GENERAL NOTES

- 1. ALL ELEVATIONS ARE BASED ON USGS DATUM
- 2. SPECIAL CARE SHALL BE TAKEN IN EXCAVATING IN THE PROXIMITY OF ALL UNDERGROUND UTILITIES. THE CONTRACTOR SHALL SECURE ASSISTANCE FROM THE APPROPRIATE UTILITY COMPANY IN LOCATING ITS LINES. THE CONTRACTOR SHALL ALSO: PROVIDE SUPPORT FOR ANY UTILITY WITHIN THE EXCAVATION, PROVIDE PROPER COMPACTION UNDER ANY UNDERMINED UTILITY STRUCTURE AND, IF NECESSARY, INSTALL TEMPORARY SHEETING OR USE A TRENCH BOX TO MINIMIZE THE EXCAVATION. THE CONTRACTOR SHALL PROTECT AND SAVE HARMLESS FROM DAMAGE ALL UTILITIES, WHETHER PRIVATELY OR PUBLICLY OWNED. ABOVE OR BELOW GROUND SURFACE, WHICH MAY BE ENCOUNTERED DURING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.
- 3. EXISTING PUBLIC UTILITIES AND UNDERGROUND STRUCTURES SUCH AS PIPE LINES, ELECTRIC CONDUITS, SEWERS AND WATER LINES, ARE SHOWN ON THE PLANS. THE INFORMATION SHOWN IS BELIEVED TO BE REASONABLY CORRECT AND COMPLETE. HOWEVER, NEITHER THE CORRECTNESS NOR THE COMPLETENESS OF SUCH INFORMATION IS GUARANTEED. PRIOR TO THE START OF ANY OPERATIONS IN THE VICINITY OF ANY UTILITIES, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES AND MISS DIG AND REQUEST THAT THEY STAKE OUT THE LOCATIONS OF THE UTILITIES IN QUESTION. COST OF REPAIR FOR ANY DAMAGED UTILITY LINES THAT IS PROPERLY STAKED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- 4. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS AND REGULATIONS GOVERNING THE FURNISHING AND USE OF SAFEGUARDS, SAFETY DEVICES AND PROTECTION EQUIPMENT. THE CONTRACTOR SHALL TAKE ANY NECESSARY PRECAUTIONS TO PROTECT THE LIFE AND HEALTH OF EMPLOYEES AND THE PUBLIC IN THE PERFORMANCE OF THE WORK.
- 5. ALL DISTURBED AREAS SHALL BE TOPSOILED, SEEDED, FERTILIZED AND MULCHED. MULCH BLANKET SHALL BE INSTALLED IN AREAS AS DESIGNATED AND SHALL BE INCIDENTAL TO OTHER ITEMS.
- 6. FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE PART OF THE "MISS DIG"

- 7. THE CONTRACTOR SHALL PROVIDE TEMPORARY SOIL EROSION CONTROL MEASURES PER P.A. 451 AS AMENDED. THE CONTRACTOR SHALL MEET WITH THE SOIL EROSION CONTROL OFFICER BEFORE STARTING CONSTRUCTION TO REVIEW THE TEMPORARY SOIL EROSION CONTROL MEASURES AND REQUIREMENTS. WITH THE USE OF SILT FENCE AND OTHER TEMPORARY MEASURES THE CONTRACTOR SHALL PROTECT THE ADJACENT AREA FROM ACCELERATED EROSION AND SEDIMENTATION FLOWS RESULTING FROM CONSTRUCTION. THE CONTRACTOR SHALL INSTALL ADDITIONAL TEMPORARY AND PERMANENT SOIL EROSION CONTROL MEASURES, IF DIRECTED BY THE ENGINEER OR SOIL EROSION CONTROL OFFICER, AT NO ADDITIONAL COST TO THE PROJECT.
- 8. ALL EXCESS TOPSOIL WILL REMAIN WITHIN THE PROPERTY OWNERS AREA. IF ADDITIONAL TOPSOIL IS AVAILABLE AFTER TOPSOILING THE CONSTRUCTION AREA, IT WILL BE STOCKPILED WITHIN 1000 FEET OF THE CONSTRUCTION AREA IN A DESIGNATED AREA AS DIRECTED BY THE FIELD ENGINEER.
- 9. THE SOIL EROSION MEASURES SHOWN ARE THE MINIMUM CONTROLS TO BE USED ON THIS PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY AND PERMANENT SOIL EROSION CONTROL MEASURES TO PROTECT THE DISTURBED AREAS AND ADJACENT PROPERTIES FROM ACCELERATED EROSION AND SEDIMENTATION. RESULTING FROM PROJECT CONSTRUCTION. AT NO ADDITIONAL COST TO THE OWNER.
- 10. THE CONTRACTOR SHALL REPAIR ALL WASHOUTS AND EROSION DURING THE GUARANTEE PERIOD OF ONE (1) YEAR AT NO ADDITIONAL COST TO THE OWNER.
- 11. LOCAL TRAFFIC SHALL BE MAINTAINED AT ALL TIMES.
- 12. EXISTING STORM DRAINAGE DITCHES SHALL BE REBUILT IF FILLED IN OR REMOVED DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO REPAIR OR REPLACE, AS REQUIRED, ALL DRAINAGE CULVERTS DAMAGED DURING CONSTRUCTION AND SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.
- 13. CONTRACTOR SHALL RESTORE ALL LAWNS, LAND-SCAPE PLANTINGS, SIDEWALKS, COMMERCIAL SIGNS, ETC., AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER.
- 14. CONTRACTOR SHALL PROVIDE ADEQUATE SUPPORT FOR UTILITY POLES AS NECESSARY.
- 15. OWNER IS RESPONSIBLE FOR ALL UTILITY POLE RELOCATIONS.

ALERT SYSTEM.

- 1 ALL CONSTRUCTION MATERIALS AND PROCEDURES SHALL CONFORM WITH CURRENT GRAND TRAVERSE COUNTY D.P.W. STANDARDS, SPECIFICATIONS AND DETAILS.
- 2. THE CONTRACTOR SHALL NOTIFY THE ENGINEER 48 HOURS PRIOR TO THE START OF CONSTRUCTION OF THE WATERMAIN. CONTRACTOR SHALL ISSUE A WORK SCHEDULE TO THE ENGINEER PRIOR TO THE START OF WATERMAIN CONSTRUCTION.
- 3. ALL WATERMAIN SHALL BE DUCTILE IRON PIPE THICKNESS CLASS 52, MEETING CURRENT AWWA STANDARDS.
- OF COVER BELOW EXISTING OR PROPOSED GRADE, UNLESS OTHERWISE NOTED ON THE PLANS.
- 5. RETAINER GLANDS SHALL BE USED ON ALL MECHANICAL JOINT FITTINGS.
- 6. BURLAP, PLASTIC OR POLY (20 MILLS) OR APPROVED EQUAL SHALL BE PLACED BETWEEN THE CONCRETE THRUST BLOCK AND DEAD-END MAINS OR DEAD-END PLUGS, TEES, HYDRANTS AND CROSSES TO FACILITATE THE REMOVAL OF THE THRUST BLOCK FOR FUTURE EXTENSION AND MAINTENANCE.
- 7. A PHYSICAL GAP SHALL BE MAINTAINED BETWEEN THE WATERMAIN AND THE EXISTING WATERMAIN UNTIL ALL WATERMAIN TESTING HAS BEEN COMPLETED AND APPROVED BY THE ENGINEER AND THE GRAND TRAVERSE COUNTY D.P.W.
- 8. THE CONTRACTOR SHALL COORDINATE THE CONNECTION TO THE EXISTING WATERMAIN WITH THE GRAND TRAVERSE COUNTY D.P.W. THE ENGINEER AND D.P.W. SHALL BE GIVEN A MINIMUM OF 24 HOURS NOTICE PRIOR TO THIS CONNECTION.
- 9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN WATER FOR FLUSHING AND TESTING PURPOSES. CONTRACTOR SHALL COORDINATE WITH THE D.P.W., IF WATER IS OBTAINED FROM THE TOWNSHIP WATER SYSTEM. THE D.P.W. SHALL BE GIVEN 48 HOURS NOTICE PRIOR TO USING ANY WATER FROM THE TOWNSHIP WATER SYSTEM.

- 10. TO FACILITATE WATER SAMPLING, THE CONTRACTOR MAY INSTALL TWO (2) INCH CORPORATION STOPS AND TYPE K COPPER TUBE FROM THE TWO (2) INCH CORPORATION TO APPROXIMATELY FOUR (4) FEET ABOVE THE FINISH GRADE IN LOCATIONS APPROVED BY THE FIELD ENGINEER. AFTER THE WATERMAIN HAS BEEN FLUSHED AND SATISFACTORY BACTERIOLOGICAL ANALYSIS TESTS HAVE PASSED, THE TYPE 'K' COPPER TUBE WILL BE REMOVED AND THE TWO (2) INCH CORPORATION WILL BE CLOSED. CONTRACTOR WILL INFORM THE FIELD REPRESENTATIVE/INSPECTOR TO ALLOW HIM TO WITNESS THE REMOVING OF THE COPPER TUBING AND THE CLOSING OF THE CORPORATION.
- 4. WATERMAIN SHALL HAVE A MINIMUM OF SIX (6) FEET 11. PRIOR TO PIGGING AND FLUSHING ALL LINES SHALL BE CHARGED WITH WATER.
 - 12. ALL PERMANENT BLOW-OFF ASSEMBLIES SHALL BE CUT BELOW GRADE AFTER TESTING IS COMPLETE. THE STANDING WATER SHALL BE PUMPED OUT OF THE RISER.
 - 13. CONTRACTOR SHALL PROPERLY DISPOSE OF CHLORINATED WATER USED IN TESTING OPERATIONS.
 - 14. ACTUAL WATERMAIN, HYDRANT AND GATE VALVE LOCATIONS SHALL BE FIELD STAKED PRIOR TO CONSTRUCTION.
 - 15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE FIRE HYDRANTS AND VALVE BOXES TO THE FINISHED GRADE.
 - 16. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING 2" WATER SERVICE LEADS FROM THE WATERMAIN TO THE PROPERTY LINE FOR EACH LOT. CONTRACTOR TO VERIFY LOCATION OF WATER SERVICE LEADS WITH THE GRAND TRAVERSE COUNTY D.P.W.

SANITARY SEWER NOTES

- 1. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP MUST CONFORM WITH THE GRAND TRAVERSE COUNTY D.P.W. CURRENT STANDARDS, SPECIFICATIONS AND
- 2. THE CONTRACTOR SHALL NOTIFY THE ENGINEER 48 HOURS PRIOR TO THE START OF CONSTRUCTION OF THE SANITARY SEWER. THE CONTRACTOR SHALL ISSUE A WORK SCHEDULE TO THE ENGINEER PRIOR TO THE START OF SANITARY SEWER CONSTRUCTION.
- 3. NO CONNECTION RECEIVING STORM WATER OR GROUND WATER SHALL BE MADE TO SANITARY SEWERS.
- 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE MANHOLE RIMS TO THE FINISH GRADE FIFVATIONS. THE ELEVATIONS SHOWN ARE BASED UPON PLAN GRADES AND ARE SUBJECT TO CHANGE

- ROAD CONSTRUCTION NOTES
- 1. ALL CONSTRUCTION WORKMANSHIP AND MATERIALS SHALL CONFORM WITH CURRENT ROAD COMMISSION STANDARDS, SPECIFICATIONS AND DETAILS.
- 2. THE PRESENCE OF OTHER THAN GRANULAR MATERIALS IN THE SUBGRADE SOIL SHALL REQUIRE A FULL WIDTH, FIFTEEN INCH, GRANULAR SUB-BASE, MDOT CLASS II OR EQUIVALENT.
- 3. PREPARE SUBGRADE WIDTH, DEPTH AND COMPACTION MUST BE REVIEWED AND/OR TESTED BY THE FIELD ENGINEER PRIOR TO PLACEMENT OF GRAVEL.
- 4. GRAVEL TO BE USED ON PROJECT MUST MEET SPECIFICATIONS FOR MDOT 22A AND MUST BE TESTED AND/OR REVIEWED BY THE FIELD ENGINEER PRIOR TO PLACEMENT.
- 5. GRAVEL PLACEMENT MUST COMPLY WITH SECTION 3.01 OF THE MICHIGAN DEPARTMENT OF TRANSPORTATION 1990 STANDARD SPECIFICATIONS.
- 6. PREPARED GRAVEL WIDTH, DEPTH AND COMPACTION MUST BE REVIEWED AND TESTED BY THE PROJECT ENGINEER PRIOR TO THE PLACEMENT OF BITUMINOUS SURFACE.
- 7. CONTRACTOR SHALL GIVE THE PROJECT ENGINEER 48 HOUR'S NOTICE PRIOR TO PLACEMENT OF BITUMINOUS SURFACE.
- 8. BITUMINOUS PAVING MUST BE PERFORMED IN ACCORDANCE WITH MDOT
- STANDARD SPECIFICATIONS. 9. ALL TREES, STUMPS, BRUSH AND ROOTS THEREOF, SHALL BE ENTIRELY

REMOVED FROM WITHIN THE GRADING LIMITS OF ALL ROADS IN THE

PROPOSED PLAT AND DISPOSED OF AS DIRECTED BY THE OWNER.

- 10. THE LEVEL OF THE FINISHED SUBGRADE SHALL BE AT LEAST TWO AND
- ONE HALF FEET ABOVE THE HIGH WATER TABLE. 11. ALL DISTURBED AREAS SHALL BE TOPSOILED, SEEDED, FERTILIZED
- 12. CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING GROUND COVER ON AREAS DISTURBED BY CONSTRUCTION AND WILL REPAIR AREAS AS NEEDED FOR A PERIOD OF ONE YEAR.
- 13. ANY CHANGES IN SPECIFICATIONS/PLANS MUST BE REVIEWED BY THE PROJECT ENGINEER AND/OR THE OWNER.

DRAINAGE AREA 'A'

<u>Basin 'a1'</u>

AND MULCHED.

25 YEAR, 24 HOUR DURATION STORM V = (Cf - Ci)(i)(acre)(86,400sec)

45'x 30'x 1' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 3037 SF C FACTOR FOR BITUMINOUS PAVEMENT = .9

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT INCLUDING HOME ROOF, GARAGE & DRIVES, etc. = 3,000 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 0 C FACTOR FOR HARD SURFACE = .9

TOTAL AREA THAT IS LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 0 SF

C FACTOR FOR LAWNS = .2 (HEAVY SOIL, AVERAGE 2-7%)

TOTAL AREA THAT IS BEING RESTORED (ROADWAY SLOPES) RESTORATION AREA = 680 SF C FACTOR FOR RESTORATION AREAS = .25(HEAVY SOIL, 7% TO STEEP)

VOLUME CALCULATIONS

TOTAL HARD SURFACE RUN-OFF = 0.07 ACRE V = (.9)(.16)(0.07)(86400sec) = 871 CFV = (.2)(.1)(0.07)(86400sec) = 121 CF

TOTAL RESTORATION RUN-OFF = 0.015 ACRE V = (.25)(.16)(0.015)(86,400sec) = 52 CFV = (.2)(.1)(0.015)(86,400sec) = 26 CF

VOLUME REQUIRED = (871 CF - 121 CF) + (52 CF - 26 CF) = 776 CFVOLUME PROVIDED = 995 CF

BASIN SIDE SLOPES 1 ON 3 TOP OF BASIN ELEVATION = 596.5

BOTTOM OF BASIN ELEVATION = 595.5FREE BOARD = .5 FOOT MINIMUM

25 YEAR, 24 HOUR DURATION STORM V = (Cf - Ci)(i)(acre)(86,400sec)

80'x 30'x 1.1' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 1935 SF C FACTOR FOR BITUMINOUS PAVEMENT = .9

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT INCLUDING HOME ROOF, GARAGE & DRIVES, etc. = 3,000 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 0 C FACTOR FOR HARD SURFACE = .9

TOTAL AREA THAT IS LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 1619 SF C FACTOR FOR LAWNS = .2

TOTAL AREA THAT IS BEING RESTORED (ROADWAY SLOPES) RESTORATION AREA = 2730 SF C FACTOR FOR RESTORATION AREAS = .25

VOLUME CALCULATIONS

(HEAVY SOIL, AVERAGE 2-7%)

(HEAVY SOIL, 7% TO STEEP)

TOTAL HARD SURFACE RUN-OFF = 0.07 ACRE V = (.9)(.16)(0.2)(86400sec) = 2488 CFV = (.2)(.1)(0.2)(86400sec) = 346 CF

TOTAL RESTORATION RUN-OFF = .06 ACRE V = (.25)(.16)(.06)(86,400sec) = 207 CFV = (.2)(.1)(.06)(86,400 sec) = 104 CF

TOTAL LAWN RUN-OFF = .037 ACRE V = (.2)(.16)(0.037)(86,400sec) = 102 CFV = (.2)(.1)(0.037)(86,400sec) = 64 CF

VOLUME REQUIRED = (2488 CF - 346 CF) + (207 CF - 104 CF)+ (102 CF - 64 CF) = 2283 CFVOLUME PROVIDED = 2685 CF BASIN SIDE SLOPES 1 ON 3

TOP OF BASIN ELEVATION = 595.0 BOTTOM OF BASIN ELEVATION = 593.6 FREE BOARD = .5 FOOT MINIMUM

STORM DRAINAGE CALCULATIONS

DRAINAGE AREA 'B'

BASIN 'B'

25 YEAR, 24 HOUR DURATION STORM V = (Cf - Ci)(i)(acre)(86,400sec)

150'x 23'x 2' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 3697 SF C FACTOR FOR BITUMINOUS PAVEMENT = .9

(HEAVY SOIL, AVERAGE 7% TO STEEP)

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT INCLUDING HOME ROOF, GARAGE & DRIVES, etc. = 3,000 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 4 C FACTOR FOR HARD SURFACE = .9(LOTS 31, 30, & 29)

TOTAL AREA THAT ARE LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 13880 SFC FACTOR FOR LAWNS = .25

TOTAL AREA THAT IS BEING RESTORFD (ROADWAY SLOPES) RESTORATION AREA = 795 SFC FACTOR FOR RESTORATION AREAS = .25(HEAVY SOIL, 7% TO STEEP)

VOLUME CALCULATIONS

TOTAL HARD SURFACE RUN-OFF (PAVEMENT) = .084 ACRE V = (.9)(.16)(0.084)(86400sec) = 1045 CFV = (.2)(.1)(0.084)(86400sec) = 145 CF

TOTAL HARD SURFACE RUN-OFF (BUILDINGS) = 0.28 ACRE V = (.9)(.16)(0.28)(86400sec) = 3484 CFV = (.2)(.1)(0.28)(86400sec) = 483 CF

TOTAL RESTORATION RUN-OFF = 0.018 ACRE V = (.25)(.16)(0.018)(86,400sec) = 62 CF

V = (.2)(.1)(0.018)(86,400sec) = 31 CF

TOTAL LAWN RUN-OFF = 0.32 ACRE V = (.25)(.16)(0.32)(86,400sec) = 1106 CFV = (.2)(.1)(0.32)(86,400sec) = 552 CF

VOLUME REQUIRED = (1045 CF - 145 CF) + (3484 CF - 483 CF) + (62 CF - 31 CF) + (1106 CF - 552 CF) = 4486 CFVOLUME PROVIDED = 4,486 CF

BASIN SIDE SLOPES 1 ON 3 TOP OF BASIN ELEVATION = 604.25BOTTOM OF BASIN ELEVATION = 602.25 FREE BOARD = .5 FOOT MINIMUM

DRAINAGE AREA 'D'

BASIN 'D1'

100 YEAR, 24 HOUR DURATION STORM (BACK TO BACK) (NO OUTLET) V=(Cf-Ci)(i)(acre)(86,400sec)

85'x 30'x 3' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 6595 SF

C FACTOR FOR BITUMINOUS PAVEMENT = .9VOLUME CALCULATIONS

TOTAL HARD SURFACE RUN-OFF (PAVEMENT) = .15 ACRE V = (.9)(.19)(0.15)(86400sec) = 2216 CF

VOLUME REQUIRED = 2,216 CF x 2 = 4,432 CF

VOLUME PROVIDED = 4,550 CFBASIN SIDE SLOPES 1 ON 3

TOP OF BASIN ELEVATION = 620.00BOTTOM OF BASIN ELEVATION = 617.00 FREE BOARD = .5 FOOT MINIMUM

BASIN 'D2'

100 YEAR, 24 HOUR DURATION STORM (BACK TO BACK) V = (Cf - Ci)(i)(acre)(86,400sec)

155'x 75'x 2.3' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 0 SFC FACTOR FOR BITUMINOUS PAVEMENT = .9

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT ONLY INCLUDING DRIVEWAYS = 700 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 2 C FACTOR FOR HARD SURFACE = .9(LOTS 6, & 7)

TOTAL AREA THAT ARE LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 13939 SF C FACTOR FOR LAWNS = .25

TOTAL AREA THAT IS UNDEVELOPED UNDEVELOPED AREA = 73257 SF C FACTOR FOR UNDEVELOPED AREAS = .2(UNDEVELOPED AREAS)

(HEAVY SOIL, AVERAGE 7% TO STEEP)

ESTIMATED FROM WATERSHED MAP TOTAL AREA THAT IS UNDEVELOPED UNDEVELOPED AREA = 32492 SF C FACTOR FOR UNDEVELOPED AREAS = .2(UNDEVELOPED AREAS)

VOLUME CALCULATIONS

TOTAL HARD SURFACE RUN-OFF (PAVEMENT) = 0 ACRE V = (.9)(.19)(0)(86400sec) = 0 CF

TOTAL HARD SURFACE RUN-OFF (BUILDINGS) = 0.016 ACRE

V = (.9)(.19)(0.016)(86400sec) = 237 CFTOTAL UNDEVELOPED ON-SITE RUN-OFF = 1.68 ACRE V = (.2)(.19)(1.68)(86,400sec) = 5516 CF

TOTAL UNDEVELOPED OFF-SITE RUN-OFF = .74 ACRE V = (.2)(.19)(.74)(86,400sec) = 2429 CFTOTAL LAWN RUN-OFF = 0.32 ACRE

V = (.25)(.19)(0.32)(86,400sec) = 1313 CF

VOLUME REQUIRED = $9495 \text{ CF } \times 2 = 18990 \text{ CF}$ VOLUME PROVIDED = 19.305 CF BASIN SIDE SLOPES 1 ON 3

FREE BOARD = .5 FOOT MINIMUM

TOP OF BASIN ELEVATION = 624.90

BOTTOM OF BASIN ELEVATION = 622.60

DRAINAGE AREA 'E'

BASIN 'E'

√=(ċ+-ci)(i)(acre)(86,400sec)

(LOTS 8, 9, 27 & 28)

155'x 25'x 2' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 13,559 SF C FACTOR FOR BITUMINOUS PAVEMENT = .9

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT ONLY INCLUDING DRIVEWAYS = 1,000 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 4 C FACTOR FOR HARD SURFACE = .9

TOTAL AREA THAT ARE LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 15712 SF C FACTOR FOR LAWNS = .25

(HEAVY SOIL, AVERAGE 7% - STEEP) TOTAL AREA THAT BEING RESTORED (ROADWAY SLOPES) RESTORATION AREA = 29254 SF C FACTOR FOR RESTORATION AREAS = .25

VOLUME CALCULATIONS

(HEAVY SOIL, 7% TO STEEP)

TOTAL HARD SURFACE RUN-OFF (PAVEMENT) = .31 ACRE V = (.9)(.16)(.31)(86400sec) = 3857 CFV = (.2)(.1)(.31)(86400sec) = 536 CF

TOTAL HARD SURFACE RUN-OFF (BUILDINGS) = 0.07 ACRE V = (.9)(.16)(0.07)(86400sec) = 871 CFV = (.2)(.1)(0.07)(86400sec) = 121 CF

TOTAL RESTORATION RUN-OFF = .67 ACRE V = (.25)(.16)(.67)(86,400sec) = 2315 CFV = (.2)(.1)(.67)(86,400sec) = 1158 CFTOTAL LAWN RUN-OFF = 0.36 ACRE V = (.25)(.16)(0.36)(86,400sec) = 1244 CFV = (.2)(.1)(0.36)(86,400sec) = 622 CF

VOLUME REQUIRED = (3857 CF - 536 CF) + (871 CF - 121 CF) + (871 CF - 121 CF) + (871 CF - 121 CF)(2315 CF - 1158 CF) + (1244 CF - 622 CF) = 5850VOLUME PROVIDED = 5936 CF

BASIN SIDE SLOPES 1 ON 3 TOP OF BASIN ELEVATION = 624.50BOTTOM OF BASIN ELEVATION = 622.50FREE BOARD = .5 FOOT MINIMUM

DRAINAGE AREA 'F'

BASIN 'F'

25 YEAR, 24 HOUR DURATION STORM V=(Cf-Ci)(i)(acre)(86,400sec)

120'x 60'x 3.75' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 19784 SF C FACTOR FOR BITUMINOUS PAVEMENT = .9

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT INCLUDING HOME ROOF, GARAGE & DRIVES, etc. = 3,000 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 10 C FACTOR FOR HARD SURFACE = .9(LOTS 19-23, 10-14)

TOTAL AREA THAT IS LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 61952 SF C FACTOR FOR LAWNS = .25

(HEAVY SOIL, AVERAGE 7% - STEEP) TOTAL AREA THAT BEING RESTORED (ROADWAY SLOPES) RESTORATION AREA = 16505 SF C FACTOR FOR RESTORATION AREAS = .25

(HEAVY SOIL, 7% TO STEEP)

VOLUME CALCULATIONS TOTAL HARD SURFACE RUN-OFF (PAVEMENT) = .45 ACRE V = (.9)(.16)(.45)(86400sec) = 5599 CF

TOTAL HARD SURFACE RUN-OFF (BUILDINGS) = 0.69 ACRE V = (.9)(.16)(0.69)(86400sec) = 8585 CFV = (.2)(.1)(0.69)(86400sec) = 1192 CF

V = (.25)(.16)(.38)(86,400sec) = 1313 CFV = (.2)(.1)(.38)(86,400sec) = 656 CFTOTAL LAWN RUN-OFF = 1.42 ACRE

V = (.25)(.16)(1.42)(86,400sec) = 4907 CF

TOTAL RESTORATION RUN-OFF = .38 ACRE

V = (.2)(.1)(.45)(86400sec) = 778 CF

V = (.2)(.1)(1.42)(86,400sec) = 2453 CFVOLUME REQUIRED = (5599 CF - 778 CF) + (8585 CF - 1192 CF) + (1313 CF - 656 CF) + (4907 CF - 2453 CF) = 15325 CFVOLUME PROVIDED = 15,325 CF

BASIN SIDE SLOPES 1 ON 3 TOP OF BASIN ELEVATION = 654.50BOTTOM OF BASIN ELEVATION = 650.75 FREE BOARD = .5 FOOT MINIMUM

DRAINAGE AREA 'G'

BASIN 'G'

25 YEAR, 24 HOUR DURATION STORM V = (Cf - Ci)(i)(acre)(86,400sec)

70'x 30'x 3' DEEP

TOTAL HARD SURFACE RUN-OFF FROM BITUMINOUS PAVEMENT = 7818 SF C FACTOR FOR BITUMINOUS PAVEMENT = .9

TOTAL HARD SURFACE RUN-OFF FROM EACH LOT INCLUDING HOME ROOF, GARAGE & DRIVES, etc. = 3,000 SF NUMBER OF LOTS WITHIN DRAINAGE AREA = 3 C FACTOR FOR HARD SURFACE = .9(LOTS 15, 16, 18)

TOTAL AREA THAT IS LAWNS (WITHIN BUILDING ENVELOPE) LAWN AREA = 18071 SFC FACTOR FOR LAWNS = .25

(HEAVY SOIL, AVERAGE 7% - STEEP) TOTAL AREA THAT BEING RESTORED (ROADWAY SLOPES) RESTORATION AREA = 11318 SF

C FACTOR FOR RESTORATION AREAS = .25

VOLUME CALCULATIONS

(HEAVY SOIL, 7% TO STEEP)

TOTAL HARD SURFACE RUN-OFF (PAVEMENT) = .18 ACRE V = (.9)(.16)(.18)(86400sec) = 2239 CFV = (.2)(.1)(.18)(86400sec) = 311 CF

TOTAL HARD SURFACE RUN-OFF (BUILDINGS) = 0.2 ACRE V = (.9)(.16)(0.2)(86400sec) = 2488 CF

V = (.2)(.1)(0.2)(86400sec) = 346 CFTOTAL RESTORATION RUN-OFF = .26 ACRE

V = (.25)(.16)(.26)(.86,400 sec) = 899 CFV = (.2)(.1)(.26)(86,400sec) = 449 CFTOTAL LAWN RUN-OFF = .41 ACRE V = (.25)(.16)(.41)(86,400sec) = 141.7 CF

V = (.2)(.1)(.41)(86,400sec) = 708 CF

VOLUME REQUIRED = (2239 CF - 311 CF) + (2488 CF - 346 CF) +(899 CF - 449 CF) + (1417 CF - 708 CF) = 5229 CFVOLUME PROVIDED = 5357 CF

BASIN SIDE SLOPES 1 ON 3 TOP OF BASIN ELEVATION = 645.00BOTTOM OF BASIN ELEVATION = 641.50FREE BOARD = .5 FOOT MINIMUM