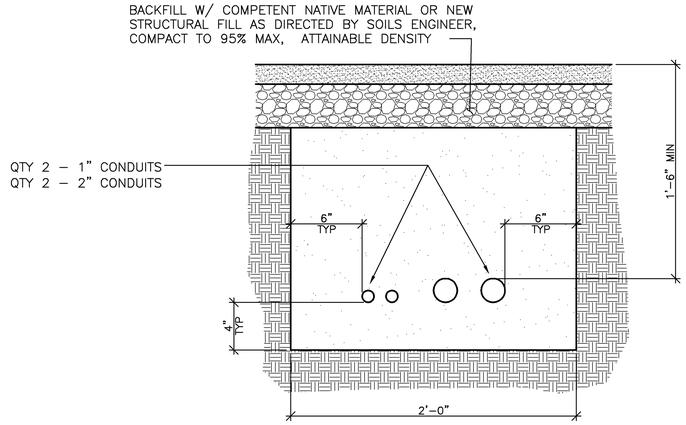
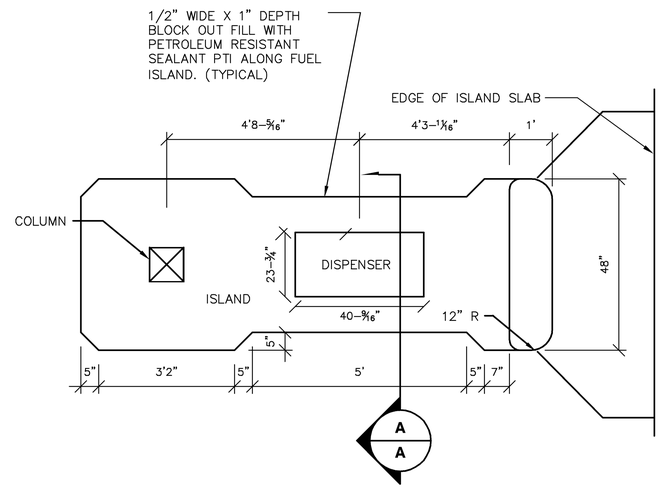


GC NOTE:
1) GC TO SUPPLY AND INSTALL ALL CONDUIT AND FILL WITH 25 LB PULL ROPE.
2) GC TO PROVIDE PULL BOXES FOR CONDUITS AS REQUIRED. MINIMUM ONE PULL BOX EVERY 250' OR AFTER (2) 90' BENDS.
3) ALL ELECTRICAL CONDUIT OR CABLE, WHERE SUBJECT TO VEHICULAR TRAFFIC SHALL HAVE A MINIMUM 24" COVER.

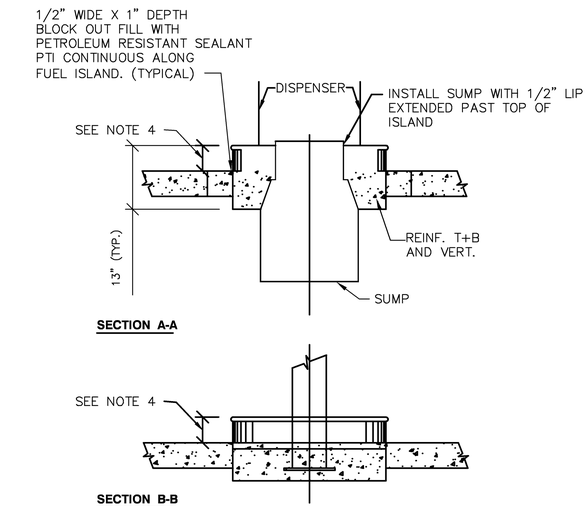
COMMUNICATION CONDUIT TRENCH DETAIL

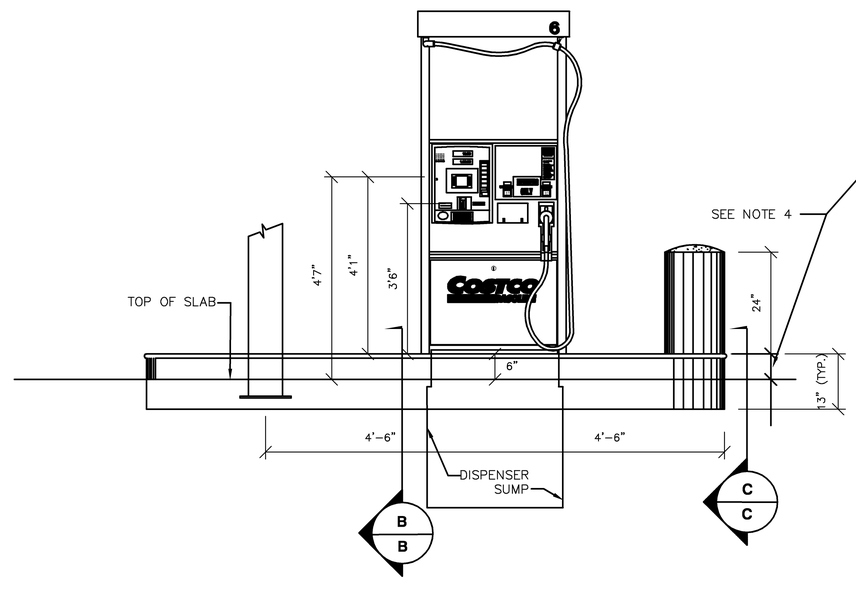
NOT TO SCALE



TYPICAL ISLAND PLAN

NOT TO SCALE



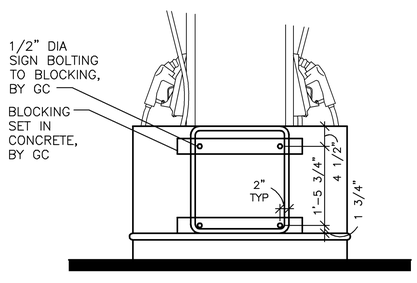


TYPICAL ISLAND ELEVATION

NOT TO SCALE

NOTES

1. THE HIGHEST OPERABLE PART OF EACH PRIMARY OR ALTERNATE CARD READER SHALL BE NO MORE THAN 54" (1372mm) MEASURED FROM THE BASE OF THE FUEL DISPENSER. WHERE CARD READERS ARE LOCATED ON FREE STANDING PEDESTALS, THE CARD READING CONTROL FUNCTION SHALL BE NO MORE THAN 54" (1372mm) ABOVE AN ACCESSIBLE LEVEL AREA WHICH IS SERVED BY AN ACCESSIBLE PATH OF TRAVEL.
2. AN ACCESSIBLE PATH OF TRAVEL SHALL BE PROVIDED TO THE BASE OF ALL FUEL DISPENSERS REQUIRED TO MEET THE PROVISIONS OF THIS SECTION. SUCH FUEL DISPENSERS SHALL BE MOUNTED ON THE ACCESSIBLE LEVEL AREA.
3. AN ACCESSIBLE LEVEL AREA SHALL BE PROVIDED WHICH IS MINIMALLY 30" BY 48" (762mm BY 1219mm) LEVEL AND CLEAR. THIS AREA SHALL BE PROVIDED WITHIN 10"(254mm) IN PLAN VIEW OF THE FACE OF THE CONTROLS AND SHALL BE UNOBSTRUCTED BY ANY FEATURES, EXCEPT PUMP NOZZLES AND HOSES, WITH THE LONG SIDE OF THIS SPACE PARALLEL TO AND CENTERED [PLUS OR MINUS 9"(229mm)] WITH THE FACE OF THE CARD-READER CONTROLS.
4. 6" FROM TOP OF ISLAND TO TOP OF DRIVE SLAB AT CENTERLINE OF DISPENSER WIDTH. TOP OF ISLANDS TO BE LEVEL.



DISPENSER ISLAND SIGNS

NOT TO SCALE

NOTE:
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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
GAS STATION DETAILS

45

DATE: 6-23-11
SHEET 47 OF 64
CADD: SGF
ENG: JAF
PM:
REVIEW: DMB
FINAL\10046GAS2
FB#

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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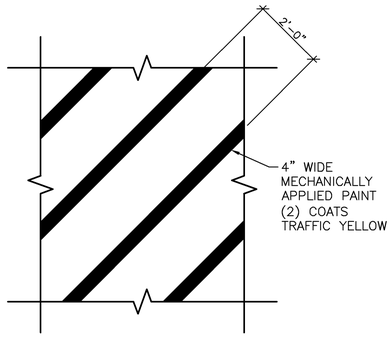
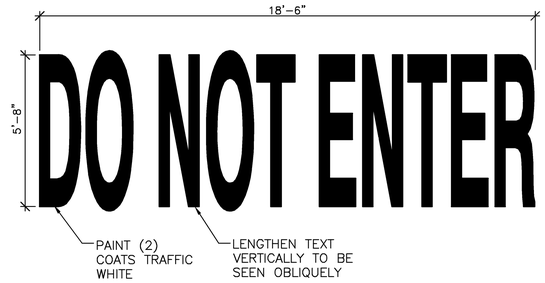


PAINTED STRIPE
NOT TO SCALE



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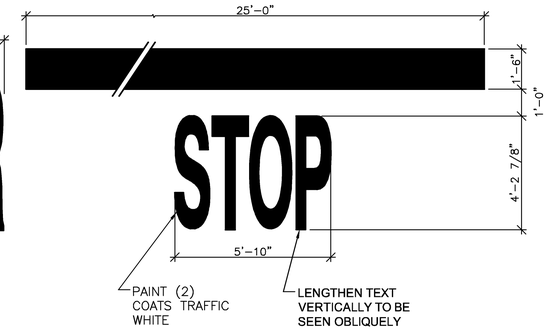

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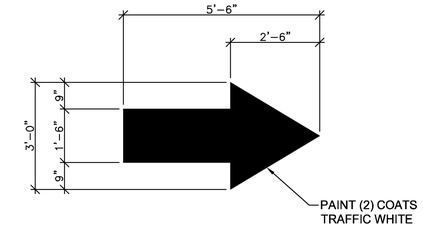

DIRECTIONAL ARROW
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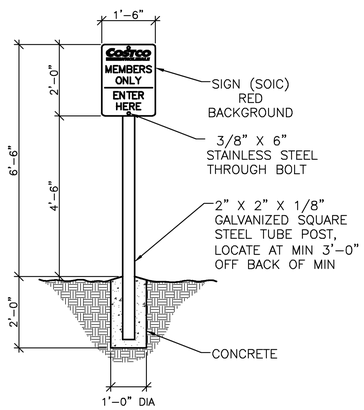
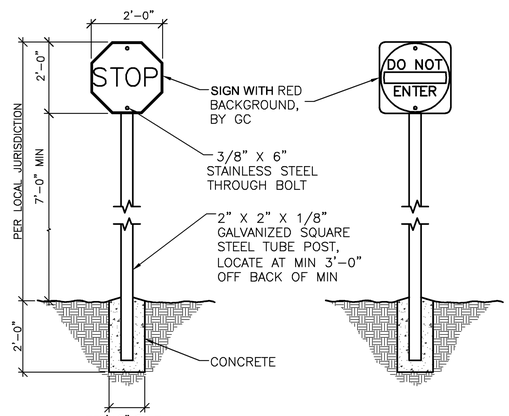
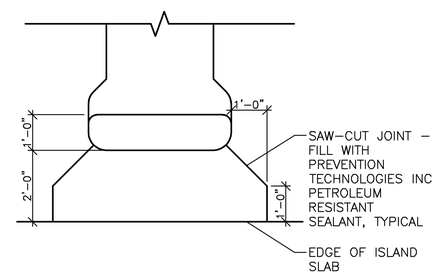


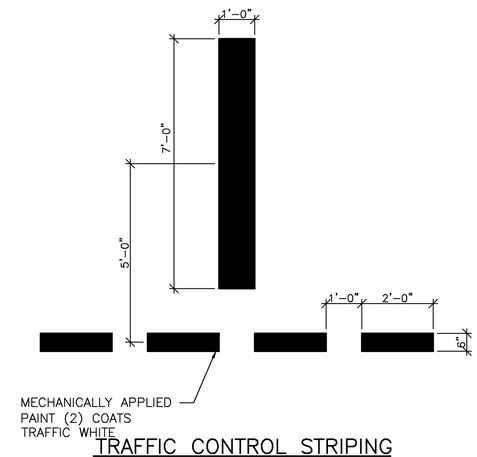
"MEMBER ONLY / ENTER HERE" SIGN
NOT TO SCALE



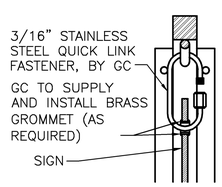
"STOP" AND "DO NOT ENTER" SIGNS
NOT TO SCALE



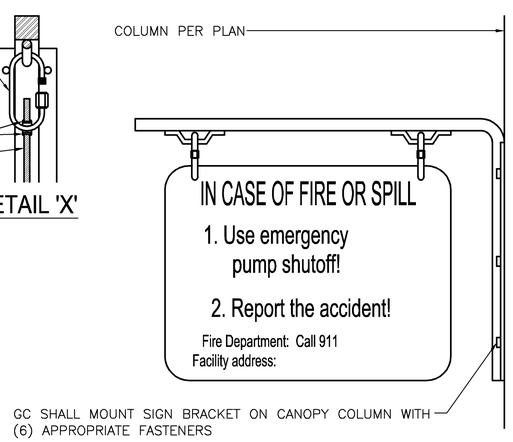
SAW-CUT JOINT AT ISLAND END
NOT TO SCALE



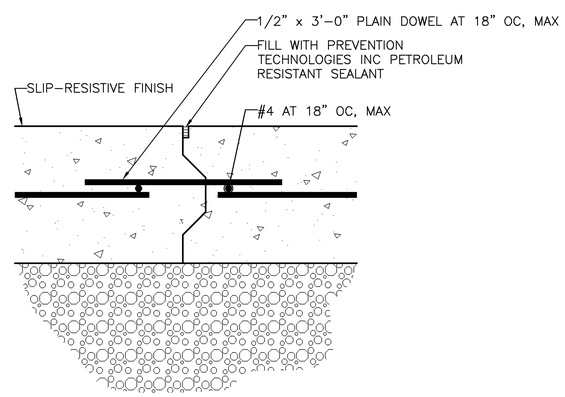
TRAFFIC CONTROL STRIPING
NOT TO SCALE



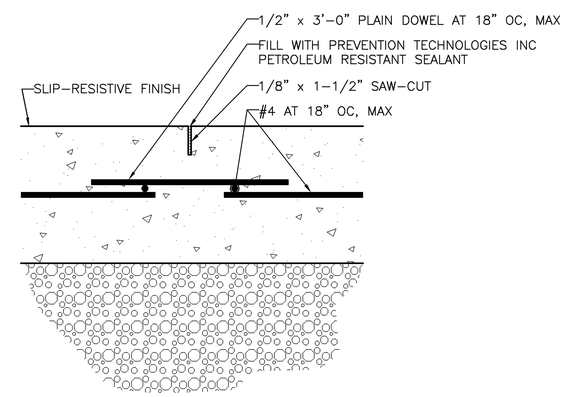
DETAIL 'X'



SIGN BRACKET
NOT TO SCALE



CONSTRUCTION JOINT (CJ)
NOT TO SCALE



SAW-CUT SHRINKAGE JOINT (SJ)
NOT TO SCALE

NOTE:
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CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
4274 GLENDALE MILFORD ROAD
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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
GAS STATION DETAILS

46

DATE: 6-23-11
SHEET 48 OF 64
CADD: SGF
ENG: JAF
PM: DMB
TECH: FILE: FINAL\10046GAS2

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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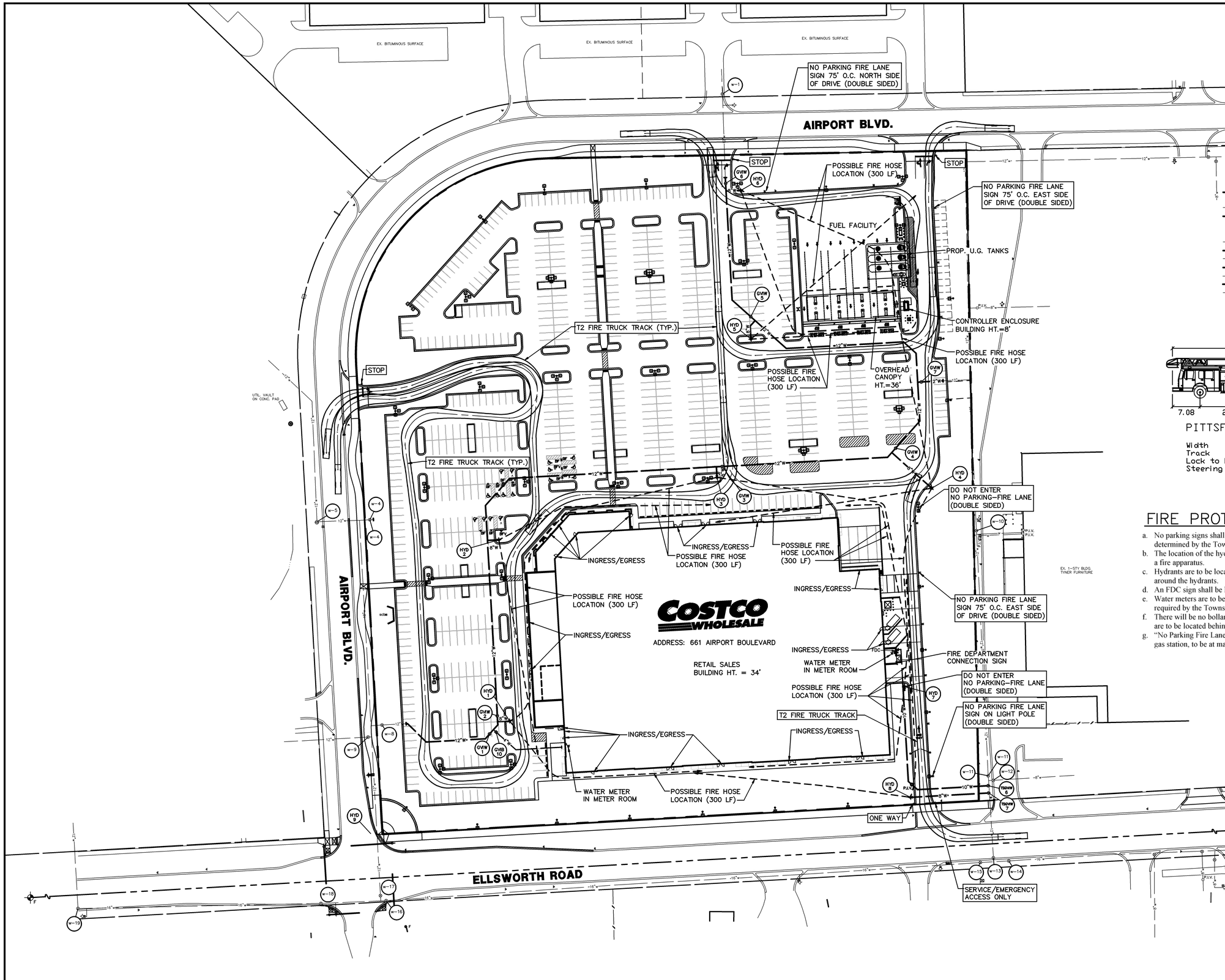
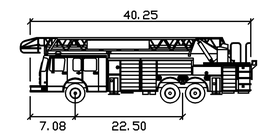


LEGEND

- EXIST. WATER MAIN
- PROP. WATER MAIN
- EXIST. HYDRANT
- PROP. HYDRANT
- EXIST. GATE VALVE IN BOX
- PROP. GATE VALVE IN BOX
- EXIST. GATE VALVE IN WELL
- PROP. GATE VALVE IN WELL
- EXIST. CURB STOP & BOX
- PROP. CURB STOP & BOX
- POST INDICATOR VALVE



PITTSFIELD TWP T-2 FIRE TRUCK

	feet
Width	: 7.00
Track	: 6.91
Lock to Lock Time	: 6.00
Steering Angle	: 45.00

FIRE PROTECTION PLAN NOTES:

a. No parking signs shall be provided along the east driveway in locations determined by the Township Fire Marshal.
b. The location of the hydrant storz is to be rotated to a location best approached by a fire apparatus.
c. Hydrants are to be located typically 5 feet back of curb. No bollards are proposed around the hydrants.
d. An FDC sign shall be located above the FDC per Township standards.
e. Water meters are to be located in meter rooms as shown on the plan and as required by the Township Land Development Standards 3.24.
f. There will be no bollards placed at any of the proposed fire hydrants because they are to be located behind the back of concrete curbs.
g. "No Parking Fire Lane" signs on east driveway and on drives east and north of gas station, to be at maximum 75' on center.

Know what's below. Call before you dig.

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COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
FIRE PROTECTION PLAN

JOB No. 10046

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

DATE: 6-23-11
SHEET 49 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FILE: FINAL\10046FP1
FB#:

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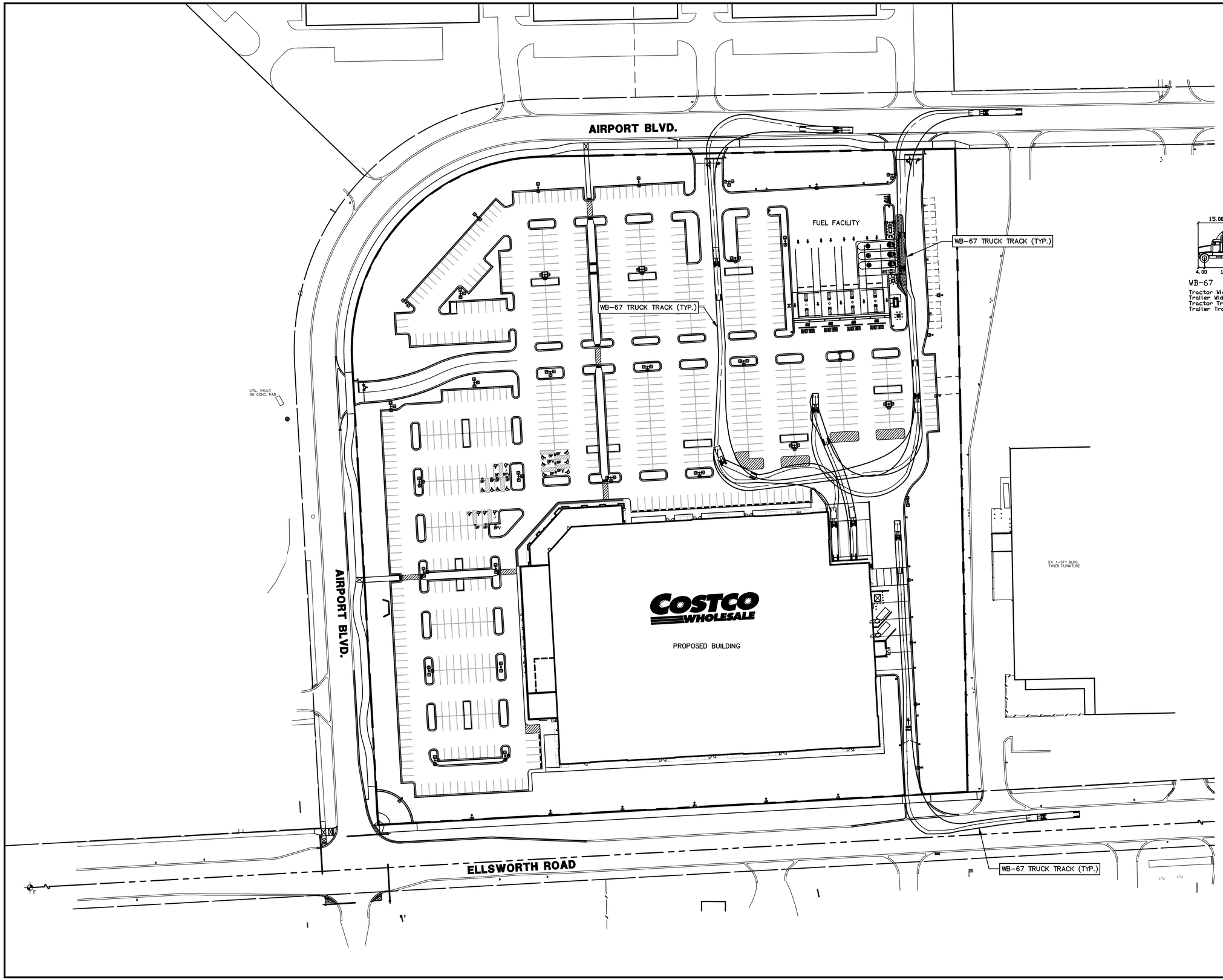

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COSTCO
FINAL SITE PLAN
WB-67 TRUCK TURNING PLAN

48

DATE: 6-23-11
SHEET 50 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
PROJ. MGR: WAJ
FINAL\10046TT1
FB#:

JOB No. 10046

REVISIONS:

	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

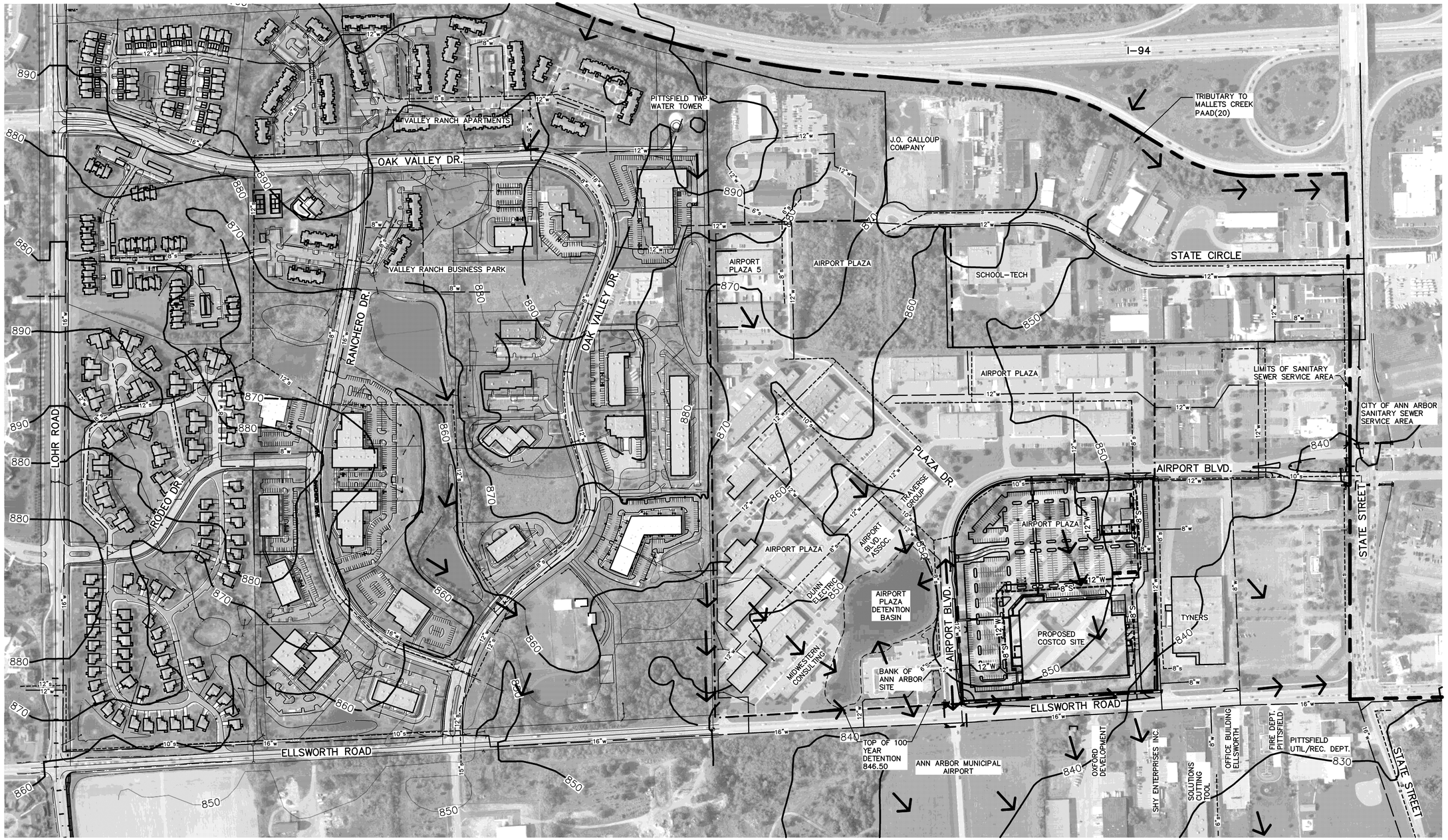
Know what's below. Call before you dig.

LEGEND

—W—	EXIST. WATER MAIN
—W—	PROP. WATER MAIN
-S-	EXIST. SANITARY SEWER
-S-	PROP. SANITARY SEWER
880	U.S.G.S. CONTOUR

SCALE: 1" = 200'

0 200 400 600



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ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
AREA WIDE PLAN

JOB No. **10046**

DATE: 6-23-11
SHEET 51 OF 64
CADD: WAJ
ENG: JAF
PM: DMB
FIELD: TW
FINAL\10046AP1
FB#

REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7-12-11
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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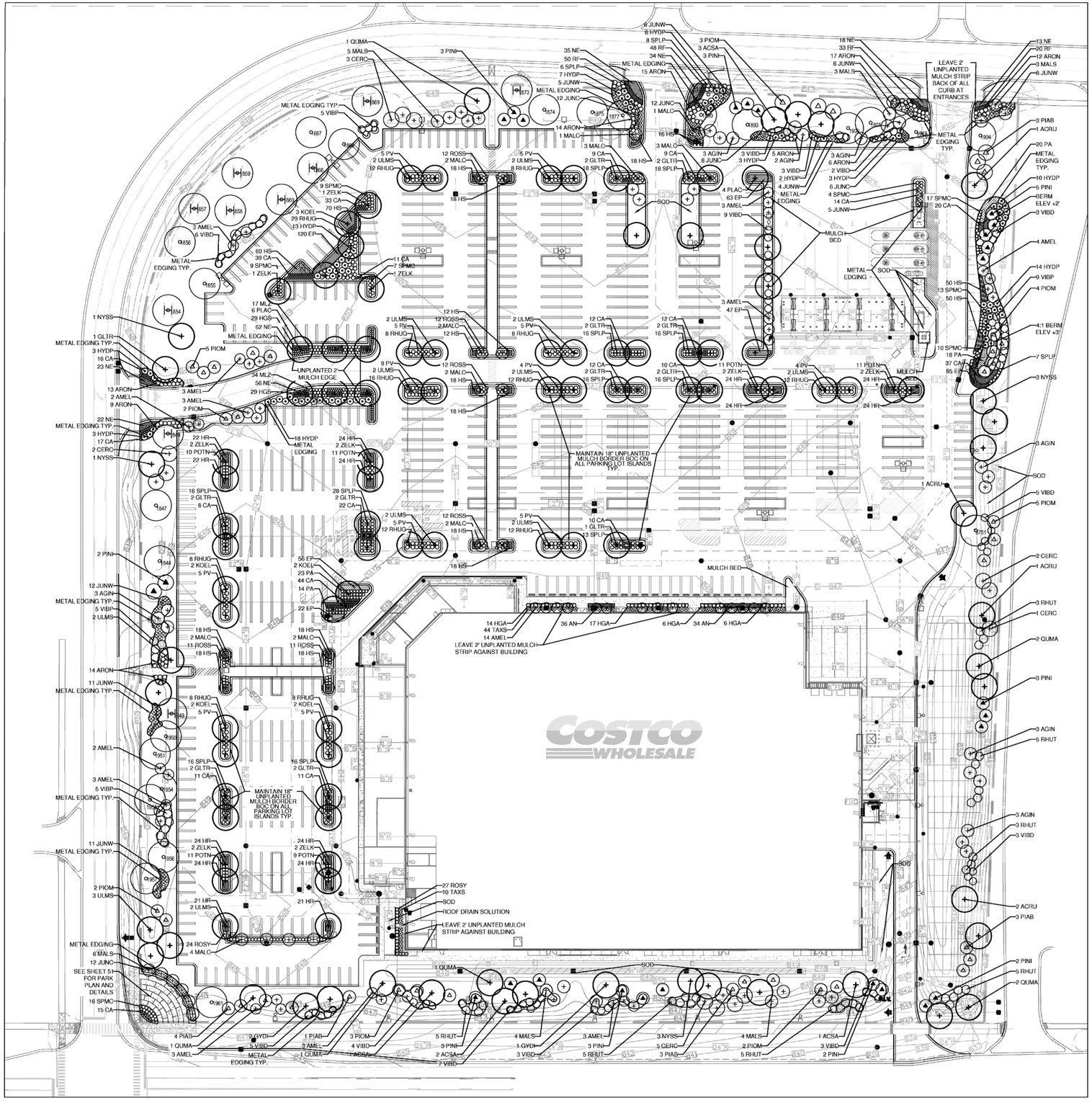

PLANT LIST

Qty	Abbreviation	Botanical Name	Common Name	Size	Form	Notes
SHADE TREES						
5	ACRU	Acer x freemanii 'Autumn Blaze'	Autumn Blaze red maple	3" Cal.	B&B	Full, well-branched, single central leader
7	ACSA	Acer saccharum 'Green Mountain'	Green Mountain sugar maple	3" Cal.	B&B	Full, well-branched, single central leader
22	GLTR	Gleditsia triancanthos var. inermis 'Shademaster'	Shademaster honeylocust	3" Cal.	B&B	Full, well-branched, single central leader
3	GYDI	Gymnocladus dioicus	Kentucky coffeetree	3" Cal.	B&B	Full, well-branched, single central leader
11	KOEL	Koehlreuteria paniculata	Goldenrain tree	3" Cal.	B&B	Full, well-branched, single central leader
8	NYSS	Nyssa sylvatica	Black tupelo	3" Cal.	B&B	Full, well-branched, single central leader
10	PLAC	Platanus x acerifolia 'Columbia'	Columbia Londonplane	3" Cal.	B&B	Full, well-branched, single central leader
7	QUMA	Quercus macrocarpa	Bur oak	3" Cal.	B&B	Full, well-branched, single central leader
25	ULMS	Ulmus x 'Pioneer'	Pioneer elm	3" Cal.	B&B	Full, well-branched
15	ZELK	Zelkova serrata 'Green Vase'	Green Vase zelkova	3" Cal.	B&B	Full, well-branched
FLOWERING TREES						
20	AGIN	Acer ginnala 'Flame'	Flame amur maple	6' Ht.	B&B	Well-branched, multi-stem, Min. 3 stems
49	AMEL	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance serviceberry	6' Ht.	B&B	Well-branched, multi-stem, Min. 3 stems
13	CERC	Cercis canadensis	Redbud	2" Cal.	B&B	Well-branched, single central leader
24	MALC	Malus 'Centurian'	Centurian crabapple	2" Cal.	B&B	Well-branched, single central leader
35	MALS	Malus 'Sugartyme'	Sugartyme crabapple	2" Cal.	B&B	Well-branched, single central leader
CONIFEROUS EVERGREENS						
50	JUNC	Juniperus chinensis 'Sea Green'	Sea Green juniper	24" Spd.	B&B	Well-branched, unsheared; 5' O.C.
68	JUNW	Juniperus scopulorum 'Wichita Blue'	Witchita Blue juniper	6' Ht.	B&B	Full to ground, unsheared
14	PIAB	Picea abies	Norway spruce	8' Ht.	B&B	Full to ground, unsheared
26	PIOM	Picea omorika	Serbian spruce	8' Ht.	B&B	Full to ground, unsheared
26	PINI	Pinus nigra	Austrian pine	8' Ht.	B&B	Full to ground, unsheared
54	TAXS	Taxus x media 'Wardii'	Ward's yew	24" Spd.	B&B	Full, unsheared; 4' O.C.
SHRUBS						
105	ARON	Aronia melanocarpa 'Autumn Magic'	Autumn Magic chokeberry	30" Ht.	Cont.	Well-branched, min. 4 canes
82	HYDP	Hydrangea paniculata 'Pink Diamonds'	Pink Diamonds hydrangea	36" Ht.	B&B	Well-branched, min. 4 canes; 6' O.C.
63	POTN	Potentilla fruticosa 'Gold Drop'	Gold Drop potentilla	24" Ht.	Cont.	Well-branched, min. 5 canes; 3' O.C.
153	RHUG	Rhus aromatica 'Gro-low'	Gro-low fragrant sumac	18" Spd.	Cont.	Well-branched, min. 3 canes; 3' O.C.
31	RHUT	Rhus typhina 'Laciniata'	Cut-leaf staghorn sumac	3' Ht.	B&B	Well-branched, min. 3 canes; 8' O.C.
70	ROSS	Rosa 'Scarlet Pavement'	Scarlet Pavement rose	18" Spd.	Cont.	Well-branched, min. 3 canes; 3' O.C.
51	ROSY	Rosa 'Yellow Submarine'	Yellow Submarine rose	18" Spd.	Cont.	Well-branched, min. 3 canes; 3' O.C.
206	SPLP	Spiraea japonica 'Little Princess'	Little Princess spirea	24" Ht.	Cont.	Well-branched, min. 5 canes; 3' O.C.
85	SPMC	Spiraea japonica 'Magic Carpet'	Magic Carpet spirea	24" Ht.	Cont.	Well-branched, min. 5 canes; 3' O.C.
53	VIBD	Viburnum dilatatum	Linden viburnum	3' Ht.	B&B	Well-branched, min. 3 canes; 7' O.C.
24	VIBP	Viburnum plicatum tomentosum 'Mariesii'	Marie's doubletie viburnum	4' Ht.	B&B	Well-branched, min. 4 canes; 7' O.C.
PERENNIALS/ORNAMENTAL GRASSES						
70	AN	Athyrium niponicum var. Pictum	Japanese painted fern	1 Gal.	Cont.	Well-rooted; 24" O.C.
372	CA	Calamagrostis a. 'Karl Foerster'	Karl Foerster feather reed grass	1 Gal.	Cont.	Well-rooted; 24" O.C.
393	EP	Echinacea purpurea 'Ruby Star'	Ruby Star purple coneflower	1 Gal.	Cont.	Well-rooted; 18" O.C.
326	HR	Hemerocallis 'Ruby Stella'	Ruby Stella daylily	1 Gal.	Cont.	Well-rooted; 18" O.C.
468	HS	Hemerocallis 'Stella d'Oro'	Stella d'Oro daylily	1 Gal.	Cont.	Well-rooted; 18" O.C.
58	HGS	Hosta 'Gold Standard'	Gold Standard hosta	1 Gal.	Cont.	Well-rooted; 30" O.C.
43	HGA	Hosta 'Guardian Angel'	Guardian Angel hosta	1 Gal.	Cont.	Well-rooted; 36" O.C.
51	MLZ	Miscanthus 'Little Zebra'	Little Zebra maiden grass	1 Gal.	Cont.	Well-rooted; 36" O.C.
263	NE	Nepeta x faassenii 'Walker's Low'	Walker's Low catmint	1 Gal.	Cont.	Well-rooted; 24" O.C.
75	PA	Perovskia atriplicifolia 'Filligran'	Filligran Russian sage	1 Gal.	Cont.	Well-rooted; 36" O.C.
62	PV	Panicum virgatum 'Shenandoah'	Shenendoah switchgrass	1 Gal.	Cont.	Well-rooted; 30" O.C.
151	RF	Rudbeckia fulgida 'Goldsturm'	Goldsturm black-eyed Susans	1 Gal.	Cont.	Well-rooted; 18" O.C.

6751 EXISTING TREE TO REMAIN

NOTES:
1. ALL AREAS NOT SHOWING LANDSCAPE BEDS SHALL RECEIVE SOD UNLESS OTHERWISE NOTED.
2. ALL SHRUB BEDS/GROUPINGS AND TREE SAUCERS SHALL RECEIVE 2" COMPOSTED SHREDDED HARDWOOD BARK MULCH.
3. ALL PARKING LOT ISLANDS SHALL HAVE AN 18" UNPLANTED MULCH BAND BACK OF CURB. ALL PLANTING AREAS ADJACENT TO DRIVES SHALL HAVE A 2' UNPLANTED MULCH BAND BACK OF CURB.

LANDSCAPE REQUIREMENTS:
1. ALL DECIDUOUS CANOPY TREE SPECIES HAVE MATURE CROWN SPREAD GREATER THAN 15 FEET AND MATURE HEIGHT OF 40 FEET OR MORE.
2. SPECIES DIVERSITY:
   REQUIRED: ONE SPECIES DOES NOT EXCEED 20% OF THE TOTAL CANOPY TREES, ORNAMENTAL TREES, CONIFEROUS TREES OR SHRUBS
   TOTAL TREES (CANOPY, ORNAMENTAL, CONIFEROUS) AND SHRUBS = 1,441
   20 % OF TOTAL = 288
   PROVIDED: MAXIMUM NUMBER OF ONE SPECIES = 206 (SPIRAEA JAPONICA 'LITTLE PRINCESS')
3. PARKING LOT TREES:
   REQUIRED: AT LEAST ONE CANOPY TREE FOR EVERY 8 PARKING SPACES
   TOTAL PARKING SPACES = 752 SPACES
   REQUIRED NUMBER OF CANOPY TREES = 752 SPACES / 8 = 94 TREES
   PROVIDED: 113 CANOPY TREES
4. EXISTING TREES KEPT IN LANDSCAPE: 34

0 25' 50' 100'
1" = 50'-0"

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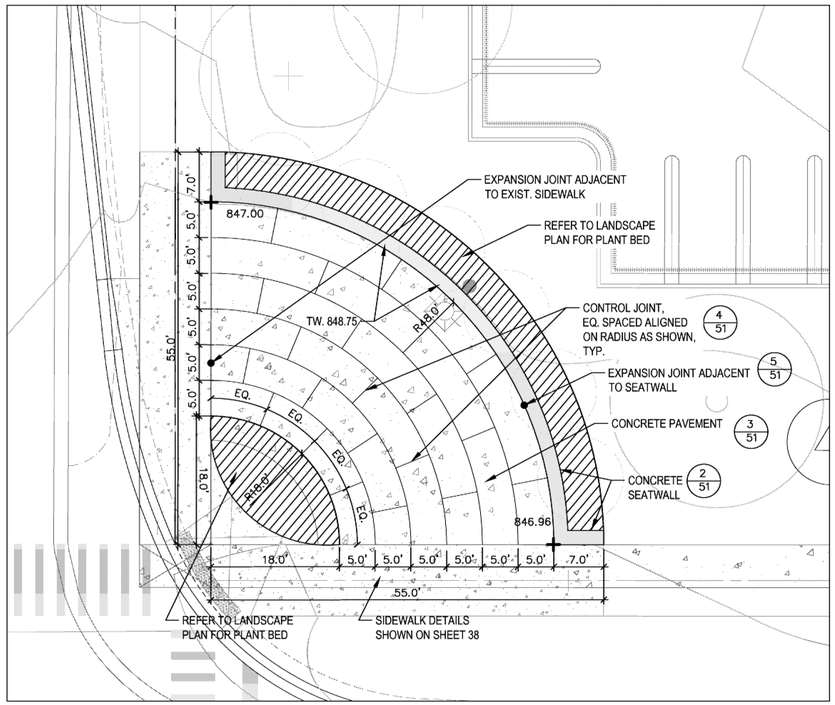
JANUARY 30, 2012
LANDSCAPE PLAN OVERALL

COSTCO WHOLESALE LANDSCAPE PLAN

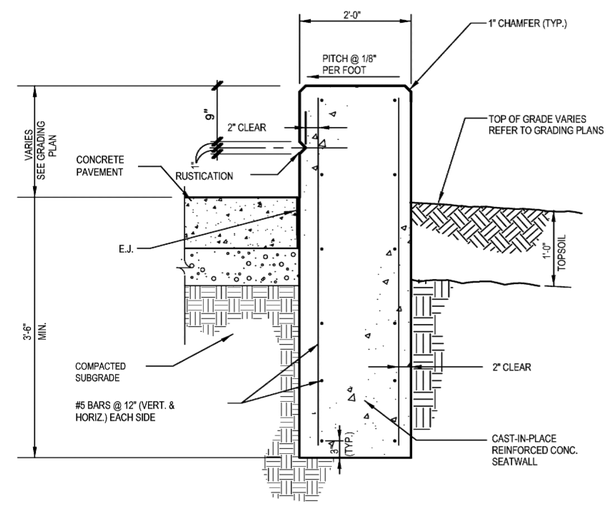
JANUARY 30, 2012

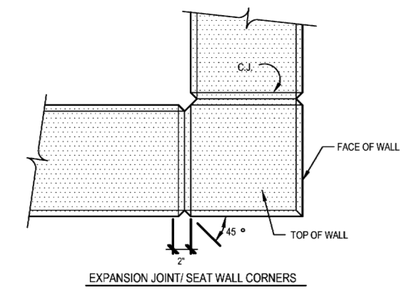


1 / 51 ENLARGEMENT OF CORNER
PLAN
SCALE: 1" = 10'-0"

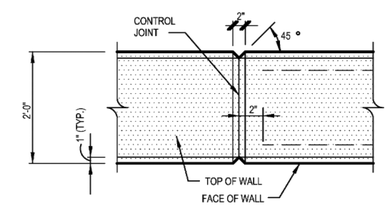
NOTES :

1. ALL EXPOSED FACES TO HAVE A LIGHT SANDBLAST FINISH. CONTRACTOR TO PROVIDE SAMPLE OF SANDBLASTING FOR APPROVAL PRIOR TO SANDBLASTING CURB.
2. PROVIDE VERTICAL CONTROL JOINTS IN WALL TO ALIGN WITH JOINTS IN CONCRETE PAVEMENT AND AT CORNERS AS SHOWN.
3. GREAT CARE SHALL BE TAKEN IN FORMING AND CONSTRUCTING SEATWALL TO AVOID IMPERFECTIONS, CHIPS MARKS, AND HOLES IN EXPOSED FACES. AT THE DISCRETION OF THE OWNER OR LANDSCAPE ARCHITECT, THE CONTRACTOR WILL BE REQUIRED TO REPAIR SURFACE IMPERFECTIONS.



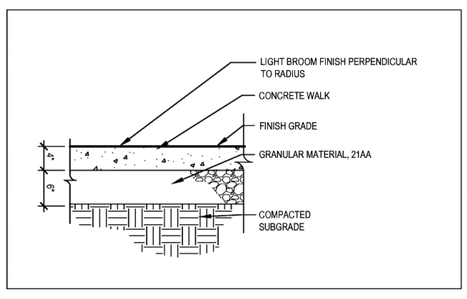


EXPANSION JOINT/ SEAT WALL CORNERS

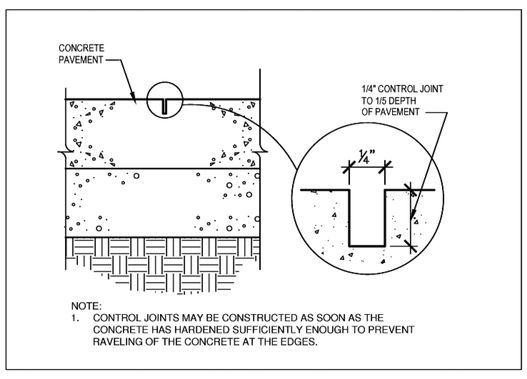


CONTROL JOINT

2 / 51 CONCRETE SEATWALL
SECTION/PLAN
SCALE: 1" = 10'-0"

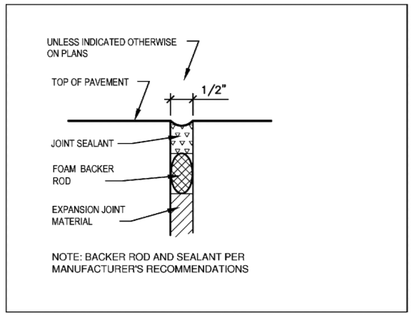


3 / 51 4" CONCRETE PAVEMENT
SECTION
SCALE: 1" = 1'-0"



NOTE:
1. CONTROL JOINTS MAY BE CONSTRUCTED AS SOON AS THE CONCRETE HAS HARDENED SUFFICIENTLY ENOUGH TO PREVENT RAVELING OF THE CONCRETE AT THE EDGES.

4 / 51 CONTROL JOINT - PAVEMENT
SECTION
SCALE: 1" = 1'-0"



NOTE: BACKER ROD AND SEALANT PER MANUFACTURER'S RECOMMENDATIONS

5 / 51 EXPANSION JOINT - PAVEMENT
SECTION
SCALE: 1" = 1'-0"

0 25' 50' 100'
1" = 50'-0"

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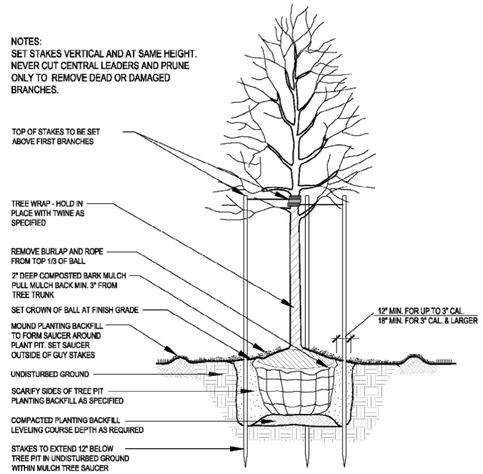
JANUARY 30, 2012
LANDSCAPE PLAN OVERALL

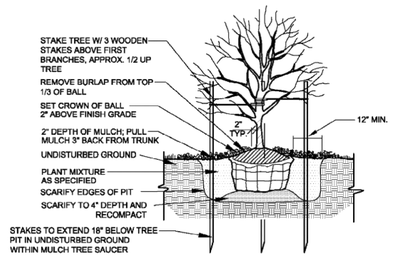
51 53 OF 64

COSTCO WHOLESALE LANDSCAPE PLAN

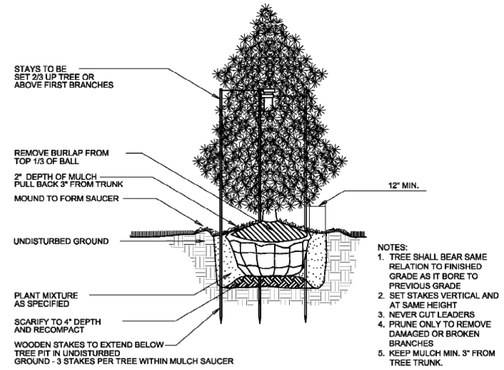
JANUARY 30, 2012



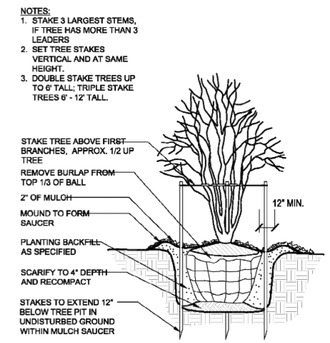
1 L-1.1 CANOPY TREE
NO SCALE



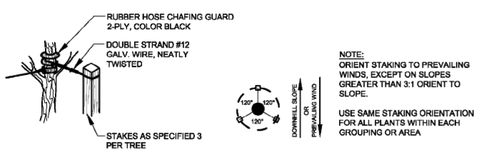
2 L-1.1 ORNAMENTAL TREE
NO SCALE



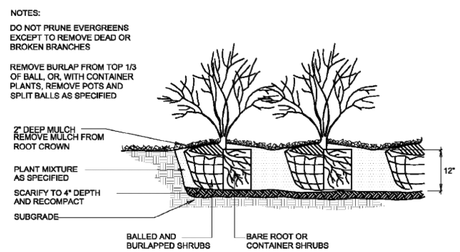
3 L-1.1 EVERGREEN TREE
NO SCALE



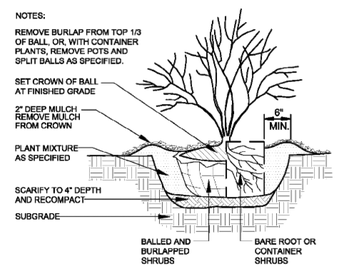
4 L-1.1 MULTI-STEM TREE STAKING
NO SCALE



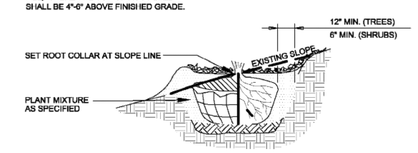
5 L-1.1 STAKING DETAIL
NO SCALE



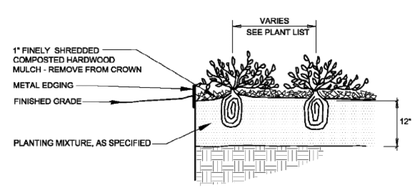
6 L-1.1 SHRUB BED PLANTING
NO SCALE



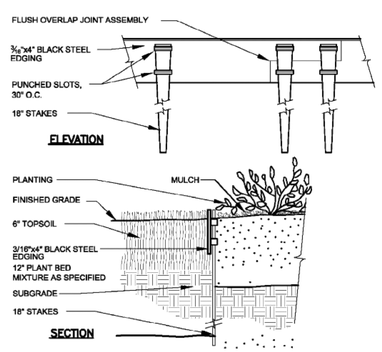
7 L-1.1 SHRUB POCKET PLANTING
NO SCALE



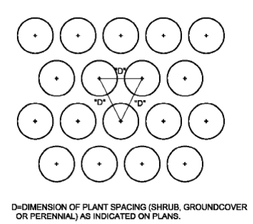
8 L-1.1 TREE AND SHRUB PLANTING ON SLOPES
NO SCALE



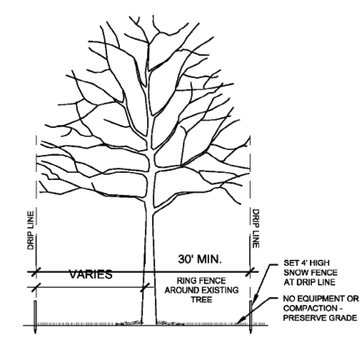
9 L-1.1 PERENNIALS/GRASSES
NO SCALE



10 L-1.1 METAL LANDSCAPE EDGING
NO SCALE



11 L-1.1 PLANT SPACING
NO SCALE



12 L-1.1 TREE PROTECTION
NO SCALE

0 25' 50' 100'
1" = 50'-0"

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JULY 21, 2011
LANDSCAPE DETAILS

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LANDSCAPE DETAILS

JULY 21, 2011

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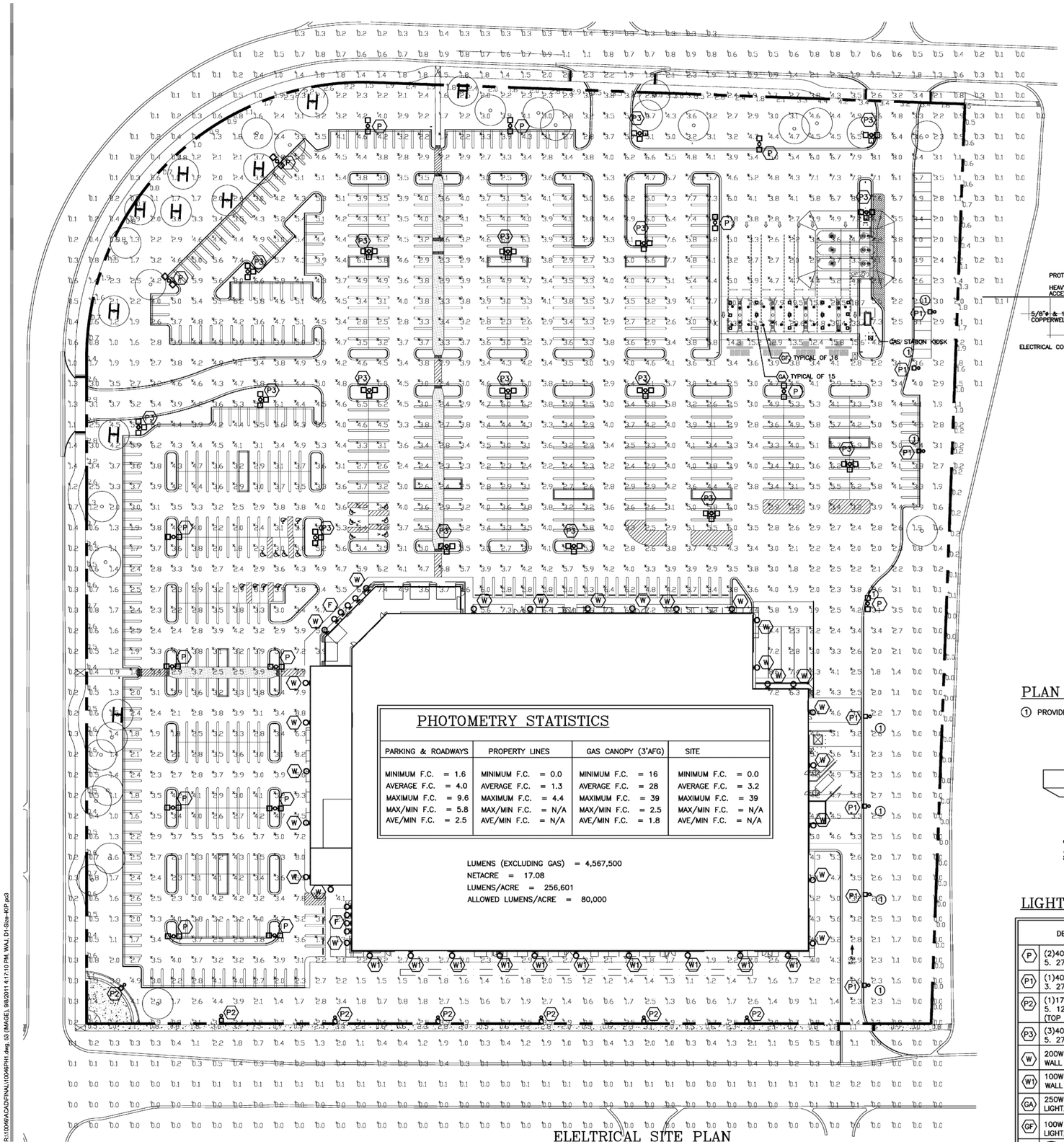
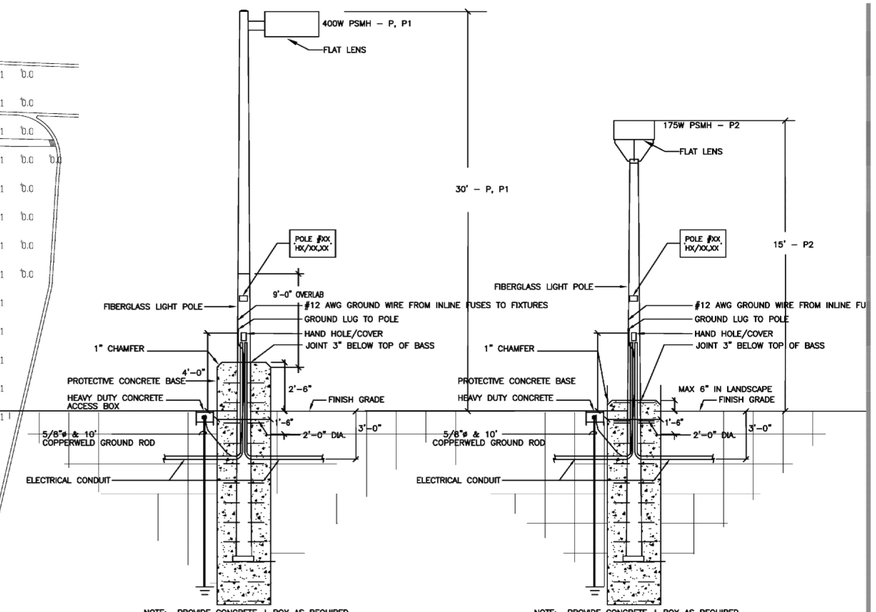


PHOTOMETRY STATISTICS

PARKING & ROADWAYS	PROPERTY LINES	GAS CANOPY (3'AFG)	SITE
MINIMUM F.C. = 1.6	MINIMUM F.C. = 0.0	MINIMUM F.C. = 16	MINIMUM F.C. = 0.0
AVERAGE F.C. = 4.0	AVERAGE F.C. = 1.3	AVERAGE F.C. = 28	AVERAGE F.C. = 3.2
MAXIMUM F.C. = 9.6	MAXIMUM F.C. = 4.4	MAXIMUM F.C. = 39	MAXIMUM F.C. = 39
MAX/MIN F.C. = 5.8	MAX/MIN F.C. = N/A	MAX/MIN F.C. = 2.5	MAX/MIN F.C. = N/A
AVE/MIN F.C. = 2.5	AVE/MIN F.C. = N/A	AVE/MIN F.C. = 1.8	AVE/MIN F.C. = N/A

LUMENS (EXCLUDING GAS) = 4,567,500
NETACRE = 17.08
LUMENS/ACRE = 256,601
ALLOWED LUMENS/ACRE = 80,000

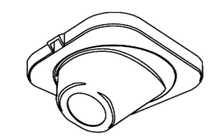
ELELTRICAL SITE PLAN
SCALE: 1" = 50'-0"



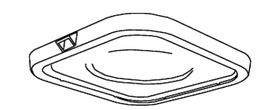
NOTE: PROVIDE CONCRETE J-BOX AS REQUIRED.
THIS DETAIL IS FOR ELECTRICAL CONDUITS ROUTING ONLY.
SEE STRUCTURAL DRAWINGS S0.2 FOR DETAILS.

POLE DETAIL
NO SCALE

NOTE: PROVIDE CONCRETE J-BOX AS REQUIRED.
SEE STRUCTURAL DRAWINGS S0.2 FOR DETAILS.



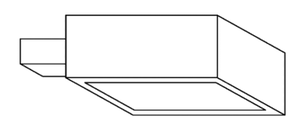
FUEL FACILITY FOCUS LIGHT – GF
NO SCALE



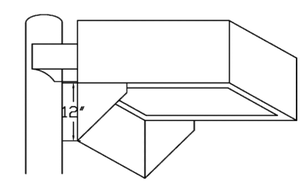
FUEL FACILITY – FLAT LENS ENCORE – GA
NO SCALE

PLAN NOTES

① PROVIDE 12" EXTERNAL HOUSE SIDE SHIELD.



TYPICAL WALL PACK DETAIL
SCALE: NTS



TYPICAL POLE MOUNT FIXTURE W/BACK SHIELD ATTACHMENT
NO SCALE

LIGHTING FIXTURE SCHEDULE

	DESCRIPTION	PART #	#	LAMP	LUMENS	LLF	.IES FILE
P	(2)400W MH FLAT LENS SHOEBOX, TYPE 5. 27.5' POLE, WITH 2-1/2' BASE.	COOPER GALLERIA GSM-AM-400MP-MT-AS-FG	15 (30)	VENTURE MS 400W/V/PS	44,000	0.72	GSM40MASF
P1	(1)400W MH FLAT LENS SHOEBOX, TYPE 3. 27.5' POLE, WITH 2-1/2' BASE.	COOPER GALLERIA GSM-AM-400MP-MT-3V-FG	7	VENTURE MS 400W/V/PS	44,000	0.72	GSM40M3VF
P2	(1)175W MH FLAT LENS SHOEBOX, TYPE 5. 12.5' POLE, WITH 1/2' BASE. (TOP OF FIXTURE 15' ABOVE GRADE)	COOPER GALLERIA GSS-SM1-175MP-MT-AR-FG	7	VENTURE MS 175W/BU/MED/PS	17,500	0.72	GSM40M3VF
P3	(3)400W MH FLAT LENS SHOEBOX, TYPE 5. 27.5' POLE, WITH 2-1/2' BASE.	COOPER GALLERIA GSM-AM-400MP-MT-AS-FG	17 (51)	VENTURE MS 400W/V/PS	44,000	0.72	GSM40MASF
W	200W MH FLAT LENS SHOEBOX, TYPE 3. WALL PACK 20' MOUNTING HEIGHT	EMCO ECW18-1-3V-200PSMH-277-BRP	23	VENTURE MS 200W/V/PS	21,000	0.72	SL-6333-EMCO
W1	100W MH FLAT LENS SHOEBOX, TYPE 3. WALL PACK 20' MOUNTING HEIGHT	EMCO ECW18-1-3V-100PSMH-277-BRP	10	VENTURE MH 100W/U/PS	9,000	0.72	SL-6333-EMCO
GA	250W SMH, RECESSED FLAT LENS DOWN LIGHT, 18' MOUNTING HEIGHT	LSI EC-S-250-PSMV-F-WHT	15	VENTURE MS 250W/V/PS	25,000	0.72	ECTA-S25-PSMV-F
GF	100W SMH, RECESSED FOCUS / SPOT LIGHT, 18' MOUNTING HEIGHT	LSI EC-SP-100-P38MH-FO-MT-WHT	16	PHILLIPS CDM100/ PAR38/FL/3K	6,800	0.72	EC-SP100P-38-FO
F	150W PSMH SIGN 15'-11" TO CENTER OF FIXTURE	ELLIPITAR M452-150G-S-02-2-000	8	PHILIPS CDM150/T6/830	14,000	0.72	46423

08-03-11

* NOT INCLUDED IN LUMEN CALCULATION

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CHECKED: JGM/ANT
DRAWN: HM
REVISION DATE:
ISSUE DATE: AUGUST 19, 2010
ARCHITECT REFERENCE NO: 09-0295-01

T.E., Inc.
830 N. RIVERSIDE DRIVE
SUITE #200
RENTON, WA 98057
PHONE: 425-970-3753
FAX: 425-970-3756

DD PACKAGE

AIRPORT BOULEVARD
& ELLSWORTH ROAD
PITTSFIELD TOWNSHIP, MI

COSTCO WHOLESALE

ELECTRICAL SITE PLAN

PROJECT NO: 10-219

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SE-1
SHEET 55 OF 64

LOG OF BORING NO. B- 1
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	14		
MC	18	22		
MC	18	24		
MC	18	32		
MC	18	37		
MC	18	27		

DESCRIPTION — Surface Elevation (ft): 846.7

Depth, ft.	Description	Elev.
0.3	3" Asphalt	846.5
	LEAN CLAY with sand, brown, moist, very stiff (CL)(Glacial Till)	
7.5	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SC-SM)(Glacial Outwash)	839.2
20.0	Bottom of Boring at 20 feet	826.7

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Backfilled @ Completion
BORING STARTED 6-14-10 | BORING COMPLETED 6-14-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 2
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	10		
MC	18	14		
MC	18	4		
MC	18	3		
MC	18	13		
MC	18	30		

DESCRIPTION — Surface Elevation (ft): 848.0

Depth, ft.	Description	Elev.
0.3	3" Asphalt	847.8
	LEAN CLAY with sand, brown, moist, stiff	
	...becomes medium stiff	
7.5	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	840.5
20.0	Bottom of Boring at 20 feet	828.0

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Backfilled @ Completion
BORING STARTED 6-14-10 | BORING COMPLETED 6-14-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 3
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	15	5	LL=25 PI=12	17.5
MC	4	30		
MC	11	38		
MC	6	23		
MC	12	21		
MC	12	15		

DESCRIPTION — Surface Elevation (ft): 848.3

Depth, ft.	Description	Elev.
0.5	Topsoil	847.8
	LEAN CLAY with sand, brown, moist, medium stiff (CL)(Glacial Till)	
5.0	...becomes very stiff	843.3
	SILTY GRAVEL with sand, cobbles, light brown, moist, medium dense to dense(GW-GM)(Glacial Outwash) ...no recovery - assume cobble obstruction ...with clay and iron stains	
20.0	Bottom of Boring at 20 feet	828.3

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 7'; Backfilled @ Completion
BORING STARTED 6-11-10 | BORING COMPLETED 6-11-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 4
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	13		
MC	18	17		
MC	18	28		
MC	18	27		
MC	18	23		
MC	18	48		

DESCRIPTION — Surface Elevation (ft): 847.0

Depth, ft.	Description	Elev.
0.3	3" Asphalt	846.8
	LEAN CLAY with sand, brown, moist, stiff (CL)(Glacial Till)	
4.0	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	843.0
20.0	Bottom of Boring at 20 feet	827.0

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 12.5'; Backfilled @ Completion
BORING STARTED 6-14-10 | BORING COMPLETED 6-14-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 5
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	10	6		
MC	12	23		
MC	15	22		
MC	12	19		
MC	9	20		
MC	18	30		

DESCRIPTION — Surface Elevation (ft): 847.2

Depth, ft.	Description	Elev.
0.5	Topsoil	846.7
	LEAN CLAY with sand, brown, moist, medium stiff (CL)(Glacial Till)	
4.0	...becomes very stiff	843.2
	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	
20.0	Bottom of Boring at 20 feet	827.2

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 11'; Backfilled @ Completion
BORING STARTED 6-10-10 | BORING COMPLETED 6-10-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 6
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OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	20		
MC	18	8		
MC	18	12		
MC	18	38		
MC	18	50		
MC	18	54		

DESCRIPTION — Surface Elevation (ft): 847.7

Depth, ft.	Description	Elev.
0.3	3" Asphalt	847.5
	LEAN CLAY with sand, brown, moist, very stiff (CL)(Glacial Till)	
5.0	...becomes stiff	842.7
	SILTY GRAVEL with sand, cobbles, light brown, moist, medium dense to dense(GW-GM)(Glacial Outwash)	
20.0	Bottom of Boring at 20 feet	827.7

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Backfilled @ Completion
BORING STARTED 6-14-10 | BORING COMPLETED 6-14-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 7
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OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	12	12	LL=52 PI=29	14.0
MC	12	20		
MC	14	20		
MC	13	17		
MC	6	43		
MC	9	27		

DESCRIPTION — Surface Elevation (ft): 848.7

Depth, ft.	Description	Elev.
0.5	Topsoil	848.2
	FAT CLAY with sand, brown, moist, stiff to very stiff (CL)(Glacial Till)	
5.0	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash) ...no recovery - assume cobble obstruction	843.7
	...very rough drilling, assume boulder	
20.0	...very rough drilling, assume boulder	828.7
	Bottom of Boring at 20 feet	

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 7.5'; Backfilled @ Completion
BORING STARTED 6-11-10 | BORING COMPLETED 6-11-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 8
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OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	0	6		
MC	0	NA		
MC	9	24		
MC	12	17		
MC	6	30		
MC	6	17		

DESCRIPTION — Surface Elevation (ft): 847.1

Depth, ft.	Description	Elev.
0.3	3" Asphalt	846.9
	...no recover in sampler, assume cobble obstruction	
5.0	SILTY GRAVEL with sand, cobbles, light brown, moist, medium dense to dense(GW-GM)(Glacial Outwash)	842.1
20.0	Bottom of Boring at 20 feet	827.1

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 6.5'; Backfilled @ Completion
BORING STARTED 6-10-10 | BORING COMPLETED 6-10-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B- 9
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OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	10	11		
MC	14	30		
MC	8	25		
MC	8	18		
MC	8	27		
MC	8	11		

DESCRIPTION — Surface Elevation (ft): 846.9

Depth, ft.	Description	Elev.
0.5	Topsoil	846.4
	SILTY SAND with gravel, cobbles, brown, moist, dense (SM)(Glacial Outwash)	
	...heavy iron staining	
20.0	Bottom of Boring at 20 feet	826.9

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 10'; Backfilled @ Completion
BORING STARTED 6-10-10 | BORING COMPLETED 6-10-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B-10
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	10	14		
MC	10	4		
MC	10	20		
MC	10	19		
MC	12	21		
MC	12	19		

DESCRIPTION — Surface Elevation (ft): 845.6

Depth, ft.	Description	Elev.
0.5	Topsoil	845.1
	LEAN CLAY with sand, brown, moist, stiff to medium stiff (CL)(Glacial Till)	
	...no recovery, assume cobble obstruction	
7.5	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	838.1
20.0	Bottom of Boring at 20 feet	825.6

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 11'; Backfilled @ Completion
BORING STARTED 6-10-10 | BORING COMPLETED 6-10-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. B-11
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	6	33		
MC	12	50		
MC	12	29		
MC	18	29		
MC	10	44		
MC	10	23		

DESCRIPTION — Surface Elevation (ft): 844.6

Depth, ft.	Description	Elev.
0.3	3" Asphalt	844.4
	LEAN CLAY with sand, brown, moist, very stiff to hard (CL)(FILL)	
5.0	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	839.6
	...becomes dense	
20.0	...becomes reddish brown, medium dense	824.6
	Bottom of Boring at 20 feet	

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 9'; Backfilled @ Completion
BORING STARTED 6-10-10 | BORING COMPLETED 6-10-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. G-1
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	15	10	LL=34 PI=17	25.9
MC	10	7		
MC	0	11		
MC	4	7		

DESCRIPTION — Surface Elevation (ft): 848.1

Depth, ft.	Description	Elev.
1.0	Topsoil	847.1
	SILTY SAND with gravel, cobbles, brown, moist, dense (SM)(Glacial Outwash)	
	...with clay	
	...no recover, assume cobble obstruction	
20.0	Bottom of Boring at 20 feet	828.1

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 6'; Backfilled @ Completion
BORING STARTED 6-10-10 | BORING COMPLETED 6-10-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. G-2
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	26		
MC	18	26		
MC	18	55		
MC	4	40		
MC	15	67		
MC	18	48		
MC	18	76		

DESCRIPTION — Surface Elevation (ft): 847.8

Depth, ft.	Description	Elev.
0.3	3" Asphalt	847.6
	SILTY GRAVEL with sand, cobbles, light brown, moist, medium dense to dense (GW-GM)(Glacial Outwash)	
	...iron nodules	
	...small recovery, assume partial obstruction	
	...becomes yellowish brown with iron nodules	
	...becomes very moist	
25.0	Bottom of Boring at 25 feet	822.8

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Boring caved in @ 17'; Backfilled @ Completion
BORING STARTED 6-11-10 | BORING COMPLETED 6-11-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. P- 1
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	7		
MC	18	20		
MC	18	30		
MC	18	15		

DESCRIPTION — Surface Elevation (ft): 848.2

Depth, ft.	Description	Elev.
0.3	3" Asphalt	848.0
	LEAN CLAY with sand, brown, moist, stiff (CL)(Glacial Till)	
4.0	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	844.2
10.0	Bottom of Boring at 10 feet	838.2

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Backfilled @ Completion
BORING STARTED 6-14-10 | BORING COMPLETED 6-14-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
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LOG OF BORING NO. P- 2
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT. ***	ATTERBERG LIMITS	MOISTURE CONTENT %
MC	18	9		
MC	18	8		
MC	18	12		
MC	18	42		

DESCRIPTION — Surface Elevation (ft): 849.6

Depth, ft.	Description	Elev.
0.3	3" Asphalt	849.4
	LEAN CLAY with sand, brown, moist, stiff (CL)(Glacial Till)	
7.5	SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)	842.1
10.0	Bottom of Boring at 10 feet	839.6

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS: Dry W.D.; Backfilled @ Completion
BORING STARTED 6-14-10 | BORING COMPLETED 6-14-10 | DRILL RIG CME-55 | DRILLER AD | APPROVED BTH | JOB NO. 111614
KLEINFELDER — 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

NOTE:
1. SEE SHEET 2 FOR SOIL BORING AND SOIL TEST PIT LOCATIONS.

MIDWESTERN CONSULTING
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COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
SOIL BORING LOGS

54

DATE: 6-23-11 | SHEET 56 OF 64 | CADD: WAJ | ENG: JAF | PM: DMB | TECH: | FINAL\10046SB1 | FB#:

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

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LOG OF BORING NO. P- 3
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	18	29
MC	18	46
MC	18	35
MC	18	10

DESCRIPTION — Surface Elevation (ft): 846.9
- 0.3 3" Asphalt — 846.7
- SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)
- 10.0 — 836.9
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-14-10	BORING COMPLETED 6-14-10
	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

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LOG OF BORING NO. P- 4
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	18	10
MC	18	12
MC	18	19
MC	18	7

DESCRIPTION — Surface Elevation (ft): 848.0
- 0.3 3" Asphalt — 847.8
- LEAN CLAY with sand, brown, moist, stiff (CL)(Glacial Till)
- ...becomes very stiff
- 7.5 — 840.5
- SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)
- 10.0 — 838.0
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-14-10	BORING COMPLETED 6-14-10
	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

KLEINFELDER — Bright People. Right Solutions. 3730 S. 149 St. Ste. 107, Omaha, NE 68144 (402) 331-2260

LOG OF BORING NO. P- 5
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	18	15
MC	18	12
MC	18	15
MC	18	30

DESCRIPTION — Surface Elevation (ft): 848.3
- 0.3 3" Asphalt — 848.1
- LEAN CLAY with sand, light brown, moist, stiff (CL)(Glacial Till)
- 3.5 — 844.8
- SILTY CLAYEY SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)
- 10.0 — 838.3
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-14-10	BORING COMPLETED 6-14-10
	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

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LOG OF BORING NO. P- 6
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	15	23
MC	15	28
MC	15	18
MC	12	23

DESCRIPTION — Surface Elevation (ft): 846.9
- 0.3 3" Asphalt — 846.7
- SILTY CLAYEY SAND with gravel, cobbles, brown, moist to wet, dense (SW-SM)(Glacial Outwash)
- ...becomes very moist
- ...becomes yellowish and reddish brown
- 10.0 — 836.9
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-11-10	BORING COMPLETED 6-11-10
Boring caved in @ 3'	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

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LOG OF BORING NO. P- 7
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	15	20
MC	15	35
MC	15	47
MC	18	82

DESCRIPTION — Surface Elevation (ft): 845.8
- 0.3 3" Asphalt — 845.6
- LEAN CLAY with sand and gravel, greenish brown to brown, moist, very stiff (CL)(FILL)
- 3.5 — 842.3
- SILTY CLAYEY SAND with gravel, cobbles, yellowish brown, moist, dense (SW-SM)(Glacial Outwash)
- ...very rough drilling, assume boulder
- 10.0 ...very rough drilling, assume boulder — 835.8
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-14-10	BORING COMPLETED 6-14-10
	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

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LOG OF BORING NO. P- 9
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	11	13
MC	13	24
MC	13	26
MC	13	32

DESCRIPTION — Surface Elevation (ft): 846.3
- 0.3 3" Asphalt — 846.1
- SILTY CLAYEY SAND with gravel and cobbles, reddish brown, moist, dense (SW-SM)(Glacial Outwash)
- ...becomes yellowish brown
- ...very rough drilling, assume boulder ...with iron nodules
- 10.0 — 836.3
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-11-10	BORING COMPLETED 6-11-10
Boring caved in @ 4.5'	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

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LOG OF BORING NO. P-10
Page 1 of 1

OWNER/CLIENT: Costco Wholesale | PROJECT NAME: Costco - Pittsfield
ARCHITECT/ENGINEER: Mulvanny G2 | LOCATION: Ann Arbor, Michigan

SAMPLE TYPE	RECOVERY	PENETRATION RESISTANCE BLOWS/FT.***
MC	15	23
MC	15	35
MC	15	NA

DESCRIPTION — Surface Elevation (ft): 845.3
- 0.3 3" Asphalt — 845.1
- LEAN CLAY with gravel, dark brown to greenish brown, moist, very stiff (CL)(FILL)
- 5.0 ...with sand — 840.3
- SILTY CLAYEY SAND SAND with gravel, cobbles, brown, moist, dense (SW-SM)(Glacial Outwash)
- 10.0 — 835.3
- Bottom of Boring at 10 feet

*Calibrated Penetrometer/***CME Automatic Hammer
The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS		
Dry W.D.	BORING STARTED 6-14-10	BORING COMPLETED 6-14-10
	DRILL RIG CME-55	DRILLER AD
Backfilled @ Completion	APPROVED BTH	JOB NO. 111614

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NOTE:
1. SEE SHEET 2 FOR SOIL BORING AND SOIL TEST PIT LOCATIONS.
2. SEE SOMAT ENGINEERING INFILTRATION REPORT FOR TEST PIT RESULTS.

MIDWESTERN CONSULTING
Civil, Environmental and Transportation Engineers, Planners, Surveyors, Landscape Architects
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CLIENT
COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

COSTCO
FINAL SITE PLAN
SOIL BORING LOGS

55

JOB No. 10046

REVISIONS:	REV. DATE
PER TWP. REVIEW	7-22-11
PER TWP. & OWNER REVIEW	8-22-11
PER TWP. REVIEW	9-9-11

DATE: 6-23-11

CADD: WAJ
ENG: JAF
PM: DMB
TECH:
FINAL\10046SB1
FB#:

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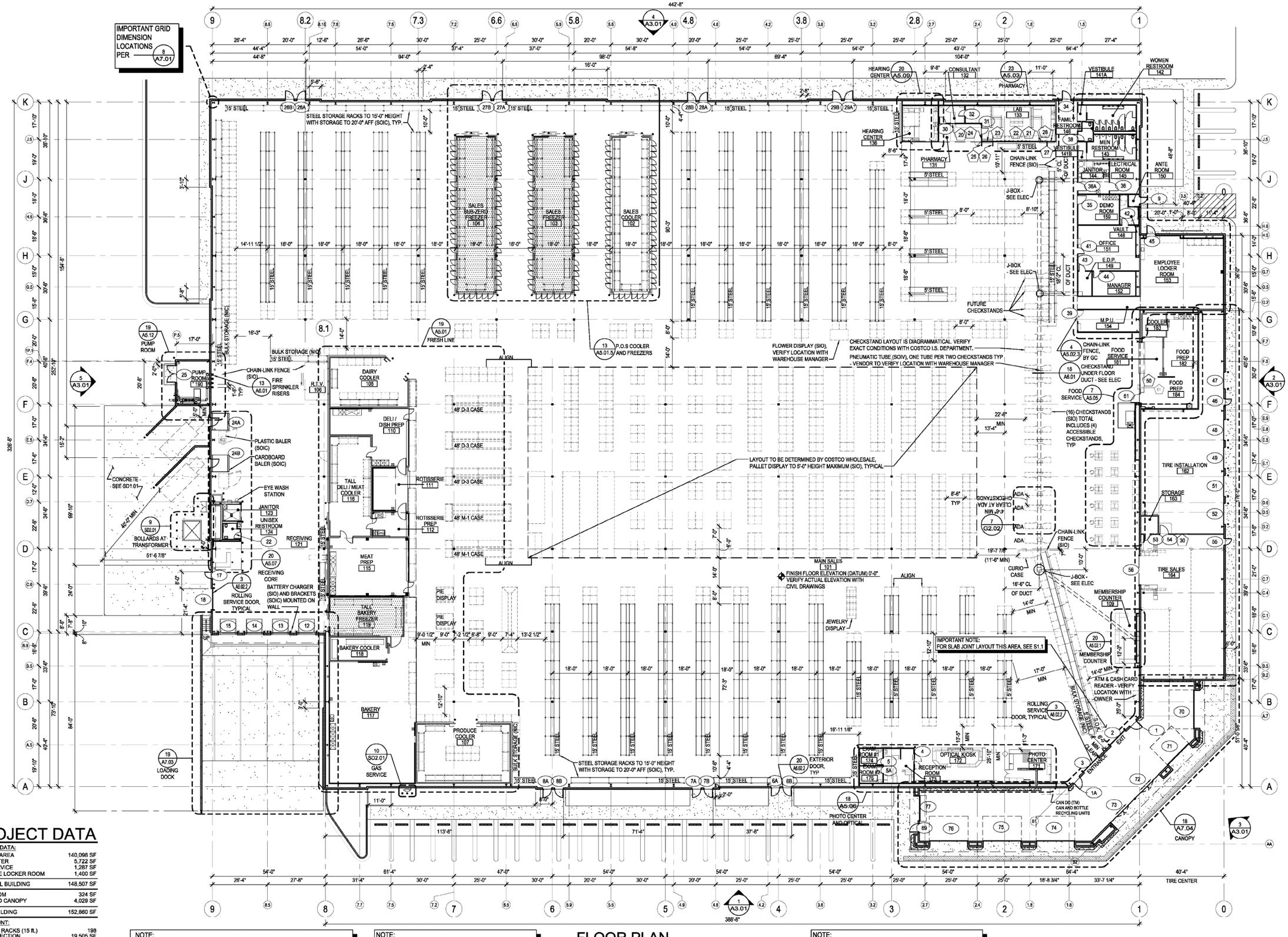

PROJECT DATA

BUILDING DATA:	
BUILDING AREA	140,098 SF
TIRE CENTER	5,722 SF
FOOD SERVICE	1,287 SF
EMPLOYEE LOCKER ROOM	1,400 SF
SUB-TOTAL BUILDING	148,507 SF
PUMP ROOM	324 SF
ENCLOSED CANOPY	4,029 SF
TOTAL BUILDING	152,860 SF
RACK COUNT:	
GROCERY RACKS (15 ft.)	198
CENTER SECTION	19,505 SF
HARDLINE RACKS (15 ft.)	132

NOTES:

NOTE:
TO DETERMINE DOOR OPENING SIZE, SEE DOOR SCHEDULE ON A6.02. DOOR DIMENSION IS TO THE FRAME, NOT TO THE ROUGH OPENING.

NOTE:
LOCATE KNOX BOXES AS DIRECTED BY FIRE DEPT. MAKE PROVISIONS TO TIE INTO SECURITY SYSTEM

FLOOR PLAN

SCALE: 1" = 20'-0"

NOTE:
ADD ADDITIONAL INSULATION AT PLUMBING LOCATED AGAINST THE EXTERIOR WALL - SEE 17 / A7.01

COSTCO WHOLESALE

PITTSFIELD, MI

AIRPORT BLVD. & ELLSWORTH ROAD
PITTSFIELD TOWNSHIP, MI

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MulvannyG2.com

BID SET

0 5' 10' 20' 40'
1" = 20'-0"

RUSSELL H. HAZZARD, ARCHITECT

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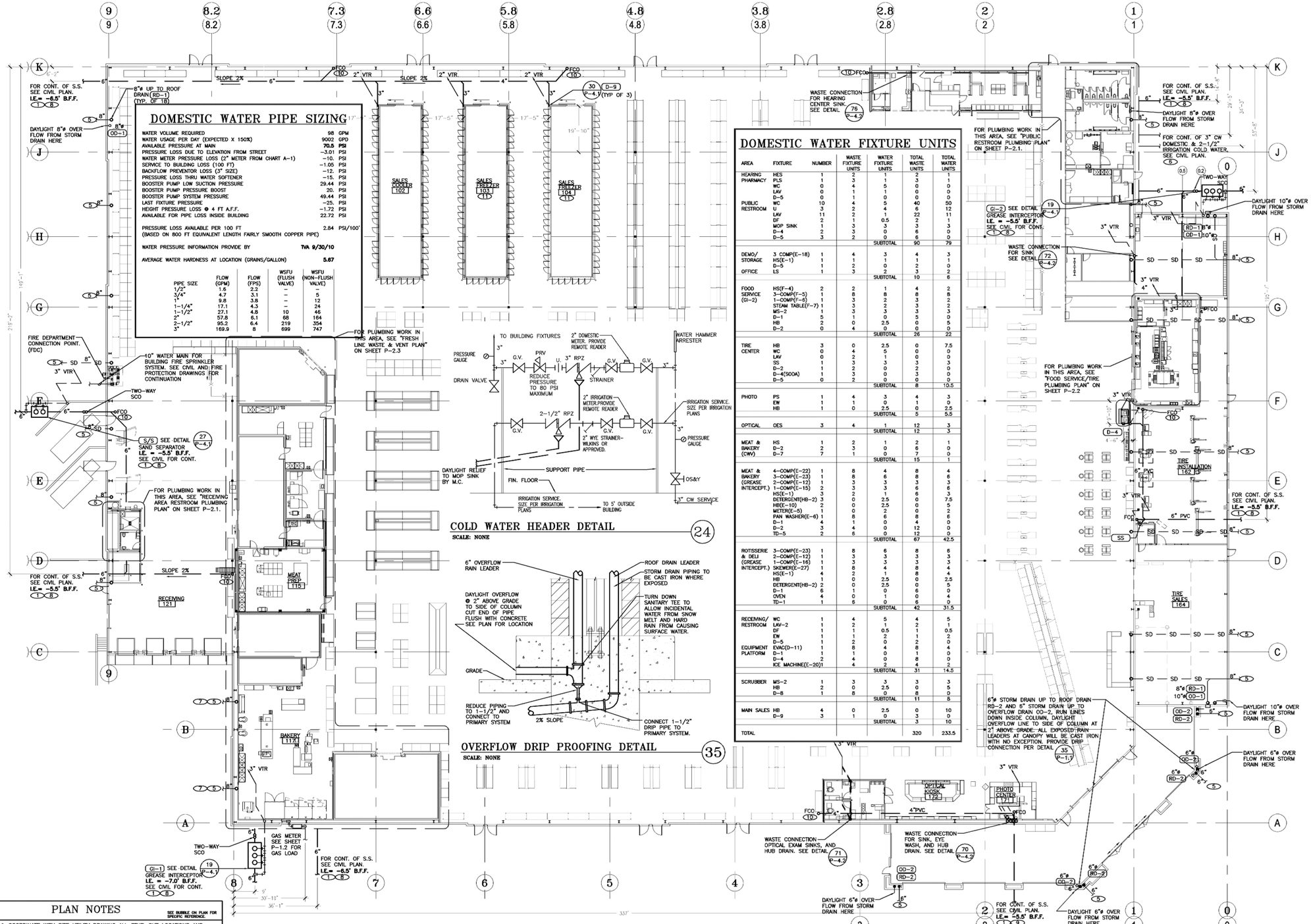
	DATE	DESCRIPTION
		OWNER APPROVAL
	6.30.11	PERMIT ISSUE
	7.18.11	BID ISSUE
		BUILDING DEPT REVISIONS
		CONTRACT ISSUE
		PR #1
		AS-BUILT ISSUE

09-0295-01
PM: ED GALLIWAY
DRAWN:

FLOOR PLAN



DOMESTIC WATER PIPE SIZING

WATER VOLUME REQUIRED	98 GPM
WATER USAGE PER DAY (EXPECTED X 150%)	9002 GPD
AVAILABLE PRESSURE AT MAIN	70.5 PSI
PRESSURE LOSS DUE TO ELEVATION FROM STREET	-3.01 PSI
WATER METER PRESSURE LOSS (2" METER FROM CHART A-1)	-10. PSI
SERVICE TO BUILDING LOSS (100 FT)	-1.05 PSI
BACKFLOW PREVENTOR LOSS (3" SIZE)	-12. PSI
PRESSURE LOSS THRU WATER SOFTENER	-15. PSI
BOOSTER PUMP LOW SUCTION PRESSURE	29.44 PSI
BOOSTER PUMP PRESSURE BOOST	20. PSI
BOOSTER PUMP SYSTEM PRESSURE	49.44 PSI
LAST FIXTURE PRESSURE	-25. PSI
HEIGHT PRESSURE LOSS @ 4 FT A.F.F.	-1.72 PSI
AVAILABLE FOR PIPE LOSS INSIDE BUILDING	22.72 PSI
PRESSURE LOSS AVAILABLE PER 100 FT (BASED ON 800 FT EQUIVALENT LENGTH FAIRLY SMOOTH COPPER PIPE)	2.84 PSI/100'
WATER PRESSURE INFORMATION PROVIDE BY	TVA 9/30/10
AVERAGE WATER HARDNESS AT LOCATION (GRAINS/GALLON)	5.67

PIPE SIZE	FLOW (GPM)	FLOW (FPS)	WSFU (FLUSH VALVE)	WSFU (NON-FLUSH VALVE)
1/2"	1.6	2.2	–	–
3/4"	4.7	3.1	–	5
1"	9.8	3.8	–	12
1-1/4"	17.1	4.3	–	24
1-1/2"	27.1	4.8	10	46
2"	57.8	6.1	68	164
2-1/2"	95.2	6.4	219	354
3"	169.9	8	699	747

DOMESTIC WATER FIXTURE UNITS

AREA	FIXTURE	NUMBER	WASTE FIXTURE UNITS	WATER FIXTURE UNITS	TOTAL WASTE UNITS	TOTAL WATER UNITS
HEARING	HES	1	2	1	2	1
PHARMACY	PLS	1	3	1	3	1
	WC	0	4	5	0	0
	LAV	0	1	1	0	0
	D-5	0	1	0	0	0
PUBLIC	WC	10	4	5	40	50
RESTROOM	U	3	2	4	6	12
	LAV	11	2	1	22	11
	DF	2	1	0.5	2	1
	MOP SINK	1	3	3	3	3
	D-4	2	3	0	6	0
	D-5	3	2	0	6	0
				SUBTOTAL	90	79
DEMO/	3 COMP(E-18)	1	4	3	4	3
STORAGE	HS(E-1)	1	1	1	1	1
	D-5	1	2	0	2	0
OFFICE	LS	1	3	2	3	2
				SUBTOTAL	10	6
FOOD	HS(F-4)	2	2	1	4	2
SERVICE	3-COMP(F-5)	1	8	8	8	8
(GI-2)	1-COMP(F-6)	1	3	2	3	2
	STEAM TABLE(F-7)	1	3	2	3	2
	MS-2	1	3	3	3	3
	D-1	5	1	0	5	0
	HB	2	0	2.5	0	5
	D-2	0	4	0	0	0
				SUBTOTAL	26	22
TIRE	HB	3	0	2.5	0	7.5
CENTER	WC	0	4	5	0	0
	LAV	0	2	1	0	0
	SS	1	3	3	3	3
	D-2	1	2	0	2	0
	D-4(SODA)	1	3	0	3	0
	D-5	0	2	0	0	0
				SUBTOTAL	8	10.5
PHOTO	PS	1	4	3	4	3
	EW	1	1	0	1	0
	HB	1	0	2.5	0	2.5
				SUBTOTAL	5	5.5
OPTICAL	OES	3	4	1	12	3
				SUBTOTAL	12	3
MEAT &	HS	1	2	1	2	1
BAKERY	D-2	2	3	0	6	0
(CWV)	D-7	7	1	0	7	0
				SUBTOTAL	15	1
MEAT &	4-COMP(E-22)	1	8	4	8	4
BAKERY	3-COMP(E-23)	1	8	6	8	6
(GREASE	2-COMP(E-12)	1	3	3	3	3
INTERCEPT.)	1-COMP(E-15)	2	3	3	6	6
	HS(E-1)	3	2	1	6	3
	DETERGENT(HB-2)	3	0	2.5	0	7.5
	HB(E-10)	2	0	2.5	0	5
	METER(E-5)	1	0	2	0	2
	PAN WASHER(E-6)	1	8	6	8	6
	D-1	4	1	0	4	0
	D-2	3	4	0	12	0
	TD-5	2	6	0	12	0
				SUBTOTAL	67	42.5
ROTISSERIE	3-COMP(E-23)	1	8	6	8	6
& DELI	2-COMP(E-12)	1	3	3	3	3
(GREASE	1-COMP(E-16)	1	3	3	3	3
INTERCEPT.)	SKEWER(E-27)	1	8	4	8	4
	HS(E-1)	4	2	1	8	4
	HB	1	0	2.5	0	2.5
	DETERGENT(HB-2)	2	0	2.5	0	5
	D-1	6	1	0	6	0
	OVEN	4	0	1	0	4
	TD-1	1	6	0	6	0
				SUBTOTAL	42	31.5
RECEIVING/	WC	1	4	5	4	5
RESTROOM	LAV-2	1	2	1	2	1
	DF	1	1	0.5	1	0.5
	EW	1	1	2	1	2
	D-5	1	2	0	2	0
EQUIPMENT	EVAC(D-11)	1	8	4	8	4
PLATFORM	D-1	1	1	0	1	0
	D-4	2	4	0	8	0
	ICE MACHINE(E-20)1		4	2	4	2
				SUBTOTAL	31	14.5
SCRUBBER	MS-2	1	3	3	3	3
	HB	2	0	2.5	0	5
	D-8	1	8	0	8	0
				SUBTOTAL	11	8
MAIN SALES	HB	4	0	2.5	0	10
	D-9	3	1	0	3	0
				SUBTOTAL	3	10
TOTAL					320	233.5

COLD WATER HEADER DETAIL

SCALE: NONE

24

OVERFLOW DRIP PROOFING DETAIL

SCALE: NONE

35

UTILITY/UNDERGROUND PLUMBING PLAN

SCALE: 1/20" = 1'-0"

PLAN NOTES

SEE BUBBLE ON PLAN FOR SPECIFIC REFERENCE.

1. VERIFY & COORDINATE WITH SITE UTILITY DRAWING ALL STUB-OUT LOCATIONS AND INVERT ELEVATIONS BEFORE STARTING CONSTRUCTION. FINISHED FLOOR ELEVATION REFERENCE = 0.00" FINAL CONNECTIONS SHALL BE MADE BY THE M.C. ANY OFFSETS REQUIRED SHALL BE DONE @ THE MECHANICAL CONTRACTOR'S EXPENSE.
5. STUB-OUT S.D. 5'-0" FROM BUILDING OR CANOPY BELOW FROST LINE AND MINIMUM 6" BELOW FOOTING. STUB OUT FOR S.D. LOCATED DIRECTLY BELOW ROOF DRAIN WITH NO HORIZONTAL OFFSET ALLOWED, SEE ARCHITECTURAL SHEET FOR S.D. DIMENSIONS. VERIFY DEPTH OF ALL CONNECTIONS ON CIVIL PLAN PRIOR TO INSTALLATION. SECURE RAIN LEADER TO BUILDING, SEE DETAIL 81/P-4.2.
6. 3"ø COLD WATER SERVICE. 2" METER LOCATED OUTSIDE BLDG. BY CIVIL. BACKFLOW DEVICE LOCATED INSIDE OF BLDG. MINIMUM PRESSURE = 70P.S.I AT BUILDING
7. GRADE AT TRUCK DOCK MAY BE AS MUCH AS 4'-6" B.F.F.
8. 6"ø SANITARY SEWER PER BRANCH OUTLET
9. 4"ø SANITARY SEWER PER BRANCH OUTLET
10. LOCATE ALL FLOOR CLEAN OUTS OUTSIDE OF FORKLIFT DRIVE AISLE (UNDER RACKING OR WITHIN 18" OF WALL). FOR SALES FLOOR WASTE LINES SEE 41/P-4.2 FOR CLEAN OUT OFFSET.
11. 4"ø SOLID PVC VENT PIPE @ 4'-0" O.C. RUN SERPENTINE IN SAND BASE BELOW INSULATION SEE DETAIL ON ARCHITECTURAL DRAWINGS

ROOF AREA DRAINAGE CHART

RAINFALL RATE	3	IN/HOUR
ROOF SLOPE	0.25	IN/FT

MAXIMUM ALLOWABLE HORIZONTAL PROJECTED ROOF AREAS

PIPE SIZE	PROJECTED ROOF AREA (SQFT.)
6"	10066
8"	21733
10"	38950

GENERAL NOTES

THE FOLLOWING NOTES APPLY TO ENTIRE PLAN AS APPLICABLE.

1. **DESIGN FROST DEPTH: XXX " BELOW GRADE**
   REQUIRED MINIMUM BURY DEPTH FOR ALL PIPING EXTERIOR TO BUILDING
2. ALL WASTE PIPING, CONDENSATE PIPING & STORM DRAIN PIPING TO BE SLOPED AT 2% MINIMUM UNLESS OTHERWISE NOTED.
3. SEE FIXTURE SCHEDULE FOR MINIMUM TRAP ARM AND VENT SIZE.
4. INSULATE ALL INTERIOR STORM DRAIN INCLUDING OVERFLOW PIPING, HOT & COLD WATER PIPING AND CONDENSATE PIPING PER SPECIFICATION SECTION 15250.
5. LOCATE ALL FLOOR CLEANOUTS OUTSIDE OF FORKLIFT DRIVE AISLE. (UNDER RACKING OR WITHIN 18" OF WALL)
6. MAINTAIN MINIMUM OF 15' BETWEEN PLUMBING VENT AND AC/AIR HANDLING UNITS
7. **CORROSIVE SOIL ALL UNDERGROUND METAL PIPE TO BE COATED OR WRAPPED. OR SUBSTITUTE PLASTIC PIPE PER SPEC. IF ALLOWED BY LOCAL AUTHORITY. FOR SUBSTITUTION OF PLASTIC PIPE ALL GREASE WASTE PIPE (GW) TO BE CPVC.**

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REVISION DATE:
ISSUE DATE: MAY 12, 2011

T.E., Inc.
830 N. RIVERSIDE DRIVE
SUITE #200
RENTON, WA 98057
PHONE: 425-970-3763
FAX: 425-970-3756

NEW WAREHOUSE

AIRPORT BOULEVARD
& ELLSWORTH ROAD
PITTSFIELD TOWNSHIP, MI

ARCHITECT REFERENCE NO: 09-0295

UNDERGROUND/UTILITY PLUMBING PLAN

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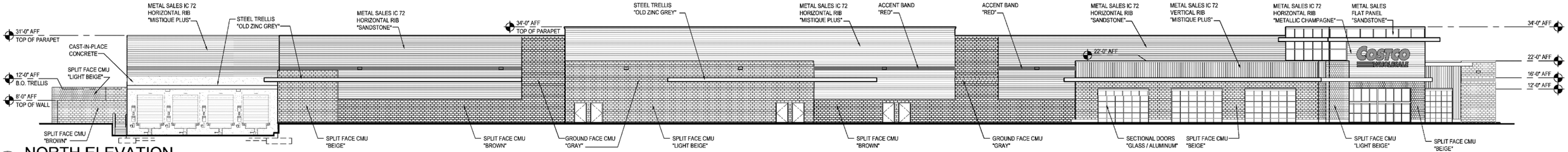
PROJECT NO: 11-135

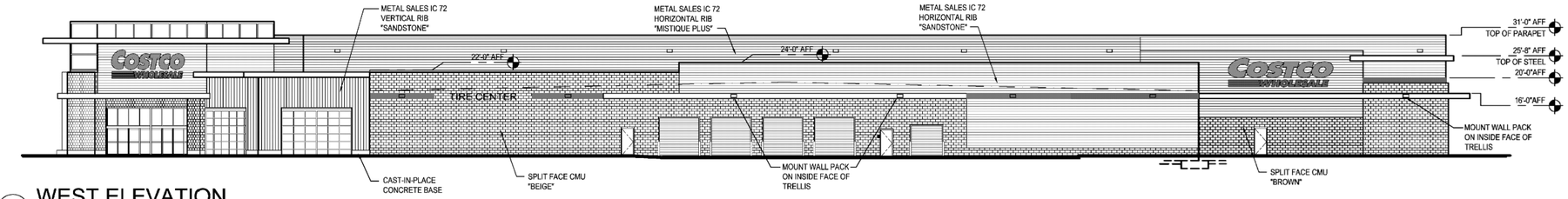
P-1.1

59 OF 64



1 NORTH ELEVATION

SCALE: 1/16" = 1'-0"

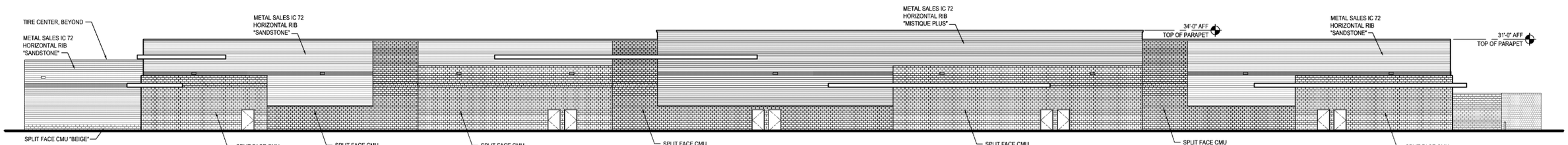


2 WEST ELEVATION

SCALE: 1/16" = 1'-0"

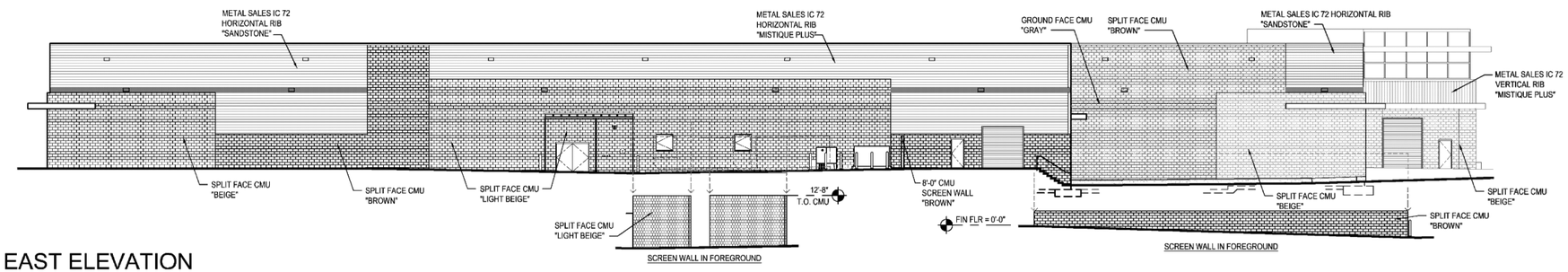
3 ENTRY ELEVATION

SCALE: 1/16" = 1'-0"



4 SOUTH ELEVATION

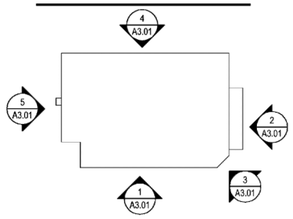
SCALE: 1/16" = 1'-0"



5 EAST ELEVATION

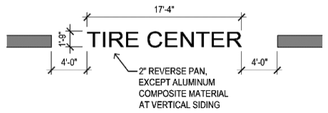
SCALE: 1/16" = 1'-0"

KEY PLAN



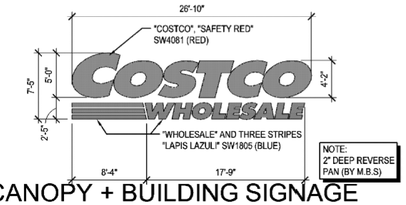
6 ADDRESS

SCALE: NOT TO SCALE (SUPPLIED AND INSTALLED BY MBS) 1210



7 LOCATION SIGNAGE

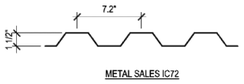
SCALE: 1/8" = 1'-0" (SUPPLIED AND INSTALLED BY MBS) 1110



8 CANOPY + BUILDING SIGNAGE

SCALE: 1/8" = 1'-0" (SUPPLIED AND INSTALLED BY MBS) 0809

SIDING PROFILE



SIGNAGE AREA TABULATION (WALL SIGNS)				
QTY.	SIGN	SIZE	AREA (S.F.) EA.	TOTAL S.F.
1	COSTCO WHOLESALE	5'-0" "C"	200 S.F.	200 S.F.
1	COSTCO WHOLESALE	5'-0" "C"	200 S.F.	200 S.F.
1	TIRE CENTER	17'-4" x 1'-9"	30 S.F.	30 S.F.
			TOTAL SIGNAGE AREA	430 S.F.

COSTCO WHOLESALE

PITTSFIELD TOWNSHIP, MI

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MulvannyG2.com

09-0295-01
JULY 25, 2011

ELEVATIONS

COSTCO WHOLESALE

PITTSFIELD TOWNSHIP, MICHIGAN

ELEVATIONS

JULY 25, 2011

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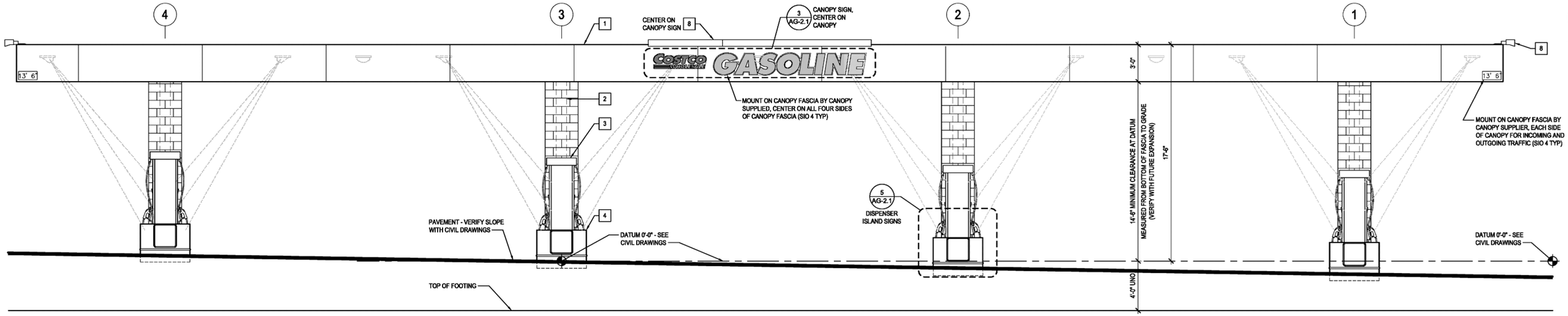


2 CANOPY AND DISPENSER ISLANDS

SCALE: 1/4" = 1'-0" 1010

SOIC - FUEL FACILITY SIGNAGE

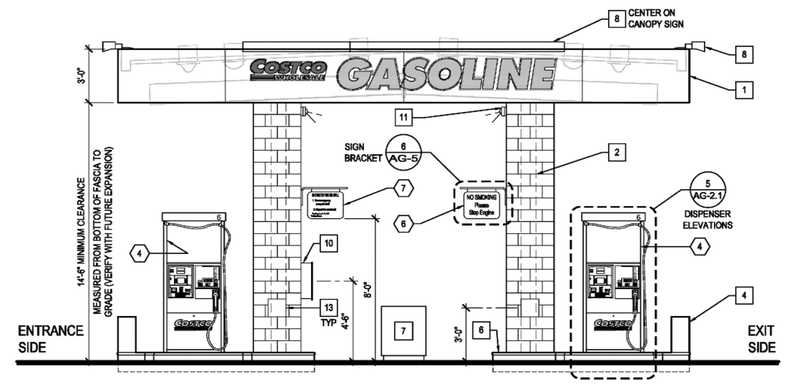
	QTY.	DESCRIPTION	TYPICAL PLACEMENT
1	2	MEMBERS ONLY / ENTER HERE W/ COSTCO LOGO, 18" x 24" ALUMINUM	METAL POST EACH SIDE ON ENTRANCE(S) SEE DETAIL 5 / AG-5
2	4	PLEASE PULL TO FORWARD PUMP 24" x 24" ALUMINUM	END OF EACH ISLAND FACING INCOMING TRAFFIC SEE DETAIL 9/AG-5 FOR MOUNTING
3	4	WRONG WAY 24" x 24" ALUMINUM	END OF EACH ISLAND FACING EXIT SEE DETAIL 9/AG-5 FOR MOUNTING
4	8	DEBIT / CREDIT ONLY, NO CASH ACCEPTED 12" x 12" ALUMINUM	4 SIDE OF DISPENSER FACING TRAFFIC 4 ON INSIDE OF EXIT SIDE DISPENSER FRAME FACING TRAFFIC
6	4	NO SMOKING / STOP ENGINE 18" x 24" ALUMINUM, TWO SIDED	HUNG FROM BRACKET ABOVE FIRE EXTINGUISHERS ON SIDE OF EACH COLUMN (CLOSEST TO EXITING TRAFFIC)
7	2	IN CASE OF FIRE OR SPILL 18" x 24" ALUMINUM, TWO SIDED	HUNG FROM BRACKET ON INSIDE OF CENTER COLUMN (CLOSEST TO EXITING TRAFFIC)
8	1	IN CASE OF FIRE OR SPILL 18" x 24" ALUMINUM, ONE SIDE	MOUNT ON CONTROLLER ENCLOSURE NEXT TO EMERGENCY PHONE, VISIBLE FROM THE PUMPS
11	16	MEMBERS ONLY 7 1/2" x 9 1/2" PLASTIC	ON DISPENSER
13	16	ACCEPTED DEBIT / CREDIT CARDS DECALS	TO LEFT OF DEBIT / CREDIT CARD READER ON DISPENSER
14	16	STATIC ELECTRICITY WARNING 4" x 11" DECAL	TO RIGHT OF LCD DISPLAYS ON DISPENSER
15	4	HOURS OF OPERATION, OPEN/CLOSED VINYL	BELOW "SELF-SERVICE" SIGNAGE, ON SIDE OF THE DISPENSER FACING TRAFFIC AT ENTRY
16	1	NO CASH ON PREMISES VINYL	MOUNT ON CONTROLLER ENCLOSURE, NEAR DOOR
17	2	EMERGENCY SHUT-OFF	ABOVE EMERGENCY SHUT-OFF ON ENCLOSURE SEE DETAIL 2/AG-4 BELOW EMERGENCY SHUT-OFF. SEE DETAIL 8/AG-5

KEY NOTES

1. PRE-FINISHED METAL FASCIA PANEL, COLOR "PLATINUM GRAY" - SUPPLIED AND INSTALLED BY CANOPY SUPPLIER UNDER SEPARATE CONTRACT
2. STEEL TUBE COLUMN WITH SPLIT-FACE CMU COLUMN WRAP, COLOR "STANDARD COLOR 191" - SEE STRUCTURAL DRAWINGS - SUPPLIED AND INSTALLED BY GC
3. MULTIPRODUCT DISPENSER 143"W x 94"H x 29"D
4. CONCRETE-FILLED METAL FORMED GUARD AT ENDS OF ISLANDS - TOP OF GUARD @ 30" ABOVE TRAFFIC SURFACE - PAINT SIDES ONLY WITH GLOSS BLUE, REFER TO SPECIFICATION
5. FUELING POSITION NUMBER, 3" HIGH WHITE DECALS - REFER TO ELECTRICAL DRAWINGS FOR EXACT DISPENSER NUMBERS (SIO)
6. RAISED CONCRETE ISLAND WITH METAL EDGE FORM - PAINT SIDES ONLY WITH GLOSS BLACK, REFER TO SPECIFICATION
7. WASTE RECEPTOR, BOLT DOWN, CENTER OF EACH ISLAND (SOIC)
8. CANOPY FASCIA LIGHT FIXTURE, "WIDE FASCIA" FIXTURE (SOIC) - REFER TO 10/AG-2.1
10. FIRE EXTINGUISHER AND CABINETS MOUNTED ON ENTRANCE SIDE OF COLUMNS - FIRE EXTINGUISHER CABINET TO BE: BROOKS MODEL # MARK II, RED CABINET WITH CLEAR COVER (OR EQUAL) - SUPPLIED BY CONTRACTOR
11. VIDEO CAMERA - VERIFY LOCATION WITH OWNER CONSTRUCTION PROJECT MANAGER. GC SHALL RUN CONDUIT AND INSTALL J-BOX FOR MOUNTING CAMERAS - SEE ELECTRICAL DRAWINGS
12. CAULK PERIMETER OF DISPENSER BASE WITH TYPE NS SEALANT, TYPICAL
13. ELECTRICAL ACCESS PANELS SUPPLIED AND INSTALLED BY GC

GENERAL NOTES

A. SEE ENLARGED SITE PLAN FOR ADDITIONAL GENERAL NOTES AND ADDITIONAL DETAIL REFERENCES.



6 CANOPY AND DISPENSER ISLANDS

SCALE: 1/4" = 1'-0" 1010

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MITCHELL C. SMITH, ARCHITECT

MULVANNY G2 ARCHITECTURE

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JUNE 13, 2011

GAS STATION
PLANS & DETAILS

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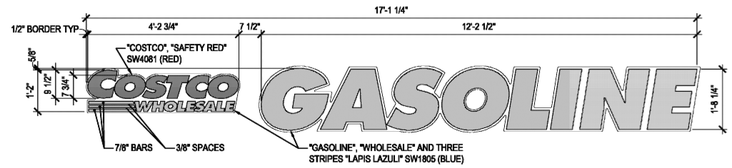
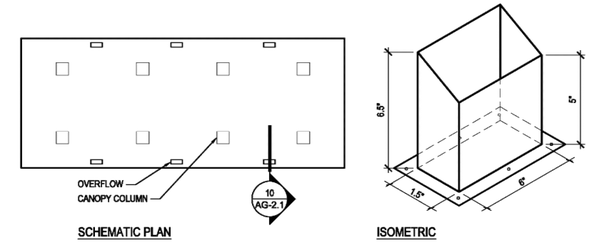


3 CANOPY SIGN
SCALE: 1/2" = 1'-0" 0110



4 CANOPY OVERFLOW
SCALE: 1" = 1'-0" 0311

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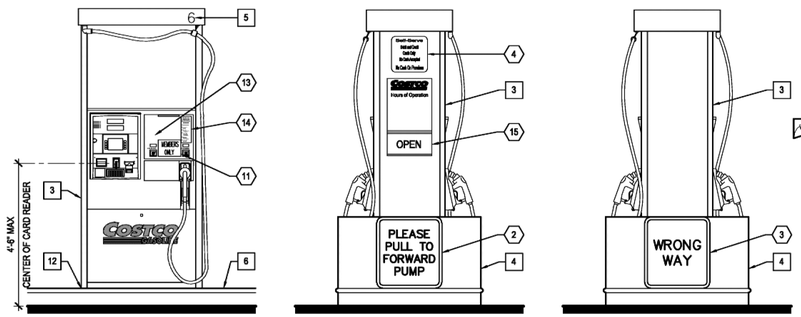
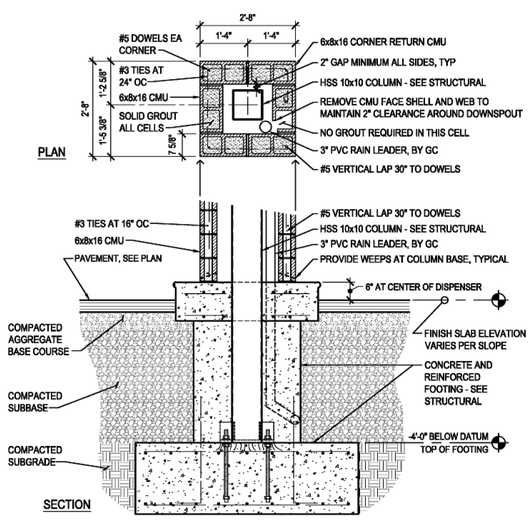
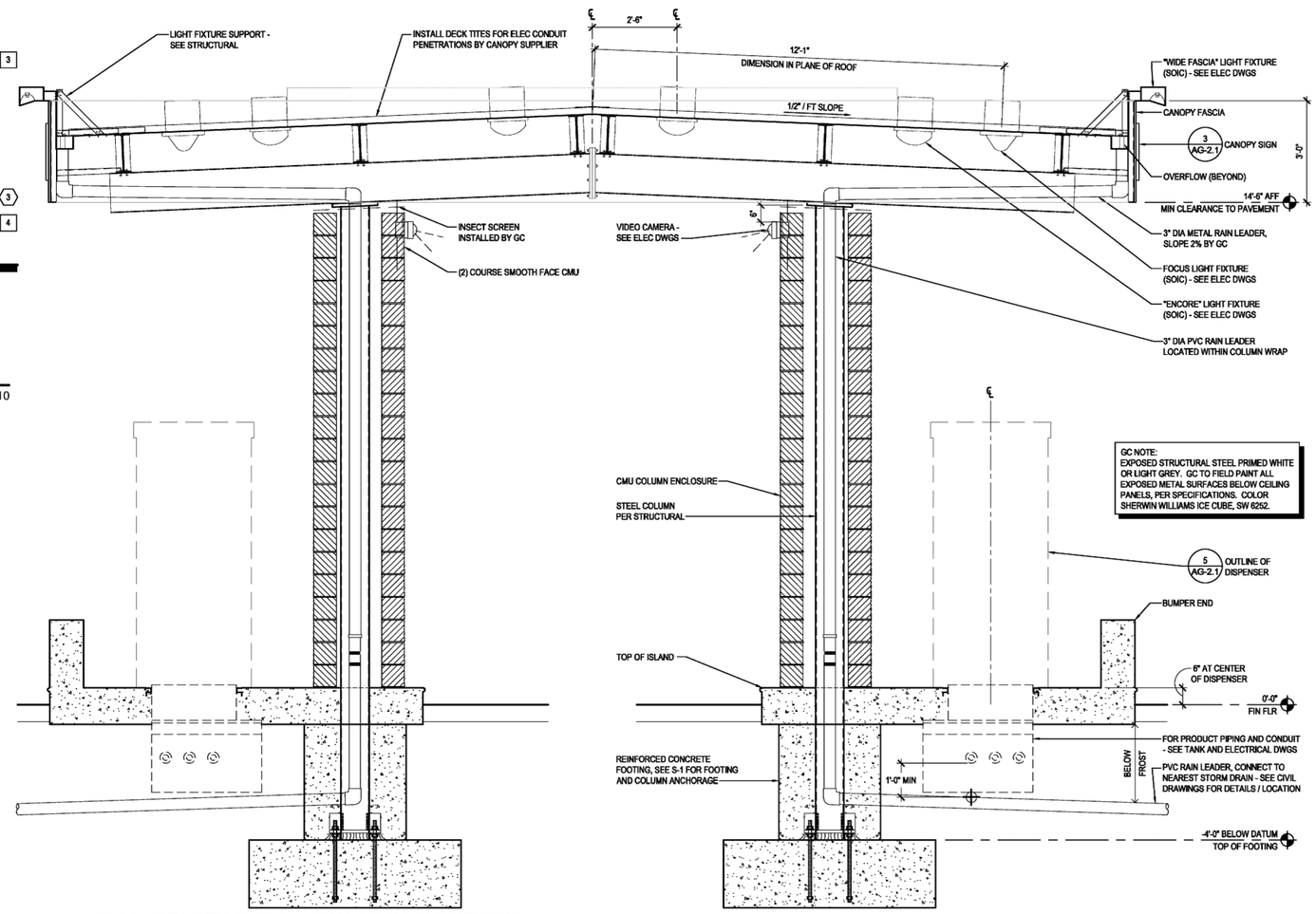


5 DISPENSER ELEVATIONS
SCALE: 1/2" = 1'-0" 1010



9 COLUMN WRAP DETAIL
SCALE: 1/2" = 1'-0" 1010



10 CANOPY FASCIA / COLUMN SECTION
SCALE: 1/2" = 1'-0" 1010

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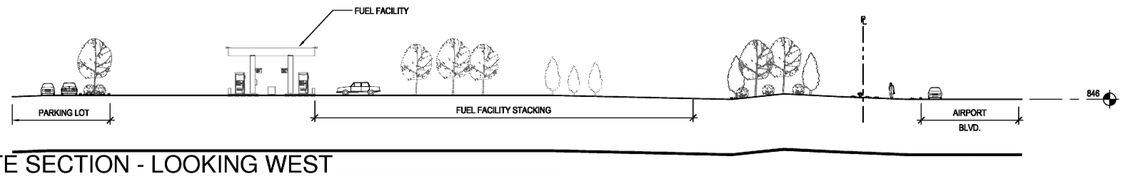
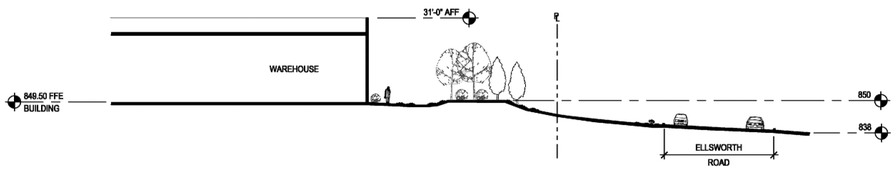
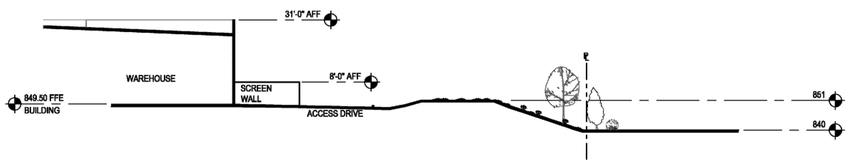


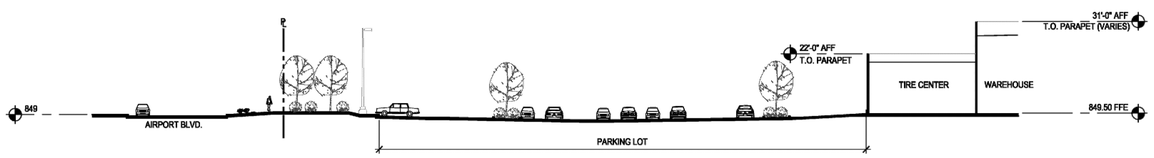
1 SITE SECTION - LOOKING WEST
SCALE: 1:300



2 SITE SECTION - LOOKING EAST
SCALE: 1:300



3 SITE SECTION - LOOKING NORTH
SCALE: 1:300



4 SITE SECTION - LOOKING NORTH
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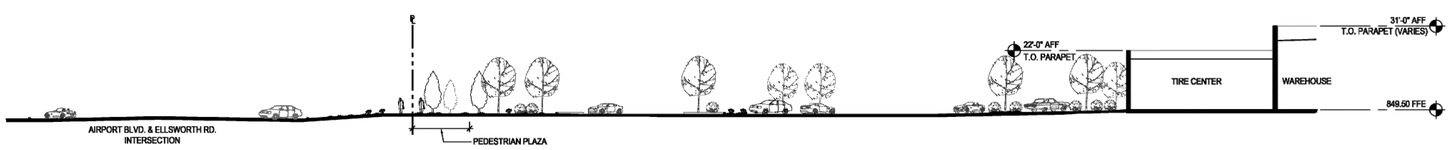
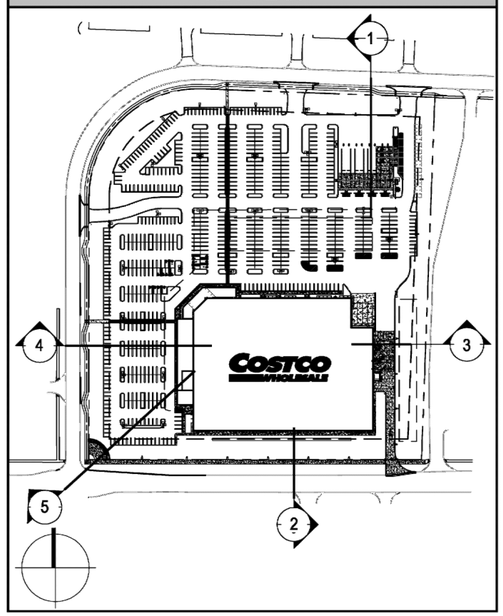


5 SITE SECTION - LOOKING NORTHWEST
SCALE: 1:300

KEY PLAN



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61 63 OF 64

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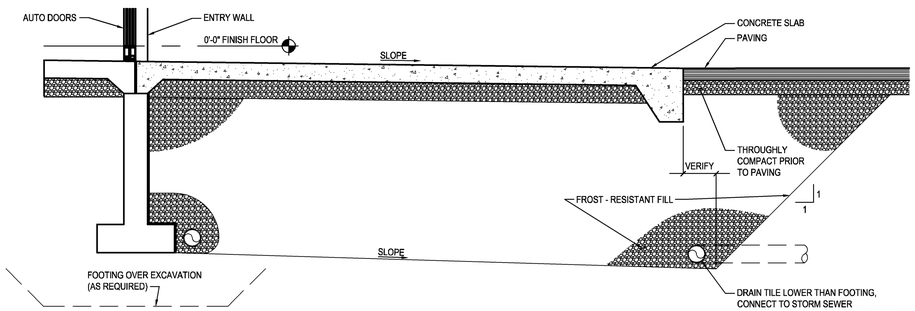
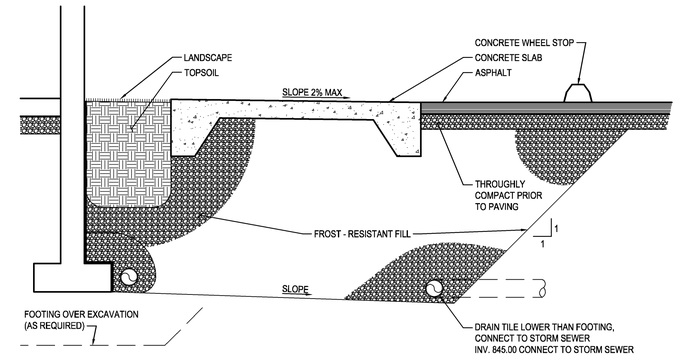


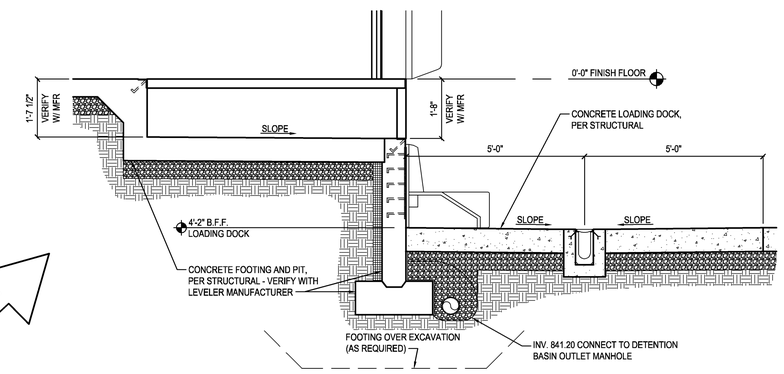
AT AUTO–DOORS AT ENCLOSED CANOPY

SCALE: 1/2" = 1'–0"



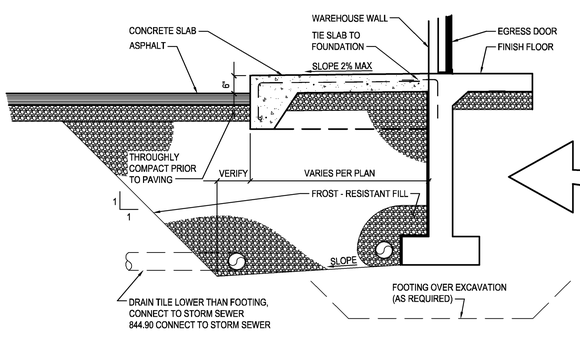
ALONG WALK / AT PARKING

SCALE: 1/2" = 1'–0"



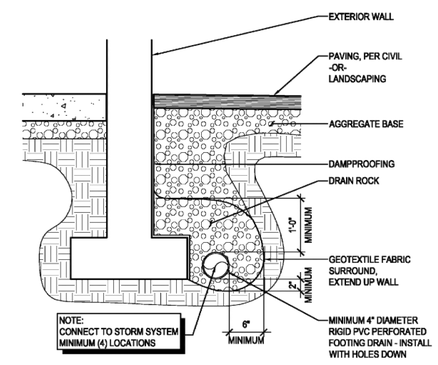
AT LOADING DOCK

SCALE: 1/2" = 1'–0"



AT EGRESS DOOR / SIDEWALK CURB

SCALE: 1/2" = 1'–0"



TYPICAL FOOTING DRAIN DETAIL

NOTE TO SCALE

NOTE:
FOOTING AND SIDEWALK DRAIN DETAILS PER CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
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FINAL SITE PLAN
FOOTING DRAIN DETAILS

62

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REVISIONS:	REV. DATE
PER PITTSFIELD TWP. & WCRC REVIEW	7–12–11
PER TWP. REVIEW	7–22–11
PER TWP. & OWNER REVIEW	8–22–11
PER TWP. REVIEW	9–9–11

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