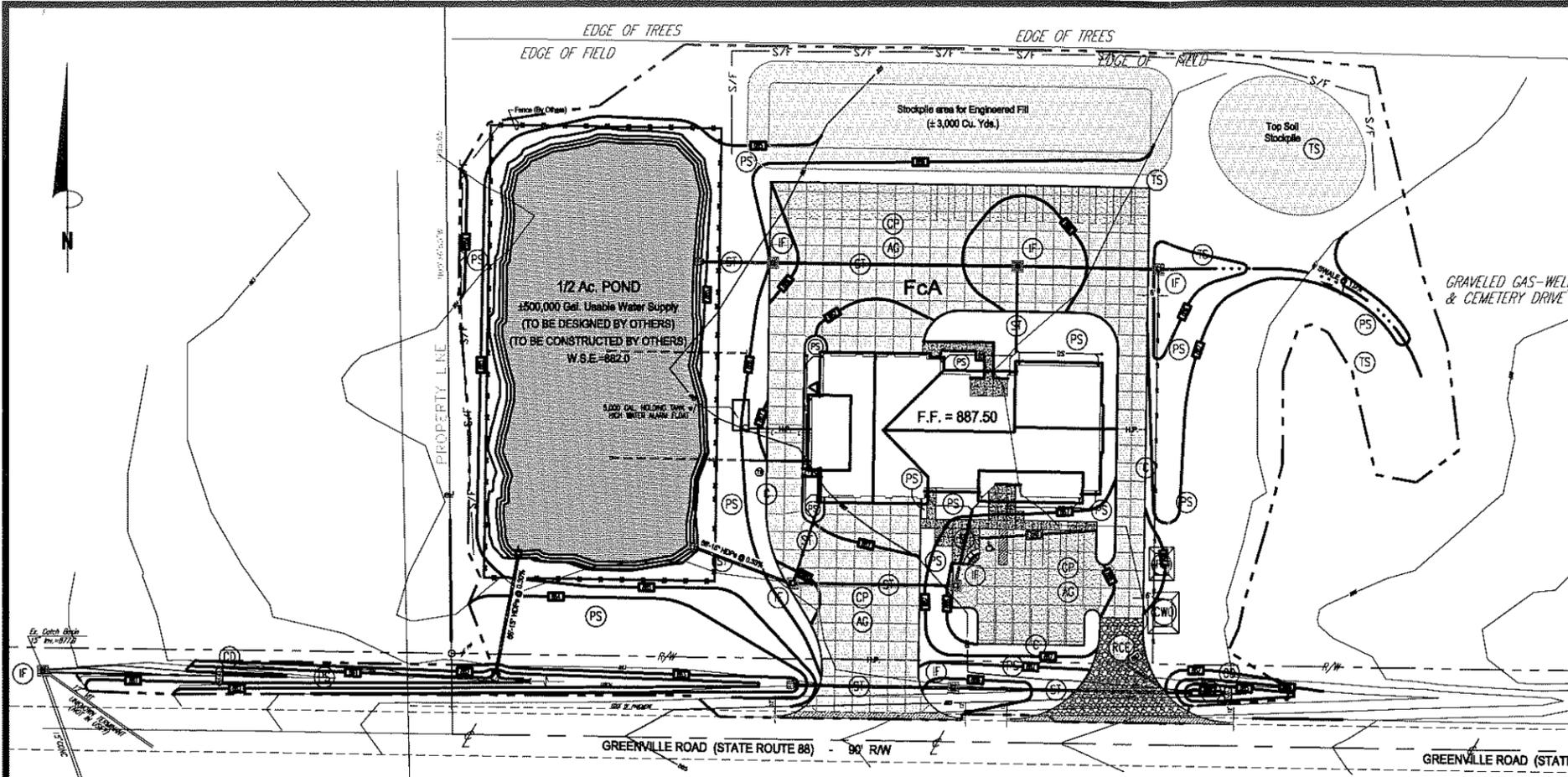
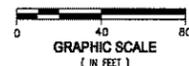


APPENDIX E

STORM WATER MANAGEMENT AND EROSION CONTROL PLAN



STORM WATER POLLUTION PREVENTION PLAN



LEGEND

- LIMITS OF DISTURBANCE (CONSTRUCTION WORK LIMITS)
- (IF) EROSION CONTROL MEASURE
- (SF) SILT FENCE
- (DS) DIVERSION SWALE
- FcA ----- SOIL SURVEY BOUNDARY & TYPE

EROSION CONTROL SCHEDULE

1. Preserve and protect as much existing vegetation as possible
2. Install sediment control measures
 - (RCE) Rock Construction Entrance
 - (SF) Silt Fence
 - (CWO) Concrete Washout
3. Grade Site / Stockpile Topsoil
4. Install Storm Water Management Measures
 - (ST) Storm Sewers
 - (IP) (CIP) Inlet Protection & Curb Inlet Protection
5. Install Concrete Curb
 - (C) Concrete Curb
6. Install Aggregate Base & Asphalt Pavement
 - (AG) (CP) Aggregate Base & Concrete Pavement
7. Vegetative cover on all areas to be exposed longer than 21 days.
 - (TS) Temporary Seeding
8. Permanent vegetative stabilization of all exposed areas
 - (PS) Permanent Seeding
9. Perform continuing maintenance until site is stabilized. Once stabilized, remove all sediment control measures and tree protection.

PROJECT IMPLEMENTATION SCHEDULE

GENERAL

In order to contain sediment on site, sediment control measures shall be constructed as a first step in grading construction and shall be made functional before up slope land disturbance takes place as construction progresses. Temporary sediment barriers and ditch checks of straw or hay bales or silt fences shall be used to intercept and retain sediment. To decrease flow velocities and to limit the flow from large disturbed areas, efforts to prevent the siltation of the storm sewer system and waterways shall include the protection of catch basins and other storm inlets by use of straw or hay bales or silt fences. As areas of earthwork construction are completed the contractor is to protect and stabilize the areas with seeding and mulching. Minimize tracking of sediments by vehicles by utilizing the construction entrance as the only entrance for vehicles. Maintain this entrance with stone as needed to prevent dirt and mud from tracking onto the roadway. Regular sweeping of the roadway may be necessary to ensure roadway does not build up with sediments. No solid or liquid waste shall be discharged into storm water runoff. (This includes washing out of cement trucks.) Designated wash pit areas are shown on the plans and are preset for this purpose away from areas of storm water runoff. Other erosion and sediment control items may be necessary due to environmental conditions and may be required at the discretion of the Mahoning County Soil & Water Conservation Office or its representatives.

PROTECTION OF EXISTING PLANTINGS

Maximum effort should be made to save fine or exceptional plant specimens. No material or temporary soil deposits shall be placed within the drip line of trees designated on the demolition plan to be retained. Prior to any clearing and grubbing operations, protective barriers or tree wells shall be installed at the drip line around each plant and/or group of plants that are to remain on site. The barrier shall be a minimum of four (4) feet high and constructed of a durable material that will last until construction is completed. Snow fences and silt fences are examples of acceptable barriers. Provide signage clearly identifying the tree protection area and state that no clearing or equipment is allowed within it.

EROSION CONTROL PROCEDURES

1. **Timing of Sediment Trapping Practices.** Sediment control practices shall be functional throughout earth disturbing activity. Stormwater ponds and erosion and sediment controls shall be implemented as the first step of grading and within seven days from the start of grubbing. Upon completion of construction of ponds, seeding and mulching shall immediately follow to aid in the stabilization and minimize erosion and sediment transport of the soil before water leaves the pond. All erosion and sediment controls shall continue to function until disturbed areas are re-stabilized. Other erosion control items may be necessary due to environmental conditions.

2. **Stabilization of Disturbed Areas.** Disturbed areas shall have soil stabilization applied within seven (7) days of last activity if they are to remain dormant (undisturbed) for more than twenty one (21) days. Velocity dissipation devices should be placed at the outlet of all detention or retention structures and along the length of any outfall channel as necessary to provide a non-erosive flow velocity from the structure to a water resource. For areas within fifty (50) feet of a water resource, soil stabilization practices shall be initiated within two (2) days on all inactive, disturbed areas. Permanent or temporary soil stabilization shall be applied to disturbed areas within seven (7) days after final grade is reached on any portion of the site. When seasonal conditions prohibit the application of temporary or permanent seeding, non-vegetative soil stabilization practices such as mulching and mowing shall be used. Erosion control blankets and mowing should be used to stabilize channels where the flow velocity is greater than 3.5 ft/s, on steep slopes, on highly erosive soils and on areas slow to establish a vegetative cover.

3. **Sediment Barriers.** Sheet flow runoff from disturbed areas shall be intercepted by sediment barriers. Sediment barriers such as silt fences or straw bale barriers shall protect adjacent properties and water resources from sediment transported by sheet flow.

4. **Inspection and Maintenance.** All temporary and permanent erosion and sediment control practices shall be inspected at least once every seven (7) calendar days and within 24 hours after any storm event greater than 0.5 inches of rain per 24 hour period. The contractor designated representative shall inspect the practices and direct maintenance and repairs to assure continued performance of their intended function. A written log of these inspections must become part of the Storm Water Pollution Prevention Plan (SWP3). This log should indicate the dates of the inspections, name of the inspector, weather conditions, observations, actions taken to correct any problems and the date the action was taken.

5. **Temporary Sediment Control Measures.** Temporary sediment control measures shall be removed upon complete stabilization of disturbed areas.

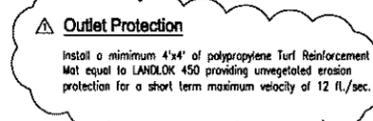
INSPECTION SCHEDULE

1. The owner of record must provide regular inspection and maintenance for all erosion and sediment control practices. Permanent records of all maintenance and inspections must be kept throughout the construction period. The name of owner's designated inspector, major observations, date of inspections and corrective measures taken must be noted on all inspections.
2. Diversion and structural measures to be inspected of seven (7) day intervals or after any storm event greater than 0.5 inches of rain per 24 hour period.
3. Repairs - any erosion control measures, structural measures or other related items in need of repair to be made within seven (7) days.



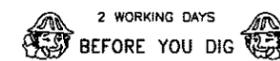
TOP SOIL

The disposition and sequencing of topsoil mounding and stockpiling shall be as determined by the owner. A minimum depth of 6" of top soil shall be placed in all areas to receive Permanent Seeding.



Outlet Protection

Install a minimum 4'x4' of polypropylene Turl Reinforcement Mat equal to LANDLOK 450 providing unvegetated erosion protection for a short term maximum velocity of 12 ft./sec.



CALL TOLL FREE 800-362-2764
040 UTILITIES PROTECTION SERVICE

Storm Water Pollution Prevention Plan Notes:
 Site Type - Fire Station
 Type of Construction Activity - Grading, Utility Installation, Building and Pavement Construction.
 Total Acreage of Entire Site - 28 Acres.
 Disturbance Area - 3.5 Acres.
 Percentage of Disturbance - 13%
 Runoff Coefficient For Preconstruction Site Condition - 0.70
 Runoff Coefficient For Post Construction Site Condition - 0.78
 Soil Classification - Fitchville silt loam (FcA)
 Watershed - Grand River
 Immediate Receiving Water - Deacon Creek
 Subsequent Receiving Water - Baughman Creek
 Schedule of Work - Spring, 2010
 Developer - Bristol Township
 Geographic Coordinates - Site Location - 41°23'16"N, 80°52'33"W

SOILS INFORMATION

- Fitchville silt loam, 0 to 2 percent slopes, (FcA)
 This deep, nearly level, somewhat poorly drained soil is on slightly convex rises in the basins of former glacial lakes. Typically the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 48 inches of yellowish brown and grayish brown mottled, friable and firm silt loam and sandy clay loam. The substratum to a depth of about 72 inches is yellowish brown, mottled, friable silt loam. Permeability is moderately slow and runoff is slow. The root zone is deep.

(Reference: United States Department of Agriculture, Soil Conservation Service, Soil Survey of Trumbull County, OH)

SOIL PROTECTION CHART

STABILIZATION TYPE	J	F	M	A	M	J	J	A	S	O	N	D
PERMANENT SEEDING				A		*	*	*				
DORMANT SEEDING	B											
TEMPORARY SEEDING				C								
SODDING				E								
MULCHING	B											

- A: Kentucky Bluegrass @ 90 LBS/AC, mixed with perennial ryegrass @ 30 LBS/AC
- B: Kentucky Bluegrass @ 135 LBS/AC, mixed with perennial ryegrass @ 45 LBS/AC, plus 2 TONS/AC. straw mulch
- C: Spring Oats @ 100 LBS/AC.
- D: Wheat or Cereal Rye @ 150 LBS/AC.
- E: Sod
- F: Straw Mulch @ 2 TONS/AC.
- * - IRRIGATION NEEDED DURING JUNE THRU AUGUST
- ** - IRRIGATION NEEDED FOR 2-3 WEEKS AFTER APPLYING SOD

Application Rates:
 Lime: On acid soil (PH 5.5 or lower) - 100 pounds per 1000 sq. ft.
 Fertilizer: 12 pounds per 1000 sq. ft. of 10-10-10 or 12-12-12 analysis or equivalent.

Hydroseeding - Hydroseeding with compatible seeding, mulch and fertilizer application rates may be used on this project.



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 Fax: (330) 370-4238



BRISTOL TOWNSHIP
 VOLUNTEER FIRE DEPARTMENT
 STATION NO. 17

REVISIONS:

- Added Outlet Protection Specification
- Removed Sedimentation Trap/Pond Reference

DRAWN BY: RJK

DATE: January 5, 2010

PROJECT NUMBER 09062

SHEET NUMBER

C5

Storm Water Pollution Prevention Plan

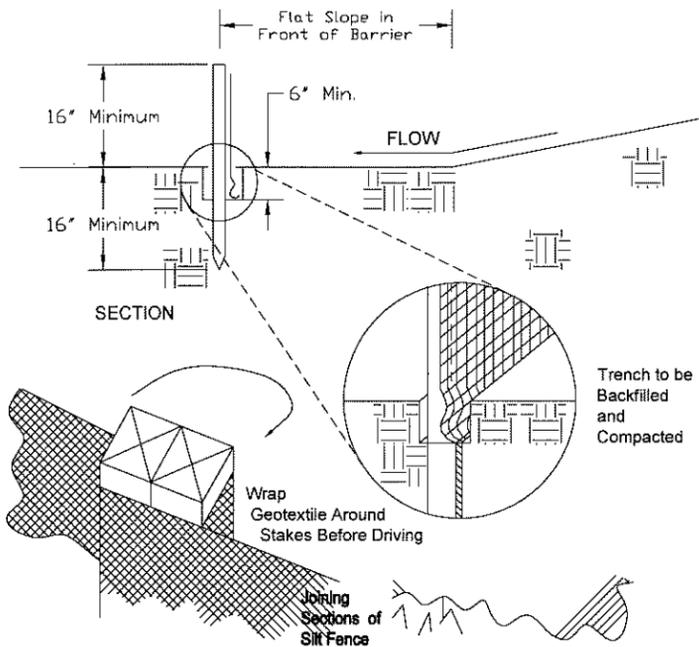
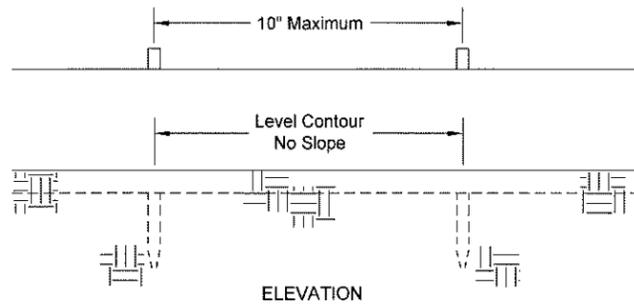
Specifications
for
Silt Fence



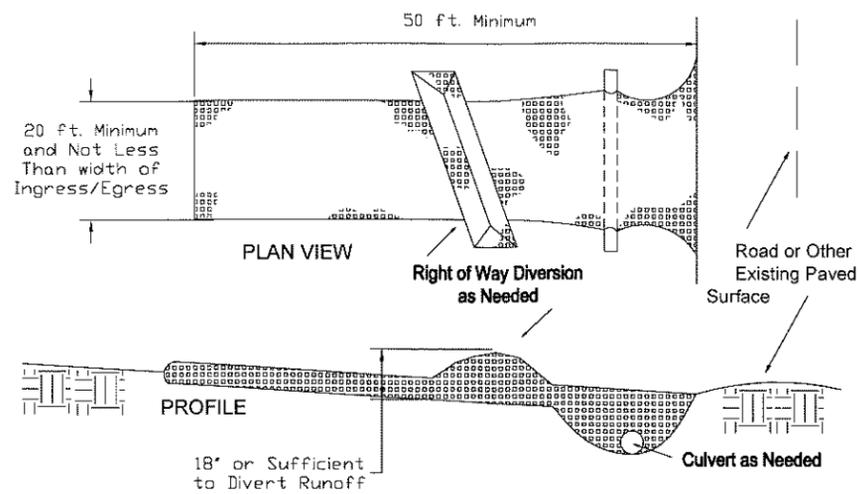
- Silt fence shall be constructed before upslope land disturbance begins.
- All silt fence shall be placed as close to the contour as possible so that water will not concentrate at low points in the fence and so that small swales or depressions which may carry small concentrated flows to the silt fence are dissipated along its length.
- To prevent water ponded by the silt fence from flowing around the ends, each end shall be constructed upslope so that the ends are at a higher elevation.
- Where possible, silt fence shall be placed on the flattest area available.
- Where possible, vegetation shall be preserved for 5 ft. (or as much as possible) upslope from the silt fence. If vegetation is removed, it shall be reestablished within 7 days from the installation of the silt fence.
- The height of the silt fence shall be a minimum of 16 in. above the original ground surface.
- The silt fence shall be placed in a trench cut a minimum of 6 in. deep. The trench shall be cut with a trencher, cable laying machine, or other suitable device which will ensure an adequately uniform trench depth.
- The silt fence shall be placed with the stakes on the downslope side of the geotextile and so that 8 in. of cloth are below ground surface. Excess material shall lay on the bottom of the 6-in.-deep trench. The trench shall be backfilled and compacted.
- Seams between section of silt fence shall be overlapped with the end stakes of each section wrapped together before driving into the ground.
- Maintenance--Silt fence shall allow runoff to pass only as diffuse flow through the geotextile. If runoff overtops the silt fence, flows under or around the ends, or in any other way becomes a concentrated flow, one of the following shall be performed, as appropriate: 1) The layout of the silt fence shall be changed, 2) Accumulated sediment shall be removed, or 3) Other practices shall be installed.

Criteria for Silt Fence Materials

- Fence Posts--The length shall be a minimum of 32 in. long. Wood posts will be 2-by-2-in. hardwood of sound quality. The maximum spacing between posts shall be 10 ft.
- Silt Fence Fabric: ODOT 712.09 Type C; Sediment Fences.

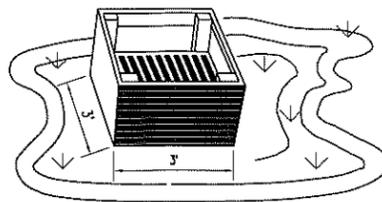


Specifications
for
Construction Entrance

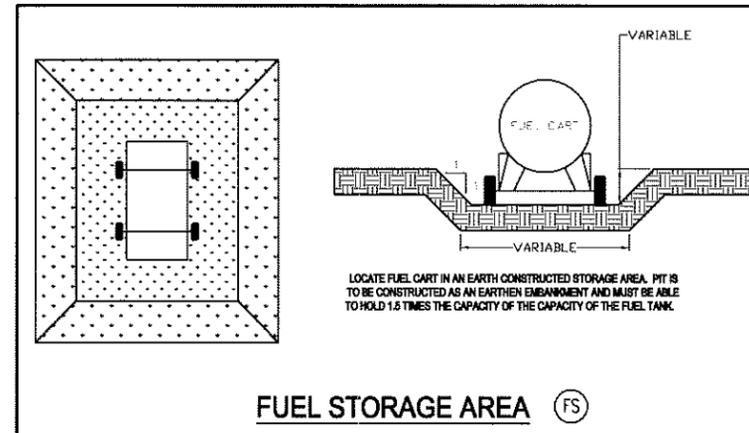
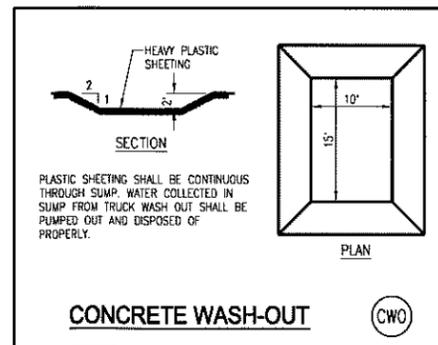
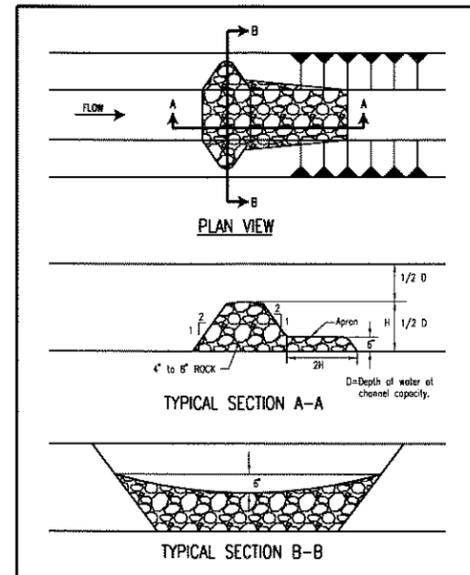


- Stone Size--Two-inch stone shall be used, or recycled concrete equivalent.
- Length--The construction entrance shall be as long as required to stabilize high traffic areas but not less than 50 ft. (except on single residence lot where a 30-ft. minimum length applies).
- Thickness--The stone layer shall be at least 6 in. thick.
- Width--The entrance shall be at least 10 ft. wide, but not less than the full width at points where ingress or egress occurs.
- Bedding--A geotextile shall be placed over the entire area prior to placing stone. It shall have a Grab Tensile Strength of at least 200 lb. and a Mullen Burst Strength of at least 190 lb.
- Culvert--A pipe or culvert shall be constructed under the entire entrance if needed to prevent surface water flowing across the entrance from being directed out onto paved surfaces.
- Water Bar--A water bar shall be constructed as part of the construction entrance if needed to prevent surface runoff from flowing the length of the construction entrance and out onto paved surfaces.
- Maintenance--Top dressing of additional stone shall be applied as conditions demand. Mud spilled, dropped, washed or tracked onto public roads, or any surface where runoff is not checked by sediment controls, shall be removed immediately. Removal shall be accomplished by scraping or sweeping.
- Construction entrances shall not be relied upon to remove mud from vehicles and prevent off-site tracking. Vehicles that enter and leave the construction site shall be restricted from muddy areas.

Silt Fence Box formed with 2"x4" posts, crossbracing & wire mesh with silt fence stapled to outside.



INLET FILTER DETAIL (IP)



EROSION CONTROL DETAILS



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BRISTOL TOWNSHIP
VOLUNTEER FIRE DEPARTMENT
STATION NO. 17

REVISIONS:

DRAWN BY: RBK
DATE: January 5, 2010
PROJECT NUMBER
09062

SHEET NUMBER
C6
SWPPP
Details

STORMWATER GENERAL NOTES

GENERAL EROSION AND SEDIMENT CONTROL NOTES:

EROSION CONTROL SHALL CONSIST OF TEMPORARY CONTROL MEASURES AS DETAILED ON THE PLANS OR ORDERED BY THE GOVERNING AGENCY DURING THE LIFE OF THE CONTRACT TO CONTROL SOIL EROSION AND SEDIMENTATION THROUGH USE OF EROSION CONTROL BEST MANAGEMENT PRACTICES (BMP'S).

TEMPORARY EROSION AND SEDIMENT CONTROL ITEMS, THE LOCATION AND SIZE OF WHICH ARE DETAILED ON THE PLANS, SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF ANY CLEARING OR EARTHWORK OPERATIONS. CONDITIONS THAT DEVELOP DURING CONSTRUCTION THAT WERE NOT FORESEEN DURING DESIGN STAGE; THAT REQUIRE ADDITIONAL OR MODIFIED TEMPORARY OR PERMANENT BMP'S SHALL BE APPROVED BY THE DESIGN ENGINEER AND REFLECTED ON THE REVISED STORM WATER POLLUTION PREVENTION PLAN (SWP3).

SEDIMENT PONDS, SEDIMENT TRAPS, AND PERIMETER SEDIMENT CONTROLS, SHALL BE IMPLEMENTED AS THE FIRST STEP OF GRADING AND WITHIN 7 DAYS FROM THE START OF GRUBBING. THEY SHALL CONTINUE TO FUNCTION UNTIL DISTURBED AREAS ARE RE-ESTABLISHED WITH TEMPORARY VEGETATION. NO SEDIMENT CONTROLS SHALL BE PLACED IN A STREAM.

TRENCH DEWATERING OR GROUND WATER, WHICH CONTAINS SEDIMENT SHALL PASS THROUGH A SEDIMENT SETTLING POND OR EQUALLY EFFECTIVE SEDIMENT CONTROL DEVICE. ALTERNATIVES MAY INCLUDE DEWATERING INTO SUMP PIT, FILTER BAG OR EXISTING VEGETATED UPSLOPE AREA. SEDIMENT LADEN WATER SHALL NOT BE DISCHARGED TO STREAMS OR THE STORM SEWER SYSTEM.

THE SWP3, NOTES AND DETAILED DRAWINGS ARE INTENDED TO SERVE AS BASIC GUIDELINES. ALL EROSION CONTROL PRACTICES SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE ODNR RAINWATER AND LAND DEVELOPMENT MANUAL.

ADDITIONAL EROSION CONTROL BMP'S MAY BE MANDATED BY THE GOVERNING AGENCY AT ANY TIME DURING THIS PROJECT AS UNFORESEEN SITUATIONS MAY ARISE THAT WARRANT FURTHER EROSION AND SEDIMENT CONTROL PRACTICES.

CLEARING AND GRUBBING

LIMITS OF CLEARING AND GRADING SHALL BE CLEARLY MARKED ON THE SITE WITH SIGNAGE, FLAGGING AND/OR CONSTRUCTION FENCING.

THE CONTRACTOR SHALL LIMIT THE SURFACE AREA OF ERODABLE EARTH MATERIAL EXPOSED BY EXCAVATION, BORROW, AND FILL OPERATIONS AND PROVIDE IMMEDIATE PERMANENT OR TEMPORARY CONTROL MEASURES TO PREVENT CONTAMINATION OF ADJACENT STREAMS OR OTHER WATER COURSES, LAKES, PONDS, WETLANDS OR OTHER AREAS OF WATER IMPOUNDMENT.

CONSTRUCTION ENTRANCE

A STONED CONSTRUCTION ENTRANCE SHALL BE INSTALLED FOR ALL INGRESS & EGRESS TO THE SITE. THE MINIMUM DIMENSIONS OF THE DRIVE SHALL BE 20 FT. WIDE AND 50 FT. LONG. THE STONE SHALL BE 6 INCHES DEEP WITH AN UNDERLAIN GEOTEXTILE FABRIC. THE DRIVE SHALL BE INSTALLED PRIOR TO ANY CLEARING AND GRUBBING. SEDIMENTS SHALL BE REMOVED FROM ROADWAYS DAILY.

STABILIZATION

PERMANENT AND TEMPORARY STABILIZATION ARE DEFINED IN PART VII OF THE OEPA AUTHORIZATION FOR FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.

OHIO EPA PERMIT NO. OHCD00003 EFFECTIVE DATE 4/21/08 - EXPIRATION DATE 4/20/13
DISTURBED AREAS MUST BE STABILIZED AS SPECIFIED IN THE FOLLOWING TABLES BELOW:

TABLE 1: PERMANENT STABILIZATION

AREA REQUIRING PERMANENT STABILIZATION	TIME FRAME TO APPLY EROSION CONTROL
ANY AREA THAT WILL LIE DORMANT FOR ONE YEAR OR MORE	WITHIN SEVEN DAYS OF THE MOST RECENT DISTURBANCE
ANY AREA WITHIN 50 FT. OF A STREAM AND AT FINAL GRADE	WITHIN TWO DAYS OF REACHING FINAL GRADE
ANY OTHER AREAS AT FINAL GRADE	WITHIN SEVEN DAYS OF REACHING FINAL GRADE WITHIN THAT AREA

TEMPORARY SEEDING

SEEDING AREAS SHALL BE INSPECTED AND WHERE THE SEED HAS NOT PRODUCED 80% COVER SHALL BE RESEED AS NECESSARY BY THE CONTRACTOR. AREAS SHALL BE STABILIZED WITH MULCH WHEN CONDITIONS PROHIBIT SEEDING.

STRAW MULCHING SHALL BE APPLIED AT A RATE 2-3 STANDARD 45 LB. BALES PER 1000 SQ.FT. OF DISTURBED AREA OR 2 TONS PER ACRE. ALL HYDROSEEDING MUST BE STRAW MULCHED ACCORDING TO THE ABOVE SPECIFICATIONS UNLESS IT IS WATERED WEEKLY.

ALL DETENTION PONDS, RETENTION PONDS, WATER QUALITY STRUCTURES, SEDIMENT PONDS, SEDIMENT TRAPS, EARTHEN DIVERSIONS OR EMBANKMENTS SHALL BE SEEDDED AND MULCHED WITHIN 7 DAYS OF COMPLETED CONSTRUCTION.

TABLE 2: TEMPORARY STABILIZATION

AREA REQUIRING TEMPORARY STABILIZATION	TIME FRAME TO APPLY EROSION CONTROL
ANY DISTURBED AREAS WITHIN 50 FT. OF A STREAM AND NOT AT FINAL GRADE	WITHIN TWO DAYS OF THE MOST RECENT DISTURBANCE IF THE AREA WILL REMAIN IDLE FOR MORE THAN 21 DAYS
FOR ALL CONSTRUCTION ACTIVITIES, ANY DISTURBED AREAS THAT WILL BE DORMANT FOR MORE THAN 21 DAYS BUT LESS THAN ONE YEAR, AND NOT WITHIN 50 FT. OF STREAM	WITHIN SEVEN DAYS OF THE MOST RECENT DISTURBANCE WITHIN THE AREA FOR RESIDENTIAL SUBDIVISIONS, DISTURBED AREAS MUST BE STABILIZED AT LEAST SEVEN DAYS PRIOR TO TRANSFER OF PERMIT COVERAGE FOR THE INDIVIDUAL LOT(S)
DISTURBED AREAS THAT WILL BE IDLE OVER WINTER	PRIOR TO ONSET OF WINTER WEATHER (NOV.1) STRAW MULCH 2 TO 3 BALES PER 1000 SQ.FT. AND OR 2 TONS PER ACRE.

PERMANENT STABILIZATION OF CONVEYANCE CHANNELS

OPERATORS SHALL UNDERTAKE SPECIAL MEASURES TO STABILIZE CHANNELS AND OUTFALLS AND PREVENT EROSION FLOWS. MEASURES MAY INCLUDE SEEDING, DORMANT SEEDING (AS DEFINED IN THE LATEST EDITION OF ODNR RAINWATER AND LAND DEVELOPMENT MANUAL), MULCHING, EROSION CONTROL MATTING, SODDING, RIPRAP NATURAL CHANNEL DESIGN WITH BIO ENGINEERING TECHNIQUES OR ROCK CHECK DAMS.

TIMING

SEDIMENT CONTROL STRUCTURES SHALL BE FUNCTIONAL THROUGHOUT THE COURSE OF EARTH DISTURBING ACTIVITY. SEDIMENT BASINS AND PERIMETER SEDIMENT BARRIERS SHALL BE IMPLEMENTED PRIOR TO GRADING AND WITHIN SEVEN DAYS FROM THE START OF GRUBBING. THEY SHALL CONTINUE TO FUNCTION UNTIL THE SLOPE DEVELOPMENT AREA IS PERMANENTLY RESTABILIZED. AS CONSTRUCTION PROGRESSES AND THE TOPOGRAPHY IS ALTERED, APPROPRIATE CONTROLS MUST BE CONSTRUCTED TO ADDRESS THE CHANGING DRAINAGE PATTERNS.

SILT FENCE & DIVERSIONS

SHEET FLOW RUNOFF FROM DENUDDED AREAS SHALL BE INTERCEPTED BY SILT FENCE OR DIVERSIONS TO PROTECT ADJACENT PROPERTIES AND WATER RESOURCES FROM SEDIMENT TRANSPORTED VIA SHEET FLOW. WHERE INTENDED TO PROVIDE SEDIMENT CONTROL, SILT FENCES SHALL BE PLACED ON A LEVEL CONTOUR. THE EPA PERMIT NO. OHCD00003 DOES NOT PRECLUDE THE USE OF OTHER SEDIMENT BARRIERS DESIGNED TO CONTROL SHEET FLOW RUNOFF. SILT FENCE IS NOT PERMITTED TO BE USED FOR CONTROLLING CONCENTRATED SURFACEWATER FLOW (ONLY SHEET FLOW).

STORMWATER DIVERSION PRACTICES SHALL BE USED TO KEEP RUNOFF AWAY FROM DISTURBED AREAS AND STEEP SLOPES WHERE PRACTICAL. SUCH DEVICES, WHICH INCLUDE SWALES, DIKES OR BERMS, MAY RECEIVE FROM AREAS UP TO 10 ACRES.

INLET PROTECTION

OTHER EROSION AND SEDIMENT CONTROL PRACTICES SHALL MINIMIZE SEDIMENT LADEN WATER ENTERING ACTIVE STORM DRAIN SYSTEMS, UNLESS THE STORM DRAIN SYSTEM DRAINS TO A SEDIMENT POND. INLET PROTECTION IS MANDATORY WHERE SEDIMENT SETTLING PONDS WILL NOT BE IMPLEMENTED.

NON-SEDIMENT POLLUTANTS CONTROLS

NO SOLID (OTHER THAN SEDIMENT) OR LIQUID WASTE, INCLUDING BUILDING MATERIALS, SHALL BE DISCHARGED IN STORMWATER RUNOFF. ALL NECESSARY BMP'S MUST BE IMPLEMENTED TO PREVENT THE DISCHARGE OF NON-SEDIMENT POLLUTANTS TO THE DRAINAGE SYSTEM OF THE SITE OR SURFACE WATERS OF THE STATE. UNDER NO CIRCUMSTANCE SHALL CONCRETE TRUCKS WASH OUT DIRECTLY INTO A DRAINAGE CHANNEL, STORM SEWER OR SURFACE WATERS OF THE STATE. NO EXPOSURE OF STORMWATER TO WASTE MATERIALS IS RECOMMENDED.

OFF-SITE TRAFFIC

OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND DUST GENERATION SHALL BE MINIMIZED.

TRENCH AND GROUND WATER CONTROL

THERE SHALL BE NO TURBID DISCHARGES TO SURFACE WATERS OF THE STATE RESULTING FROM DEWATERING ACTIVITIES. IF TRENCH OR GROUND WATERS CONTAIN SEDIMENT, IT MUST PASS THROUGH A SEDIMENT SETTLING POND OR OTHER EQUALLY EFFECTIVE SEDIMENT CONTROL DEVICE, PRIOR TO BEING DISCHARGED FROM THE CONSTRUCTION SITE. ALTERNATIVELY, SEDIMENT MAY BE REMOVED BY SETTLING IN PLACE OR DEWATERING INTO A SUMP PIT, FILTER BAG OR COMPARABLE PRACTICE. GROUND WATER DEWATERING WHICH DOES NOT CONTAIN SEDIMENT OR OTHER POLLUTANTS IS NOT REQUIRED TO BE TREATED PRIOR TO DISCHARGE, HOWEVER, CARE MUST BE TAKEN WHEN DISCHARGING GROUND WATER TO ENSURE THAT IT DOES NOT BECOME POLLUTANT-LADEN BY TRAVERSING OVER DISTURBED SOILS OR OTHER POLLUTANT SOURCES.

MAINTENANCE

ALL TEMPORARY AND PERMANENT CONTROL PRACTICES SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ENSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL SEDIMENT CONTROL PRACTICES MUST BE MAINTAINED IN A FUNCTIONAL CONDITION UNTIL ALL UP SLOPE AREAS THEY CONTROL ARE PERMANENTLY STABILIZED. THE CONTRACTOR SHALL COMPLY WITH THE MAINTENANCE SCHEDULE INCLUDED IN THE APPROVED PLANS FOR THE PROPOSED EROSION CONTROLS. A WRITTEN DOCUMENT CONTAINING THE SIGNATURES OF ALL CONTRACTORS AND SUB-CONTRACTORS INVOLVED IN THE IMPLEMENTATION OF THE BMP'S MUST BE MAINTAINED AS PROOF ACKNOWLEDGING THAT THEY REVIEWED AND UNDERSTAND THE CONDITIONS AND RESPONSIBILITIES OF THE SWP3.

INSPECTION

ALL STORMWATER CONTROLS ON THE SITE ARE INSPECTED AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN ONE-HALF INCH OF RAIN PER 24 HOUR PERIOD. A WRITTEN RECORD DOCUMENTATION THE RESULTS OF THESE INSPECTIONS MUST BE CREATED AND MAINTAINED WITH THE SWP3. DISTURBED AREAS AND AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION SHALL BE INSPECTED FOR EVIDENCE OF OR THE POTENTIAL FOR POLLUTANTS ENTERING THE EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED IN THE SWP3 SHALL BE OBSERVED TO ENSURE THAT THOSE ARE OPERATING CORRECTLY. DISCHARGE LOCATIONS SHALL BE INSPECTED TO ASCERTAIN WHETHER EROSION AND SEDIMENT CONTROL MEASURES ARE EFFECTIVE IN PREVENTING SIGNIFICANT IMPACTS TO THE RECEIVING WATERS. LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE SHALL BE INSPECTED FOR EVIDENCE OF OFF-SITE VEHICLE TRACKING.

I. WHEN PRACTICES REQUIRE REPAIR OR MAINTENANCE.

IF THE INSPECTION REVEALS THAT A CONTROL PRACTICE IS IN NEED OF REPAIR OR MAINTENANCE, WITH EXCEPTION OF A SEDIMENT SETTLING POND, IT MUST BE REPAIRED OR MAINTAINED WITHIN THREE DAYS OF INSPECTION. SEDIMENT SETTLING PONDS MUST BE REPAIRED OR MAINTAINED WITHIN 10 DAYS OF THE INSPECTION.

II. WHEN PRACTICES FAIL TO PROVIDE THEIR INTENDED FUNCTION.

IF THE INSPECTION REVEALS THAT A CONTROL PRACTICE FAILS TO PERFORM ITS INTENDED FUNCTION AND THAT ANOTHER, MORE APPROPRIATE CONTROL PRACTICE IS REQUIRED, THE SWP3 MUST BE AMENDED AND THE NEW CONTROL PRACTICE MUST BE INSTALLED WITHIN 10 DAYS OF INSPECTION.

III. WHEN PRACTICES DEPICTED ON THE SWP3 ARE NOT INSTALLED.

IF THE INSPECTION REVEALS THAT A CONTROL PRACTICE HAS NOT BEEN IMPLEMENTED IN ACCORDANCE WITH THE SWP3, THE SWP3 MUST BE AMENDED AND THE NEW CONTROL PRACTICE MUST BE INSTALLED WITHIN 10 DAYS OF THE INSPECTION. IF THE INSPECTION REVEALS THAT THE PLANNED CONTROL PRACTICE IS NOT NEEDED, THE RECORD MUST CONTAIN A STATEMENT OF EXPLANATION AS TO WHY THE CONTROL PRACTICE IS NOT NEEDED.

WASTE DISPOSAL

CONTAINERS (e.g., DUMPSTERS, DRUMS) SHALL BE AVAILABLE FOR DISPOSAL OF DEBRIS, TRASH, HAZARDOUS OR PETROLEUM WASTES. ALL CONTAINERS MUST BE COVERED AND LEAK-PROOF. ALL WASTE MATERIAL SHALL BE DISPOSED OF AT FACILITIES APPROVED FOR THE PERTINENT MATERIAL.

CLEAN HARD FILL

BRICKS, HARDENING CONCRETE, AND SOIL WASTE SHALL BE FREE FROM CONTAMINATION WHICH MAY LEACH CONSTITUENTS TO WATERS OF THE STATE.

CLEAN CONSTRUCTION WASTES THAT WILL BE DISPOSED INTO THE PROPERTY, SHALL BE SUBJECT TO ANY LOCAL PROHIBITIONS FROM THIS TYPE OF DISPOSAL.

CONSTRUCTION & DEMOLITION DEBRIS

ALL CONSTRUCTION & DEMOLITION DEBRIS (C&DD) WASTE SHALL BE DISPOSED OF IN AN OHIO EPA APPROVED C&DD LANDFILL AS REQUIRED BY OHIO REVISED CODE (ORC) 3714. CONSTRUCTION DEBRIS MAY BE DISPOSED OF ON-SITE, BUT DEMOLITION DEBRIS MUST BE DISPOSED IN A OHIO EPA APPROVED LANDFILL. ALSO, MATERIALS WHICH CONTAIN ASBESTOS MUST COMPLY WITH AIR POLLUTION REGULATIONS (SEE OHIO ADMINISTRATIVE CODE (OAC) 3745-20).

CONSTRUCTION CHEMICAL COMPOUNDS

AREA SHALL BE DESIGNATED FOR MIXING OR STORAGE OF COMPOUNDS SUCH AS FERTILIZERS, LIME ASPHALT, OR CONCRETE. THESE DESIGNATED AREAS SHALL BE LOCATED AWAY FROM WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORMWATER DRAINAGE AREA.

EQUIPMENT FUELING & MAINTENANCE

EQUIPMENT FUELING & MAINTENANCE SHALL BE IN DESIGNATED AREAS ONLY.

A SPILL PREVENTION CONTROL AND COUNTERMEASURES

A SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) PLAN MUST BE DEVELOPED FOR SITES WITH ONE ABOVE-GROUND STORAGE TANK OF 660 GALLONS OR MORE, TOTAL ABOVE-GROUND STORAGE OF 1,330 GALLONS, OR BELOW-GROUND STORAGE OF 4,200 GALLONS OF FUEL.

CONCRETE WASH WATER

ALL DESIGNATED CONCRETE WASHOUT AREAS SHALL BE LOCATED AWAY FROM WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORMWATER DRAINAGE AREAS.

CONTAMINATED SOILS

ALL CONTAMINATED SOIL MUST BE TREATED AND/OR DISPOSED IN OHIO EPA APPROVED SOLID WASTE MANAGEMENT FACILITIES OR HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITIES (TSDFs).

SPILL REPORTING REQUIREMENTS

THE CONTRACTOR SHALL CONTACT THE OHIO EPA AT 800-283-9378, THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE IN THE EVENT OF A PETROLEUM SPILL (>25 GALLONS) OR THE PRESENCE OF SHEEN.

OPEN BURNING

OPEN BURNING IS NOT PERMITTED.

DUST CONTROLS/SUPPRESSANTS

USED OIL MAY NOT BE USED AS A DUST SUPPRESSANT. NO DUST SUPPRESSANT SHALL BE APPLIED NEAR CATCH BASINS, STORM SEWERS OR OTHER DRAINAGE WAYS.

STREAM CROSSINGS

STREAM CROSSINGS SHALL BE CONSTRUCTED ENTIRELY OF STONE, ROCK, OR CLEAN RECYCLED CONCRETE. SOIL OR EARTHEN MATERIAL MAY NOT BE USED. A 20 FT. STONE APRON ON EITHER SIDE OF THE STREAM SHALL BE CONSTRUCTED TO PREVENT LOCALIZED SEDIMENTATION. ALL DISTURBED AREAS OF THE BANK WITHIN 50 FT. OF THE STREAM SHALL BE STABILIZED WITH SEED AND MULCH WITHIN 2 DAYS OF THE DISTURBANCE.

PERMITS

THIS SITE IS COVERED UNDER OHIO EPA CONSTRUCTION GENERAL PERMIT # Submitted to O.E.P.A. 12/29/09

THIS SITE IS COVERED UNDER OHIO EPA / ARMY 401/404 PERMIT # N/A



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BRISTOL TOWNSHIP
VOLUNTEER FIRE DEPARTMENT
STATION NO. 17

REVISIONS:

DRAWN BY: **RK**

DATE: **January 5, 2010**

PROJECT NUMBER
09062

SHEET NUMBER

C7

Storm Water
General Notes

STORM WATER CALCULATIONS

**BRISTOL TOWNSHIP
VOLUNTEER FIRE DEPARTMENT**

STATION NO. 17

**STATE ROUTE 88
BRISTOL TOWNSHIP
TRUMBULL COUNTY, OHIO 44402**

DECEMBER 2009

prepared by

LYNN, KITTINGER & NOBLE, INC.
Consulting Engineers and Surveyors



2900 Elm Road, NE
Warren, Ohio 44483-2606

Phone: [330]373-1244
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NARRATIVE

PROJECT DESCRIPTION

The subject property is located approximately 0.35 miles west of State Route 45 on the north side of State Route 88, in Bristol Township, Ohio. This project consists of constructing a new 11,349 sq.ft. Fire Station along with associated parking and drives. A pond will also be constructed on the west side of the fire station to be used for water storage for fire trucks and the building's sprinkler system.

EXISTING CONDITIONS

The site is currently used for agriculture with corn typically being planted yearly. The site slopes generally east to west, southwest at approximately 1% to 1.5%. Most of the site's runoff subsequently drains into a ditch that runs along the north side of State Route 88.

PROPOSED CONDITIONS

The construction of the Fire Station, pavement and walks will create additional impervious area which will increase the volume and rate of runoff from the site. The proposed water storage pond will also be utilized for storm water detention and storm water quality. The developed site storm water runoff will be routed to this pond and discharge through the pond outlet structure to the drainage ditch along the north side of State Route 88. The Critical Storm was calculated to be the 2-year storm. The storm water management system has been designed to detain runoff from a post-developed 2-year storm and release it at a rate not exceeding the pre-developed 2-year storm. Post-developed runoff rates from the 5-year up to and including the 100-year storm will be released at rates not exceeding the pre-developed runoff rates from the same storms.

CALCULATION SUMMARY

Storm Event	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Developed Storm Water Runoff (c.f.s.)	8.33	9.95	11.63	14.86	15.62	17.40
Developed Peak Storm Water Runoff (c.f.s.)	Out of Pond = 1.01 Direct Runoff = 0.87 Total Runoff = 1.88	Out of Pond = 1.31 Direct Runoff = 1.03 Total Runoff = 2.34	Out of Pond = 1.62 Direct Runoff = 1.20 Total Runoff = 2.82	Out of Pond = 2.30 Direct Runoff = 1.54 Total Runoff = 2.84	Out of Pond = 2.45 Direct Runoff = 1.62 Total Runoff = 4.07	Out of Pond = 2.79 Direct Runoff = 1.80 Total Runoff = 4.59
Max. Elev. In Pond	882.68	882.74	882.79	882.89	882.92	882.97

Miscellaneous Drainage Calculations

Bristol Township Volunteer Fire Department - Station No. 17
 Bristol Township - Trumbull County, Ohio
Critical Storm Calculation

Pre-Developed Condition

A = 3.35 Ac. (145,875 sq.ft.) L_o = 620 ft. S_o = 1.1% C = 0.75 (Cultivated Land)

From Overland Flow Chart T_c = 13 min.

i₂ = 2.84 in./hr.

Pre-Developed Runoff Rate Q = C x I x A, Q₁ = 0.75 x 2.84 x 3.35 = 7.14 c.f.s.

Pre-Developed Volume of Runoff:

Total Rainfall = 13 min. x 1 hr./60 min. x 2.84 in./hr. = 0.62 in.

Total Runoff = 0.75 x 0.62 in. = 0.47 in.

Volume of Runoff = 145,875 sq.ft. X 0.47 in./12 = 5,713 cu.ft.

Developed Condition

A = 3.35 Ac. (145,875 sq.ft.) L_o = 320 ft. S_o = 1.4% C = 0.78

C_{AVG.}:

<u>Desc.</u>	<u>C</u>	<u>A (Acres)</u>	<u>CxA</u>
Grass/Landscaping	0.5	1.21	0.6050
Building/Pavement/Walk	0.94	2.14	<u>2.0116</u>
			2.6166

C_{AVG.} = 2.6166/3.35 = 0.78

T_c = 15 min.

i₂ = 2.72 in./hr.

Developed Runoff Rate Q = C x I x A, Q₂ = 0.78 x 2.72 x 3.35 = 7.12 c.f.s.

Developed Volume of Runoff:

Total Rainfall = 15 min. x 1 hr./60 min. x 2.72 in./hr. = 0.68 in.

Total Runoff = 0.78 x 0.68 in. = 0.53 in.

Volume of Runoff = 145,875 sq.ft. X 0.53 in./12 = 6,443 cu.ft.

Percent Increase in Volume

% increase = (6,443 - 5,713) / 5,713 = 0.13 = **13%**

24 Hour Critical Storm is 2 yr. Storm

Bristol Township Volunteer Fire Department - Station No. 17
 Bristol Township - Trumbull County, Ohio

Storm Water Quality

Water Quality Volume

Total Site Drainage Area = 3.35 Ac.

Pre-Developed C = 0.75 (Cultivated Land)

Developed C:	<u>Description</u>	<u>C</u>	<u>Area (Ac.)</u>	<u>C x Area</u>
	Grass/Landscaping	0.5	1.21	0.6050
	Pavement/Roof/Walks	0.94	2.14	<u>2.0116</u>
				2.6166

Developed C = 2.6166/3.35 = 0.78

$$\begin{aligned}
 WQ_v &= P \times C \times A/12 \\
 &= 0.75 \times 0.78 \times 3.35/12 = 0.163 \text{ Ac-Ft} \\
 &= 7,100 \text{ Cu.Ft.} \\
 &\quad + 1,420 \text{ Cu.Ft. (20\% Sediment Storage)} \\
 &= 8,520 \text{ Cu.Ft.}
 \end{aligned}$$

Detention Area Draw Down

$$8,520 \text{ ft}^3 / (24 \text{ hrs})(60 \text{ min/hr})(60 \text{ sec/min}) = 0.0986 \text{ cfs}$$

$$Q = c \times A (2gh)^{1/2}$$

$$A = Q / (c)(2gh)^{1/2}$$

$$A = (0.0986) / (.6)[(2)(32.2)(0.39)]^{1/2}$$

$$A = 0.0328 \text{ s.f.} = 4.72 \text{ in.}^2$$

$$A = \pi d^2 / 4$$

$$d = [(4)(A)/\pi]^{1/2} = [(4)(4.72 \text{ in.}^2)/\pi]^{1/2} = 2.45 \text{ in. Use 2 3/8" dia. hole}$$

STORM SEWER COMPUTATION SHEET

Calculated By **RTK** Date **11/22/09**
 Checked By **RTK** Date **11/22/09**
 Mannings "n" **0.017** **SITE** **STARK SEWER**
 Mannings "n" **0.015** **S.K. STARK SEWER**

Just Full Capacity **10**
 Hydraulic Gradient **Z5**
 Yr. Frequency **1**
 Yr. Frequency **1**

Project **FREE STORM No. 17**
 Sheet **1** of **1**
Beavertown Township

No.	M.H. C.B. or Inlet	Station	Side	Drainage Area In Acres	Time of Concentration In Min.	Rainfall In Inches/hour	Runoff Coef.	Column 7 X Column 4	Discharge in cfs (Col.6 x Col.8)	Size of Pipe Inches	Length of Pipe Feet	Slope of Pipe Ft./Ft.	Inlet F/L of Pipe	Outlet F/L of Pipe	Mean Velocity Ft./Sec.	Just Full Cap. (10 Year Q) cfs	Frict. Slope Ft./Ft.	Head Losses Feet	Elevation of Hydr. Gradient (25 Year Q)	Grate or Cover Elev.	Remarks:
1				0.46	10	4.51	0.82	0.38	1.73	12	92	0.0050	883.00	882.54	3.83	2.73	0.0050	0.48	883.51	885.1	
2				0.26	11	4.51	0.82	0.24	2.71	15	45	0.0030	882.54	882.54	3.51	3.83	0.0030	0.14	883.03	885.75	Z5 Year Flow Elev.
3				1.12	15	4.16	0.5	0.56	2.17	15	80	0.0030	883.07	882.83	3.83	3.83	0.0030	0.24	883.87	885.5	
4				0.48	15	4.16	0.88	0.42	3.72	15	138	0.0030	882.83	882.42	4.58	3.83	0.0043	0.59	883.43	885.4	
5				0.16	16	4.51	0.90	0.14	4.18	15	40	0.0038	882.42	882.25	4.17	4.31	0.0054	0.15	883.04	885.6	Z5 Year Flow Elev.
6				0.14	10	4.51	0.7	0.10	4.87	15	90	0.0050	882.60	882.15	3.33	3.96	0.0050	0.45	883.28	885.5	Z5 Year Flow Elev.
		HEADWALL		0.46	10	4.51	0.7	0.32	1.46	15	120	0.0075	883.50	882.60	3.64	4.85	0.0075	0.90	884.18	-	

OVERLAND FLOW CHART

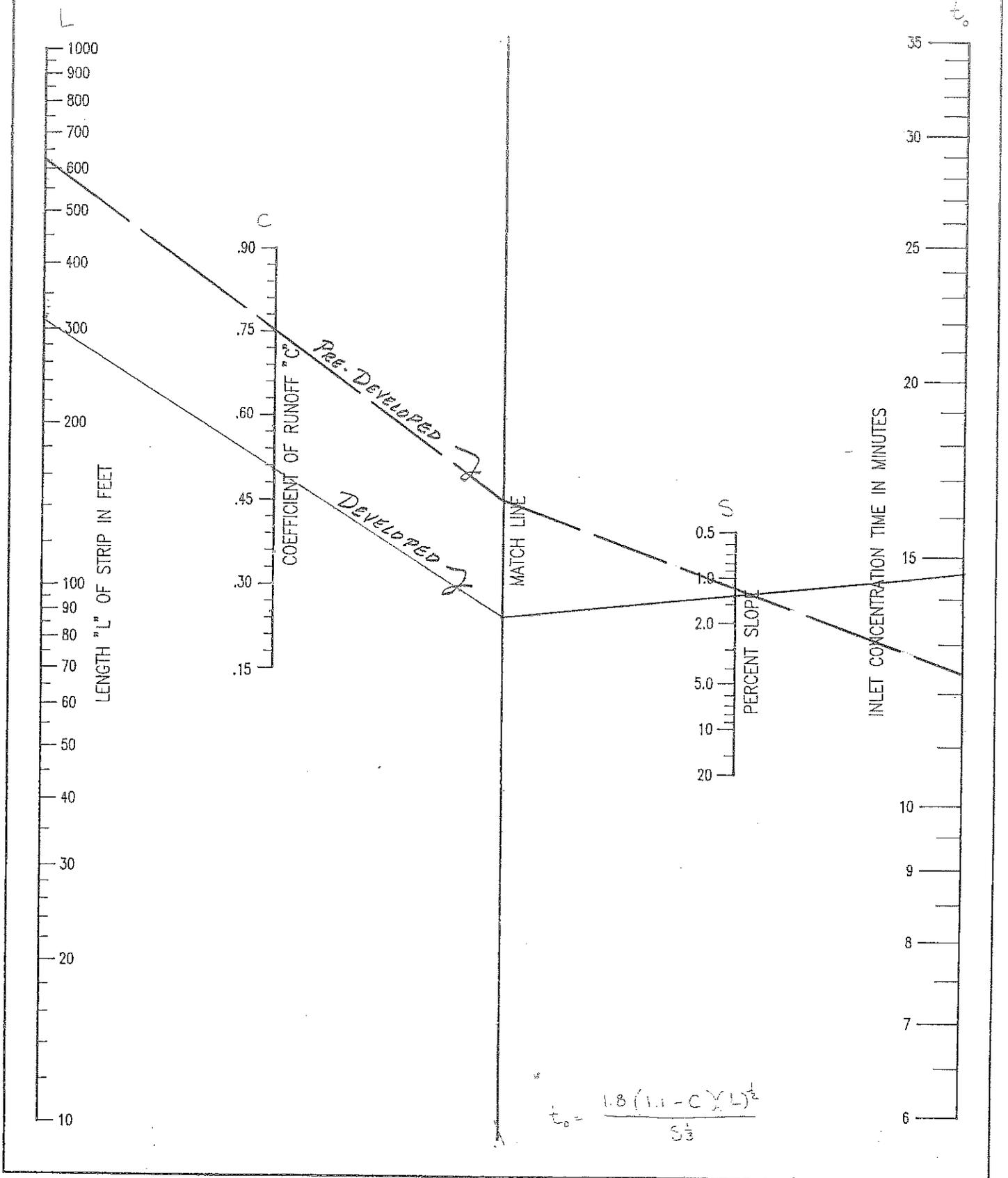


Figure 3. Work sheet for calculating time of concentration.

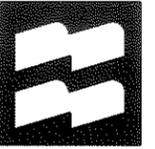
Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-----	-----	5.94	-----	7.10	8.30	10.60	11.14	12.41	Pre-Developed to S.R. 88 Ditch
2	Rational	-----	-----	8.33	-----	9.95	11.63	14.86	15.62	17.40	Pre-Developed Runoff - Total Site
3	Rational	-----	-----	8.67	-----	10.35	12.10	15.45	16.24	18.09	Developed
4	Reservoir	3	-----	1.01	-----	1.31	1.62	2.30	2.45	2.79	Pond
5	Rational	-----	-----	0.87	-----	1.03	1.20	1.54	1.62	1.80	Post-Developed Direct Runoff to S.R

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	5.94	1	13	4,637	---	-----	-----	Pre-Developed to S.R. 88 Ditch
2	Rational	8.33	1	13	6,499	---	-----	-----	Pre-Developed Runoff - Total Site
3	Rational	8.67	1	13	6,759	---	-----	-----	Developed
4	Reservoir	1.01	1	24	6,749	3	882.68	122,988	Pond
5	Rational	0.87	1	10	520	---	-----	-----	Post-Developed Direct Runoff to S.R
Bristol Twp. Fire Station No. 17.gpw					Return Period: 2 Year		Friday, Dec 18 2009, 2:10 PM		

Drainage Areas



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BRISTOL TOWNSHIP
 VOLUNTEER FIRE DEPARTMENT
 STATION NO. 17

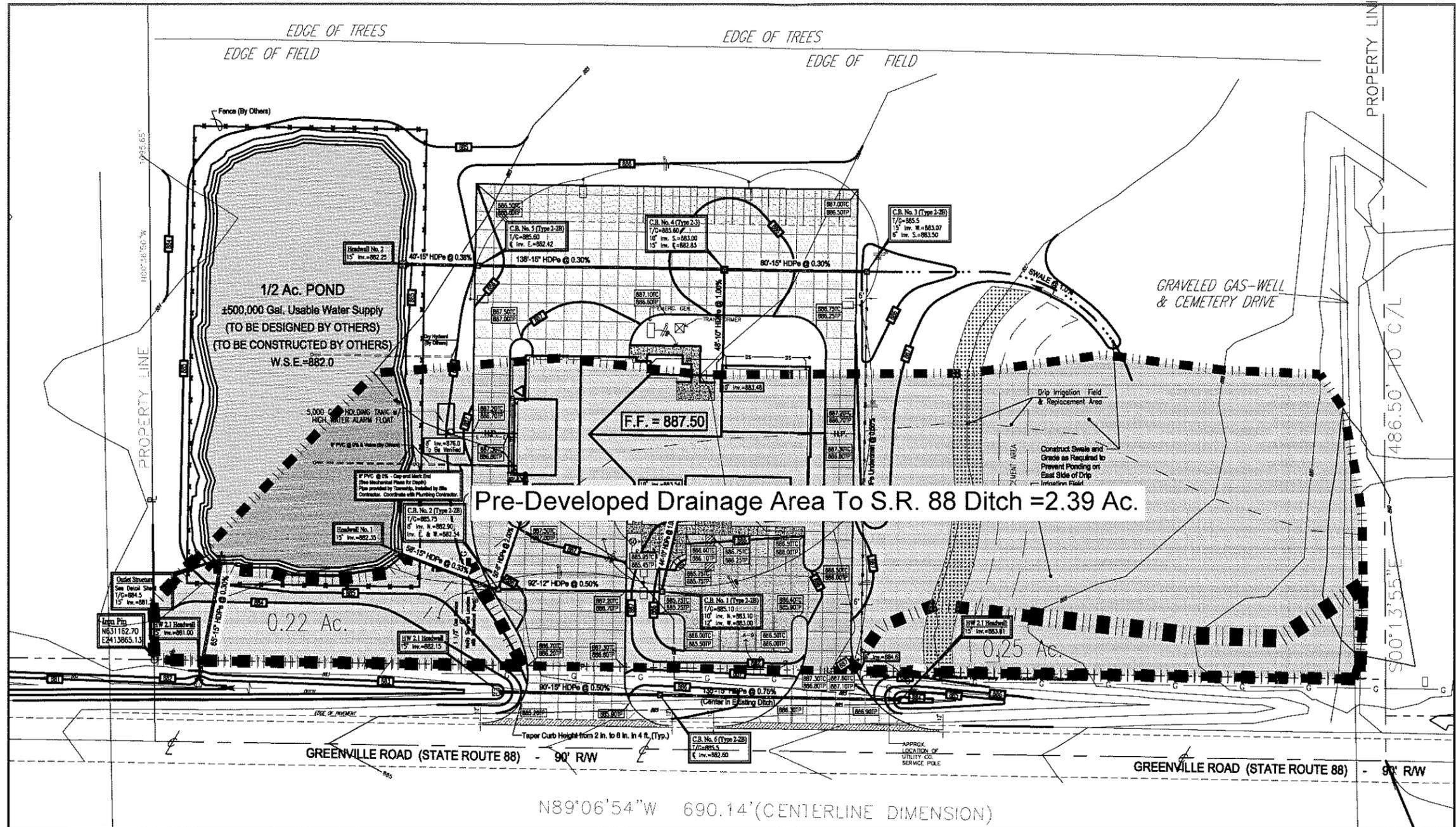
REVISIONS:

DRAWN BY: RJK

DATE:

PROJECT NUMBER: 08062

SHEET NUMBER: D1
 Pre-Developed Drainage Area
 To S.R. 88 Ditch

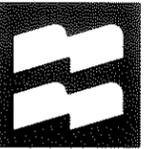


LEGEND

- | | | | |
|-------|----------------------------|----------|-------------------------|
| —●— | Iron Pin Found | ⊙ MH | Manhole |
| — | Swale/Ditch | □ | Catch Basin/Inlet |
| — | Toe or Top | ⊙ FH | Fire Hydrant |
| —W— | Water Mains | ⊙ W.V. | Water Valve |
| —E— | Aerial Electric | ⊙ G.V. | Gas Valve |
| —G— | Gas Mains | ⊙ | Light Pole |
| —T— | Telephone Lines | ⊙ | Tele. Pole |
| —E/T— | Electric & Telephone Lines | ⊙ | Power Pole |
| —X— | Fence | ⊙ | Service Pole |
| —S— | Sanitary Sewer | ⊙ | Pole @ Anchor |
| —ST— | Existing Storm Drain | ~ 1170 ~ | Existing Contour |
| TC | Top of Curb | — | Proposed Contour |
| NG | Normal Cutter | — | Slope Line |
| TP | Top of Pavement | — | Proposed Spot Elevation |
| HP | High Point | | |

Pre-Developed Drainage Area To S.R. 88 Ditch





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BRISTOL TOWNSHIP
 VOLUNTEER FIRE DEPARTMENT
 STATION NO. 17

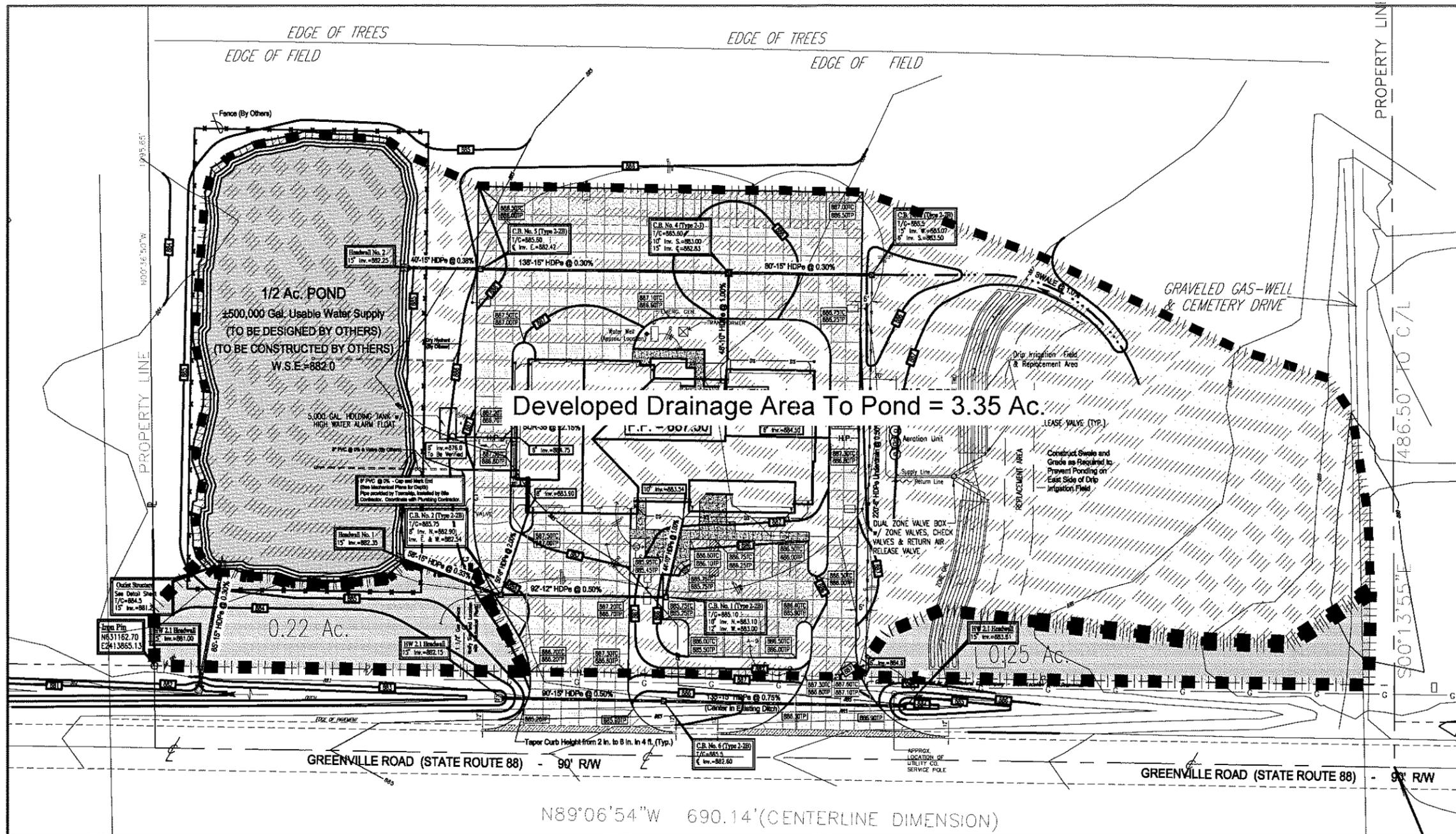
REVISIONS:

DRAWN BY: RJK

DATE:

PROJECT NUMBER: 08062

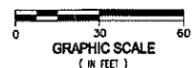
SHEET NUMBER: D2
 Developed Drainage Area To Pond



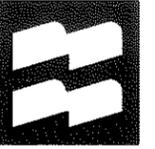
LEGEND

- | | | | |
|-------|----------------------------|--------------------------|-------------------------|
| —●— | Iron Pin Found | ⊙ M.H. | Manhole |
| — | Swale/Ditch | □ | Catch Basin/Inlet |
| — | Toe or Top | ⊕ | Fire Hydrant |
| —W— | Water Mains | ⊕ W.V. | Water Valve |
| —E— | Aerial Electric | ⊕ G.V. | Gas Valve |
| —G— | Gas Mains | ⊕ | Light Pole |
| —T— | Telephone Lines | ⊕ | Tele. Pole |
| —E/T— | Electric & Telephone Lines | ⊕ | Power Pole |
| —X— | Fence | ⊕ | Service Pole |
| —S— | Sanitary Sewer | ⊕ | Pole w/ Anchor |
| —SI— | Existing Storm Drain | — 1170 — | Existing Contour |
| TC | Top of Curb | — 1170 — | Proposed Contour |
| NC | Normal Gutter | ▲ | Slope Line |
| TP | Top of Pavement | — TC 100.5
NC 100.0 — | Proposed Spot Elevation |
| HP | High Point | | |

Developed Drainage Area To Pond



DRAINAGE AREAS



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BRISTOL TOWNSHIP
 VOLUNTEER FIRE DEPARTMENT
 STATION NO. 17

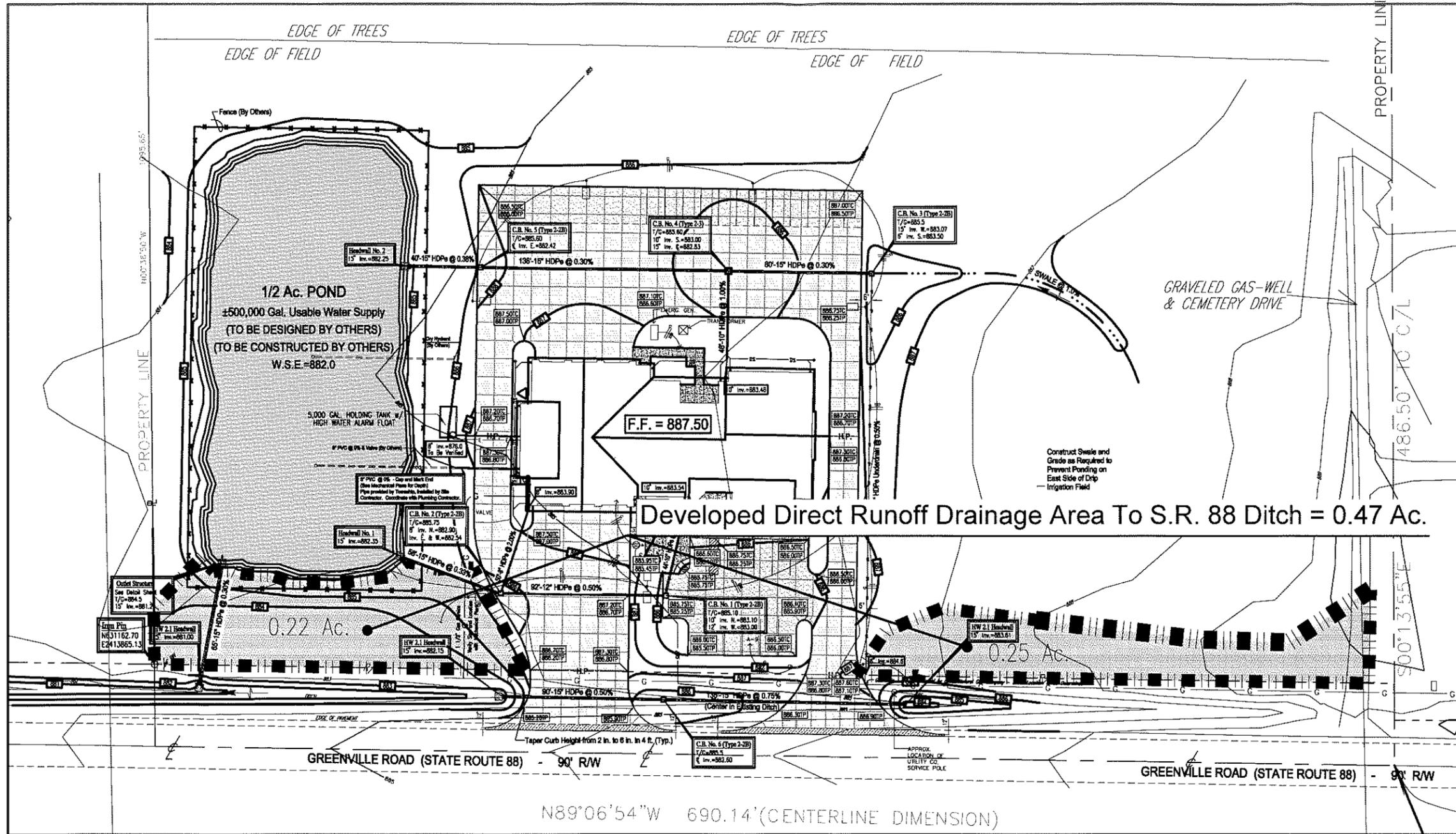
REVISIONS:

DRAWN BY: RJK

DATE:

PROJECT NUMBER: 08062

SHEET NUMBER: D3
 Drainage Area - Direct Runoff



Developed Direct Runoff Drainage Area To S.R. 88 Ditch = 0.47 Ac.

LEGEND

- | | |
|------------------------------------|---------------------------------|
| —●— Iron Pin Found | ⊙ M.H. Manhole |
| — Swale/Ditch | □ Catch Basin/Inlet |
| — Toe or Top | ⊕ F.H. Fire Hydrant |
| — W — Water Mains | ⊙ W.V. Water Valve |
| — E — Aerial Electric | ⊙ G.V. Gas Valve |
| — G — Gas Mains | ⊙ L.P. Light Pole |
| — T — Telephone Lines | ⊕ T.P. Tele. Pole |
| — E/T — Electric & Telephone Lines | ⊕ P.P. Power Pole |
| — X — Fence | ⊕ S.P. Service Pole |
| — S — Sanitary Sewer | ⊕ P.A. Pole w/ Anchor |
| — ST — Existing Storm Drain | — 1170 — Existing Contour |
| TC Top of Curb | — 1170 — Proposed Contour |
| NG Normal Curb | — Slope Line |
| TP Top of Pavement | ⊕ 100.5 Proposed Spot Elevation |
| HP High Point | ⊕ 100.0 Proposed Spot Elevation |

Drainage Areas - Direct Runoff

