GENOA TOWNSHIP

FEB 2 2 2018

RECEIVED

GENOA CHARTER TOWNSHIP

Application for Site Plan Review – LAKE SHORE VILLAGE PH 3 Amendment

TO THE GENOA TOWNSHIP PLANNING COMMISSION AND TOWNSHIP BOARD:

OWNER AGENT APPLICANT NAME & ADDRESS: WALTER COPONEN COPONEN ARCHITECTS 8002 W. GRAND RIVER, BRIGHTON, MI. 48114
If applicant is not the owner, a letter of Authorization from Property Owner is needed.

OWNER'S NAME & ADDRESS: LAKESHORE VILLAGE L.T.D HOUSING ASSOCIATION 27777 FRANKLIN RD. SUITE 1410 SOUTHFIELD, MI. 48034

SITE ADDRESS: LAKESHORE VILLAGE APARTMENTS 2812 ONTARIO CT. HOWELL, MI. PARCEL #(s): PHASE III

APPLICANT PHONE: (810) 225-4141 OWNER PHONE: ( )

OWNER AGENT OWNER EMAIL: coponenarchitects@sbcglobal.net

LOCATION AND BRIEF DESCRIPTION OF SITE: LAKESHORE VILLAGE APARTMENTS PHASE THREE CONSISTS OF 144 APARTMENTS ALONG WITH A BUSINESS/FITNESS CENTER. THE PROJECT WAS APPROVED LAST OCTOBER AND IS CURRENTLY UNDER CONSTRUCTION.

BRIEF STATEMENT OF PROPOSED USE: LAKESHORE VILLAGE APARTMENTS IS A RESIDENTIAL RENTAL COMMUNITY CONSISTING OF ONE, TWO, AND THREE BEDROOM APARTMENTS WITH CLUB HOUSE AND SWIMMING POOL.

THE FOLLOWING BUILDINGS ARE PROPOSED: THE PROPOSED AMENDED SITE PLAN WILL ADD (4) FOUR ONE BEDROOM APARTMENT UNITS AND MOVE THE BUSINESS/FITNESS CENTER 30 FEET TO ALLOW FOR FUTURE EXPANSION OF THE BUILDING, SEE LETTER ATTACHED.

I HEREBY CERTIFY THAT ALL INFORMATION AND DATA ATTACHED TO AND MADE PART OF THIS APPLICATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

BY: Walter F. Coponen, Coponen Architects, P.C.

ADDRESS: 8002 W. Grandriver, Suite A, Brighton, Mi. 48114

Contact Information - Review Letters and Correspondence shall be forwarded to the following:

1.) WALTER COPONEN of COPONEN ARCHITECTS at coponenarchitects@sbcglobal.net
Name | Business Affiliation | E-mail Address

FEE EXCEEDANCE AGREEMENT

As stated on the site plan review fee schedule, all site plans are allocated two (2) consultant reviews and one (1) Planning Commission meeting. If additional reviews or meetings are necessary, the applicant will be required to pay the actual incurred costs for the additional reviews. If applicable, additional review fee payment will be required concurrent with submittal to the Township Board. By signing below, applicant indicates agreement and full understanding of this policy.

SIGNATURE: Walter F. Coponen DATE: 2.26.18

PRINT NAME: WALTER F. COPONEN PHONE: 810.225.4141

ADDRESS: 8002 W. Grandriver suite A, Brighton, Mi. 48114

Lockwood Companies

February 15, 2018

Genoa Township
2911 Dorr Road
Brighton, MI 48116

Re: Lakeshore III Site Plan Approval

To Whom It May Concern:

Lakeshore Village Limited Dividend Housing Association Limited Partners is the owner for the construction of Lakeshore Village Apartments Phase III. This 144 unit project will be located on the east side Chilson Rd, south of Grand River in Genoa Twp, MI.

The purpose of this letter is to authorize Walt Coponen of Coponen Architects, P.C. to act as our agent to coordinate site plan approval with Genoa Township for changes made to the original site plan, which was approved in October 2016.

Should you need to contact me, I can be reached by telephone at 248-703-0145.

Sincerely,

Mark Lockwood
President and CEO

27777 Franklin Rd. Suite 1410
Southfield, MI 48034-2337
248.203.0991

IMPACT ASSESSMENT
FOR
"LAKESHORE VILLAGE PHASE III"
AMENDED SITE PLAN APPROVAL
GENOA TOWNSHIP
LIVINGSTON COUNTY, MI

Prepared for:

THE LOCKWOOD COMPANIES
c/o Ms. Jennifer Lunsford
27777 Franklin Road, Suite 1410
Southfield, MI 48034

Prepared by:

BOSS ENGINEERING COMPANY
3121 EAST GRAND RIVER AVE
HOWELL, MICHIGAN 48843
517-546-4836
BE Project No. 16-010

February 1, 2016
revision #1 February 24, 2016
revision #2 April 26, 2016
revision #3 Feburary 22, 2018

INTRODUCTION

The purpose of this Impact Assessment (IA) report is to show the effect that this proposed development has on various factors in the general vicinity of the project. The format used for presentation of this report conforms to the *Submittal Requirements For Impact Assessment/Impact Statement* guidelines in accordance with Section 13.05 of the published Zoning Ordinance for Genoa Township, Livingston County, Michigan.

DISCUSSION ITEMS

A. Name(s) and address(es) of person(s) responsible for preparation of the impact assessment and a brief statement of their qualifications.

Prepared By:
BOSS ENGINEERING COMPANY
3121 E. Grand River
Howell, Michigan 48843
Phone: 517-546-4836

Prepared For:
Ms. Jennifer Lunsford
The Lockwood Companies
27777 Franklin Road, Suite 1410
Southfield, MI 48034

B. Description of the site, including existing structures, man made facilities, and natural features, all-inclusive to within 10' of the property boundary.

The subject site is located on the east side of Chilson Road, bounded on the south by the Chesapeake & Ohio Railroad and on the north by the existing Lakeshore Village Phase II property. The site improvements are located on a part a property owned by Lakeshore Village, LDHA, LP. The parcel number is 4711-06-400-015. The overall acreage of the site is 27.80 acres. The property is located in the Southeast ¼ of Section 6, T2N-R5E, Genoa Township, Livingston County, Michigan. Current zoning of the site is MDR (Medium Density Residential).

Currently on site is an existing natural gas well and access driveway located within easements.

The site is gently rolling with areas of steeper slopes and generally slopes from the Northwest to the Southeast, with a county drain (Marion-Genoa County Drain Branch No. 3) that flows to a culvert under the railroad at the south end of the site. Elevations vary between 969.0± and 935.0±, respectively.

Adjacent properties include:
South – Farmland / Planned Industrial Development (zoned PID)
North – Lakeshore Village Phase II (zoned MDR) / Single Family Homes (zoned SR)
East – Industrial Buildings (zoned IND)
West – Chilson Road / MHOG Sewage Treatment Plant (zoned PRF)

C. Impact on natural features: A written description of the environmental characteristics of the site prior to development, i.e., topography, soils, vegetative cover, drainage, streams, creeks or ponds.

The site is gently rolling with areas of steeper slopes and generally slopes from the Northwest to the Southeast, with a county drain (Marion-Genoa Drain Brain No. 3) that flows to a culvert under the railroad at the south end of the site. Elevations vary between 969.0± and 935.0±, respectively.
The USDA Soil Conservation Service "Soil Survey of Livingston County, Michigan", indicates native site soils consist of:

1. MIAMI LOAM (MoB), 2% to 6% slopes. Surface runoff is slow, permeability is moderate, and erosion hazard is slight.
2. MIAMI LOAM (MoC), 6% to 12% slopes. Surface runoff is medium, permeability is moderate, and erosion hazard is moderate.
3. BOYER-OSHTEMO LOAMY SANDS, 2% to 6% slopes. Surface runoff is very slow, permeability is moderately rapid, and erosion hazard is slight.
4. GILFORD SANDY LOAM (Gd), 0% to 2% slopes. Surface runoff is very slow, permeability is moderately rapid, and erosion hazard is slight.
5. CONOVER LOAM (CvA), 0% to 2% slopes. Surface runoff is slow, permeability is moderately slow, and erosion hazard is slight.

Vegetative cover for the site includes heavy woods and low brush cover. There are three main areas that are heavily wooded with predominantly Poplar and Birch scrub vegetation (the majority of which is less than 4-in caliper). These vegetated areas are of low-quality and the majority of will be removed for the development.

The National Wetland Inventory Plan prepared by the United States Department of the Interior, Fish and Wildlife Service indicates that there are no wetlands located on the site. However, preliminary field observations of the site indicate that wetlands are present onsite.

Site drainage from the proposed site will be directed to storm sewers for conveyance. All site drainage will be directed into multiple proposed detention basins on site. The proposed detention basins will outlet to the existing Marion-Genoa County Drain Branch No. 3 located onsite.

D. Impact on storm water management: description of soil erosion control measures during construction.

Surface runoff during periods of construction will be controlled by proper methods set forth by the Livingston County Drain Commissioner. These methods shall include silt fence, silt sacks, and seeding with mulch and/or matting.

At the time of construction, there may be some temporary dust, noise, vibration and smoke, but these conditions will be of relatively short duration and shall be controlled by applying appropriate procedures to minimize the effects, such as watering if necessary for dust control.

E. Impact on surrounding land use: Description of proposed usage and other man made facilities; how it conforms to existing and potential development patterns. Effects of added lighting, noise or air pollution which could negatively impact adjacent properties.

The applicant is proposing to construct new buildings and parking lots. The new buildings will consist of apartments and a business center for the development. The property on which the site development is located is HDR (High Density Residential). The proposed buildings and parking lots conform to the existing and potential land development patterns in the area.

The existing vegetation onsite is of poor quality and will be removed for the proposed development. Proposed landscaping will enhance the character of the existing site.

Chilson Road presently experiences a medium volume of traffic along with associated noise level generated from commercial vehicles. The proposed buildings are expected to accommodate an increase in residents, which is consistent with the property's zoning (HDR). There will be minimal increase in the amount of noise emanating from the site due to the proposed site improvements.

Additional lighting is proposed on site and is to be directed away from adjacent properties to limit adverse affects of lighting. Proposed landscaping along the property boundary will help serve as a visual buffer and as a noise buffer. Additional noise created by the development will be minimal and due to the nature of the adjacent properties (commercial and industrial facilities to the east, residential

properties to the north, sewage treatment plant to the west), there will be very low impact. There will be no increase in the amount of odor emanating from the site.

F. Impact on public facilities and services: Description of number of residents, employees, patrons, and impact on general services, i.e., schools, police, fire.

The proposed development is planned to include the construction of 148 residential apartment units, with an expected 259 residents added to the community. This expected total includes 160 adults and 99 children. The additional residents will not cause a significant change in the availability of services.

G. Impact on public utilities: Description of public utilities serving the project, i.e., water, sanitary sewer, and storm drainage system. Expected flows projected in residential units.

There are new water, sanitary, and storm sewer drainage services proposed for the apartments, business center, and parking lots.

A new water main service is proposed to tie into the existing watermain that is located north of the subject site in Lakeshore Village Phase II on St Clair Ct. The new water main will be constructed through the development to the intersection of the private road entrance on Chilson Road for future extensions.

A new storm sewer system is proposed throughout the site and will connect two new detention basins on the southeast and south central areas of the site. These basins will both outlet to the existing Marion-Genoa County Drain Branch No. 3.

A new sanitary sewer system is proposed throughout the site and will connect to an existing sanitary sewer located in Victory Drive that drains to an existing lift station through an existing easement the adjacent site to the east of the subject site.

H. Storage or handling of any hazardous materials: Description of any hazardous materials used, stored, or disposed of on-site.

Lakeshore Village Phase III will not be storing or handling any hazardous materials.

I. Impact on traffic and pedestrians: Description of traffic volumes to be generated and their effect on the area.

The proposed expansion of the apartment community will house residents who will work in the surrounding community. Based on the Institute of Transportation Engineers' Trip Generation Manual, the expected increase of traffic volumes correlates with Land-Use #221 (Low-Rise Apartments). With the construction of 148 apartment units, the expected vehicular trips generated from this development will be 1,156 total trips per day with an AM peak volume of 81 trips and a PM peak volume of 101 trips.

The current residents of Lakeshore Village Apartments Phases I & II exit the property from Tahoe Boulevard at East Grand River Avenue. A sampling of traffic patterns from the existing residents indicates that approximately 16% of traffic is traveling westbound on East Grand River Avenue during the AM peak time period. Tahoe Boulevard is three lanes at the intersection with East Grand River Avenue with two exiting lanes and one entrance lane.

With the addition of the new driveway on Chilson Road that is proposed as a part of this development, an alternate route for traffic travelling westbound on East Grand River Avenue will be provided. Exiting right turns from the new driveway will travel approximately one mile north to the signalized intersection of East Grand River Avenue and Chilson Road. Since the Latson Road/I-96 interchange was constructed in 2013, Chilson Road traffic volumes have decreased more than 50%. With the reduction of traffic volumes on Chilson Road, this development will have minimal impact on traffic volumes at the intersection of East Grand River Avenue and Chilson Road.

The Livingston County Road Commission has determined that the additional traffic generated by this development will require acceleration and deceleration lanes, but bypass or left-turn lanes will not be required.

Through an information campaign, the developer will also encourage existing residents of Lakeshore Village Apartments Phases I & II who are traveling westbound on East Grand River Avenue to utilize the Chilson Road driveway, reducing wait times at the intersection of Tahoe Boulevard and East Grand River Avenue.

At the direction of the Genoa Township Planning Commission at the March 14, 2016 meeting, a traffic impact study was completed by David Sonnenberg, P.E. with Traffic Engineering Associates. This study was reviewed during the initial Site Plan approval process.

J. Special provisions: Deed restrictions, protective covenants, etc.

There is an existing natural gas well and access driveway located on the subject property. The existing easements for the well and driveway will be adjusted to ensure access and operation of the well

K. Description of all sources:

- Genoa Township Zoning Ordinance
- 2013 Genoa Township Master Plan Update
- "Soil Survey of Livingston County, Michigan" Soil Conservation Services, U.S.D.A.
- National Wetlands Inventory, U.S. Department of Interior, Fish and Wildlife Service
- Lockwood Development Company Topographic Survey (BE #15-357 - October 2015)

AMENDED SITE PLAN
FOR
LAKESHORE VILLAGE APARTMENTS
PHASE 3
PART OF SE 1/4, SECTION 8, T2N R5E
GENOA TOWNSHIP, LIVINGSTON COUNTY, MI

LEGAL DESCRIPTIONS

LAND IN THE TOWNSHIP OF GENOA, LIVINGSTON COUNTY, MICHIGAN, DESCRIBED AS FOLLOWS:

PARCEL 2–B:

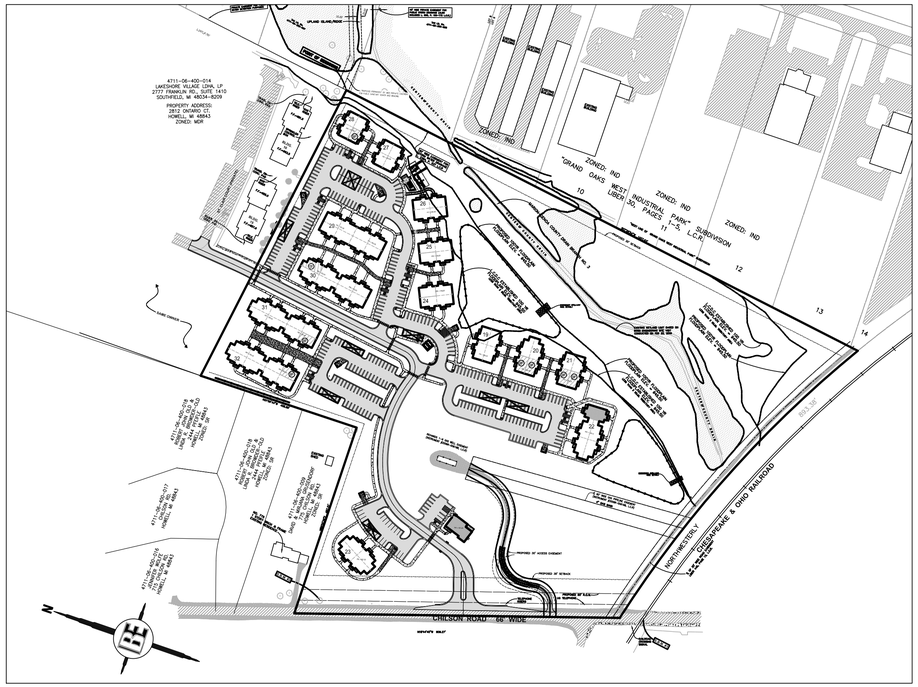
PART OF THE SOUTHEAST ¼ OF SECTION 6, TOWN 2 NORTH, RANGE 5 EAST, GENOA TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN, MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE EAST ¼ CORNER OF SAID SECTION 6; THENCE ALONG THE NORTH LINE OF "GRAND OAKS WEST INDUSTRIAL PARK," A SUBDIVISION AS RECORDED IN LIBER 30 OF PLATS ON PAGES 1–5 OF LIVINGSTON COUNTY RECORDS, SOUTH 86 DEGREES 35 MINUTES 09 SECONDS WEST, 330.00 FEET; THENCE ALONG THE WEST LINE OF SAID SUBDIVISION, SOUTH 01 DEGREE 04 MINUTES 01 SECOND EAST, 351.89 FEET; THENCE CONTINUING ALONG SAID WEST LINE, SOUTH 86 DEGREES 35 MINUTES 09 SECONDS WEST, 100.00 FEET; THENCE CONTINUING ALONG SAID WEST LINE, SOUTH 07 DEGREES 28 MINUTES 54 SECONDS WEST, 658.72 FEET TO THE POINT OF BEGINNING OF THE PARCEL TO BE DESCRIBED; THENCE CONTINUING ALONG SAID WEST LINE, SOUTH 07 DEGREES 28 MINUTES 54 SECONDS WEST, 1427.53 FEET; THENCE ALONG THE NORTHERLY RIGHT–OF–WAY LINE OF THE C&O RAILROAD, NORTHWESTERLY ON AN ARC LEFT, HAVING A LENGTH OF 893.38 FEET, A RADIUS OF 2834.50 FEET, A CENTRAL ANGLE OF 18 DEGREES 03 MINUTES 31 SECONDS AND A LONG CHORD WHICH BEARS NORTH 67 DEGREES 50 MINUTES 07 SECONDS WEST, 889.69 FEET; THENCE ALONG THE CENTERLINE OF CHILSON ROAD (66 FOOT WIDE RIGHT–OF–WAY), NORTH 18 DEGREES 44 MINUTES 40 SECONDS WEST, 809.27 FEET; THENCE NORTH 89 DEGREES 00 MINUTES 29 SECONDS EAST, 487.21 FEET; THENCE NORTH 01 DEGREE 06 MINUTES 44 SECONDS WEST, 408.86 FEET; THENCE SOUTH 82 DEGREES 31 MINUTES 05 SECONDS EAST, 797.47 FEET, TO THE POINT OF BEGINNING. CONTAINING 27.80 ACRES

TAX ITEM NO,: 11–06–400–015–201–47070

CONSTRUCTION NOTES

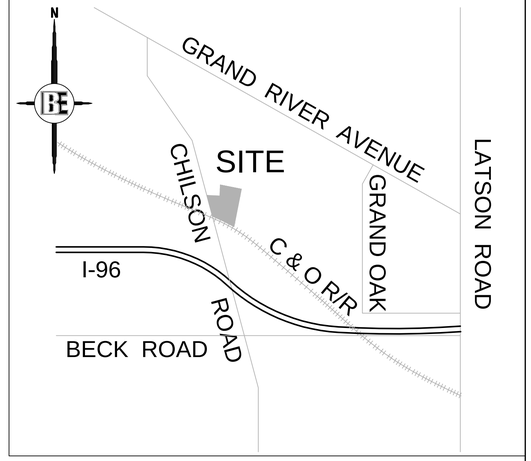
THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING NOTES AND ANY WORK INVOLVED SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.

1. THE CONTRACTOR SHALL HOLD HARMLESS THE DESIGN PROFESSIONAL, MUNICIPALITY, COUNTY, STATE AND ALL OF ITS SUB CONSULTANTS, PUBLIC AND PRIVATE UTILITY COMPANIES, AND LANDOWNERS FOR DAMAGES TO INDIVIDUALS AND PROPERTY, REAL OR OTHERWISE, DUE TO THE OPERATIONS OF THE CONTRACTOR AND/OR THEIR SUBCONTRACTORS.
2. DO NOT SCALE THESE DRAWINGS AS IT IS A REPRODUCTION AND SUBJECT TO DISTORTION.
3. A GRADING PERMIT FOR SOIL EROSION-SEDIMENTATION CONTROL SHALL BE OBTAINED FROM THE GOVERNING AGENCY PRIOR TO THE START OF CONSTRUCTION.
4. IF DUST PROBLEM OCCURS DURING CONSTRUCTION, CONTROL WILL BE PROVIDED BY AN APPLICATION OF WATER, EITHER BY SPRINKLER OR TANK TRUCK.
5. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH LOCAL MUNICIPAL STANDARDS AND SPECIFICATIONS.
6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED TOWNSHIP, COUNTY, AND STATE OF MICHIGAN PERMITS.
7. PAVED SURFACES, WALKWAYS, SIGNS, LIGHTING AND OTHER STRUCTURES SHALL BE MAINTAINED IN A SAFE, ATTRACTIVE CONDITION AS ORIGINALLY DESIGNED AND CONSTRUCTED.
8. ALL BARRIER-FREE FEATURES SHALL BE CONSTRUCTED TO MEET ALL LOCAL, STATE AND A.D.A. REQUIREMENTS.
9. ANY DISCREPANCY IN THIS PLAN AND ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE DESIGN ENGINEER PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL SETBACKS, EASEMENTS AND DIMENSIONS SHOWN HEREON BEFORE BEGINNING CONSTRUCTION.
10. THE CONTRACTOR SHALL CONTACT ALL OWNERS OF EASEMENTS, UTILITIES AND RIGHTS-OF-WAY, PUBLIC OR PRIVATE, PRIOR TO THE START OF CONSTRUCTION.
11. THE CONTRACTOR SHALL COORDINATE WITH ALL OWNERS TO DETERMINE THE LOCATION OF EXISTING LANDSCAPING, IRRIGATION LINES & PRIVATE UTILITY LINES. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING LANDSCAPING, IRRIGATION LINES, AND PRIVATE UTILITY LINES.
12. THE CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE UPON COMPLETION OF THE PROJECT.
13. THE CONTRACTOR SHALL MAINTAIN THE SITE IN A MANNER SO THAT WORKMEN AND PUBLIC SHALL BE PROTECTED FROM INJURY, AND ADJOINING PROPERTY PROTECTED FROM DAMAGE.
14. THE CONTRACTOR SHALL KEEP THE AREA OUTSIDE THE "CONSTRUCTION LIMITS" BROOM CLEAN AT ALL TIMES.
15. THE CONTRACTOR SHALL CALL MISS DIG A MINIMUM OF 72 HOURS PRIOR TO THE START OF CONSTRUCTION.
16. ALL EXCAVATION UNDER OR WITHIN 3 FEET OF PUBLIC PAVEMENT, EXISTING OR PROPOSED SHALL BE BACKFILLED AND COMPACTED WITH SAND (MDOT CLASS II).
17. ALL PAVEMENT REPLACEMENT AND OTHER WORKS COVERED BY THESE PLANS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWNSHIP, INCLUDING THE LATEST MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
18. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE TO EXISTING UTILITIES.
19. NO ADDITIONAL COMPENSATION WILL BE PAID TO THE CONTRACTOR FOR ANY DELAY OR INCONVENIENCE DUE TO THE MATERIAL SHORTAGES OR RESPONSIBLE DELAYS DUE TO THE OPERATIONS OF SUCH OTHER PARTIES DOING WORK INDICATED OR SHOWN ON THE PLANS OR IN THE SPECIFICATION OR FOR ANY REASONABLE DELAYS IN CONSTRUCTION DUE TO THE ENCOUNTERING OR EXISTING UTILITIES THAT MAY OR MAY NOT BE SHOWN ON THE PLANS.
20. DURING THE CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL NOT PERFORM WORK BY PRIVATE AGREEMENT WITH PROPERTY OWNERS ADJACENT TO THE PROJECT.
21. IF WORK EXTENDS BEYOND NOVEMBER 15, NO COMPENSATION WILL BE DUE TO THE CONTRACTOR FOR ANY WINTER PROTECTION MEASURES THAT MAY BE REQUIRED BY THE ENGINEER.
22. NO TREES ARE TO BE REMOVED UNTIL MARKED IN THE FIELD BY THE ENGINEER.
23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE PROPERTY BEYOND THE CONSTRUCTION LIMITS INCLUDING BUT NOT LIMITED TO EXISTING FENCE, LAWN, TREES AND SHRUBBERY.
24. ALL AREAS DISTURBED BY THE CONTRACTOR BEYOND THE NORMAL CONSTRUCTION LIMITS OF THE PROJECT SHALL BE SODDED OR SEEDED AS SPECIFIED OR DIRECTED BY THE ENGINEER.
25. ALL ROOTS, STUMPS AND OTHER OBJECTIONABLE MATERIALS SHALL BE REMOVED AND THE HOLE BACKFILLED WITH SUITABLE MATERIAL. WHERE GRADE CORRECTION I S REQUIRED, THE SUBGRADE SHALL BE CUT TO CONFORM TO THE CROSS-SECTION AS SHOWN IN THE PLANS.
26. TRAFFIC SHALL BE MAINTAINED DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL SIGNS AND TRAFFIC CONTROL DEVICES. FLAG PERSONS SHALL BE PROVIDED BY THE CONTRACTOR IF DETERMINED NECESSARY BY THE ENGINEER. ALL SIGNS SHALL CONFORM TO THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AT NO COST TO THE TOWNSHIP. NO WORK SHALL BE DONE UNLESS THE APPROPRIATE TRAFFIC CONTROL DEVICES ARE IN PLACE.
27. ALL DEMOLISHED MATERIALS AND SOIL SPOILS SHALL BE REMOVED FROM THE SITE AT NO ADDITIONAL COST, AND DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
28. AFTER REMOVAL OF TOPSOIL, THE SUBGRADE SHALL BE COMPACTED TO 95% OF ITS UNIT WEIGHT.
29. ALL GRADING IN THE PLANS SHALL BE DONE AS PART OF THIS CONTRACT. ALL DELETERIOUS MATERIAL SHALL BE REMOVED FROM THE SUBGRADE PRIOR TO COMPACTING.
30. NO SEEDING SHALL BE DONE AFTER OCTOBER 15 WITHOUT APPROVAL OF THE ENGINEER.
31. ANY EXISTING APPURTENANCES SUCH AS MANHOLES, GATE VALVES, ETC. SHALL BE ADJUSTED TO THE PROPOSED GRADE AND SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
32. SOIL EROSION MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL VEGETATION HAS BEEN RE-ESTABLISHED.
33. ALL PERMANENT SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST REVISION OF THE MICHIGAN MUTCD MANUAL AND SHALL BE INCIDENTAL TO THE CONTRACT.
34. THE EXISTING AND PROPOSED ONSITE DRAINAGE SYSTEMS ARE TO BE OWNED AND PROPERLY MAINTAINED BY THE PROPERTY OWNER.



OVERALL SITE MAP

NO SCALE



LOCATION MAP

NO SCALE

SHEET INDEX

INDEMNIFICATION STATEMENT

THE CONTRACTOR SHALL HOLD HARMLESS THE DESIGN PROFESSIONAL, MUNICIPALITY, COUNTY, STATE AND ALL OF ITS SUB CONSULTANTS, PUBLIC AND PRIVATE UTILITY COMPANIES, AND LANDOWNERS FOR DAMAGES TO INDIVIDUALS AND PROPERTY, REAL OR OTHERWISE, DUE TO THE OPERATIONS OF THE CONTRACTOR AND/OR THEIR SUBCONTRACTORS.

PROJECT TEAM:

COPONEN ARCHITECTS
8002 W. GRAND RIVER, SUITE A
BRIGHTON, MI 48114
CONTACT: WALTER COPONEN
PHONE: 810.225.4141

KENNETH WEIKAL LANDSCAPE ARHITECTURE
33203 BIDDESTONE LANE
FARMINGTON HILLS, MI 48334
CONTACT: KEN WEIKAL
PHONE: 248.477.3600

LAKESHORE VILLAGE APARTMENTS
PHASE 3

PREPARED FOR:

THE LOCKWOOD COMPANIES
27777 FRANKLIN ROAD, SUITE 1410
SOUTHFIELD, MI 48034
CONTACT: MARK LOCKWOOD
PHONE: 248.433.7401

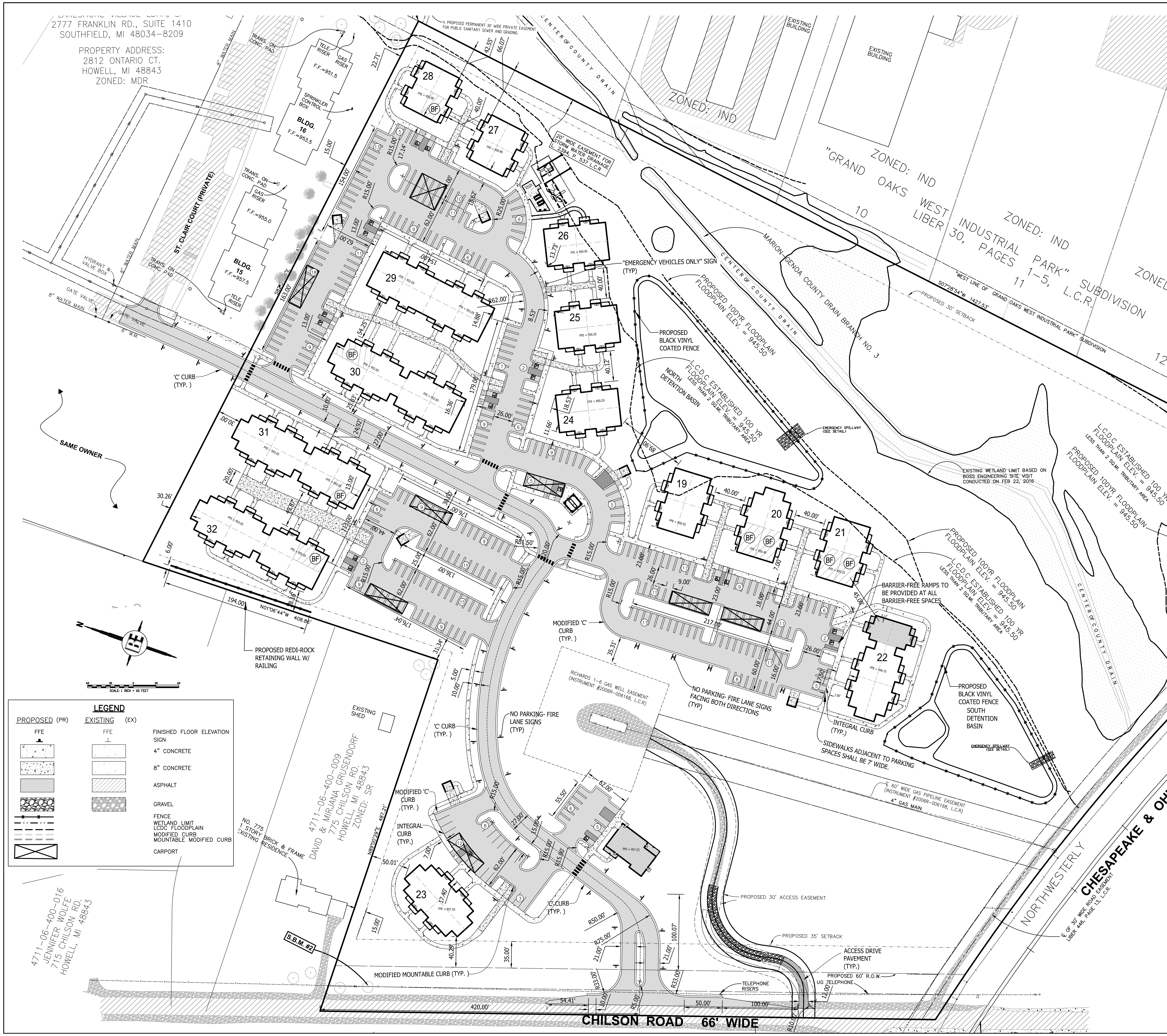
PREPARED BY:

BE BOSS Engineering
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
800.246.6735 FAX 517.548.1670

NO	BY	CK	REVISION PER	DATE
3	TE	BL	PER CLIENT – ADD 4 UNITS	2/22/18
2	RD	MJ	PER TOWNSHIP ENGINEER	5/9/16
1	RD	BL	TOWNSHIP ENGINEER, FIRE DEPT., TOWNSHIP PLANNERS	2/24/16

C1

ISSUE DATE: 2–3–16
JOB NO. 16–010



4 ADDITIONAL SINGLE UNIT APARTMENTS ADDED TO BUILDING 22, BUSINESS CENTER SHIFTED NORTH BY 31'

SITE DATA

SITE AREA: 27.80 ACRES
EXISTING ZONING: HDR (HIGH DENSITY RESIDENTIAL)

SETBACKS (MIN.):
FRONT – 35' MIN PROPOSED = 40.29'
SIDE – 15' (TOTAL 30') PROPOSED = 22.71'
REAR – 30' PROPOSED = 42.55'

MAX BUILDING HEIGHT:
3 STORY (40' HEIGHT) PROPOSED =2 STORY (25' HIGH)

LOT WIDTH: 165' MIN PROPOSED = 809.27'

DENSITY: (8 UNITS PER ACRE MAX.)
27.8 ACx8 = 222 UNITS MAX PROPOSED = 148 UNITS
1 BEDROOM UNITS 20 UNITS
2 BEDROOM UNITS 84 UNITS
3 BEDROOM UNITS 44 UNITS

PARKING CALCULATIONS:
2.0 SPACES PER EACH FAMILY (NON-ELDERLY) UNIT
1 SPACE FOR EVERY 200 SFT USEABLE FLOOR AREA FOR BUSINESS CENTER

2 SPACES/UNIT x 144 FAMILY UNITS = 296 SPACES
1/200 SFT x 1785 SFT U.F.A BUSINESS CENTER = 9 SPACES
TOTAL REQUIRED SPACES = 305 (INCLUDES 12 BARRIER-FREE)
TOTAL SPACES PROVIDED = 334 SPACES (20 BARRIER-FREE)
% OF PARKING SPACES PROVIDED ABOVE REQUIRED IS 10%

LOT COVERAGE:
35% MAX. BUILDING FOOTPRINT (9.73 AC MAX ALLOWED) = 2.10 AC (7.55%) PROVIDED
50% MAX. IMPERVIOUS SURFACE (13.9 AC MAX ALLOWED) = 6.48 AC (23.31%) PROVIDED

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171 (TOLL FREE)

BOSS Engineering
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
800.246.6735 FAX 517.548.1670

PROJECT
LAKESHORE VILLAGE APARTMENTS – PHASE 3

PREPARED FOR
THE LOCKWOOD COMPANIES
27777 FRANKLIN ROAD, SUITE 1410
SOUTHFIELD, MI 48034
248.433.7401

TITLE
SITE PLAN

NO	BY	REVISION PER	DATE
3	TE	PER CLIENT	2/22/18
1	RD	TOWNSHIP ENGINEER, FIRE DEPT., PLANNER	2/24/2016

DESIGNED BY: TD
DRAWN BY: RD
CHECKED BY:
SCALE 1" = 60'
JOB NO. 16–010
DATE 2–3–2016
SHEET NO. C5

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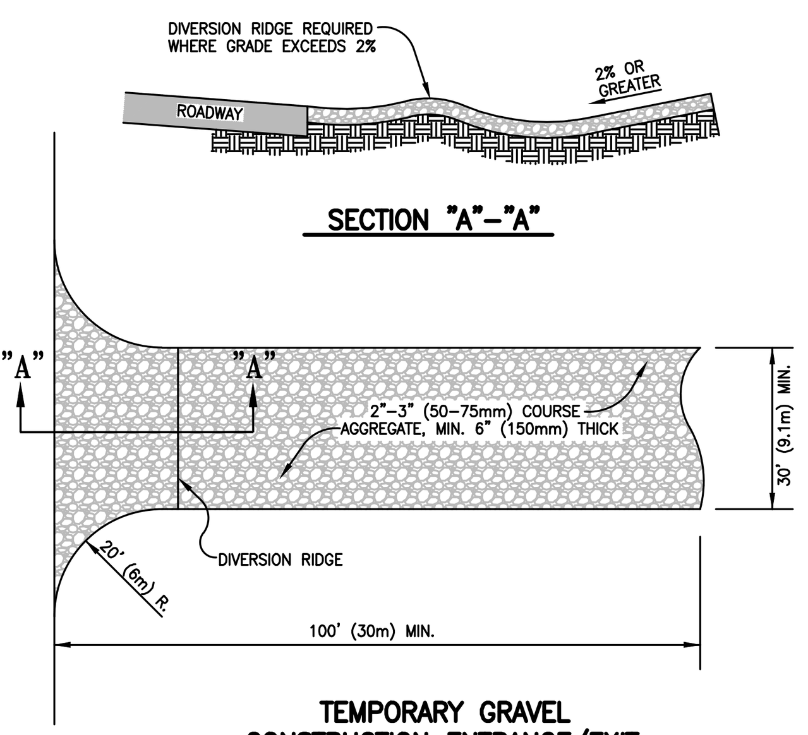
LEGEND

PROPOSED (PR)	EXISTING (EX)	
900	900	CONTOUR
		STORM DRAINAGE FLOW
T/C XXX.XX	+ 922.08	SPOT ELEVATION
FF	FF	FINISHED FLOOR ELEVATION
FG	FG	FINISHED GRADE ELEVATION
T/A	T/A	TOP OF ASPHALT
T/C	T/C	TOP OF CURB / CONCRETE
T/G	T/G	TOP OF GRAVEL
T/P	T/P	TOP OF PIPE
B/P	B/P	BOTTOM OF PIPE
RIM	RIM	RIM ELEVATION
INV	INV	INVERT ELEVATION
MH	MH	MANHOLE STRUCTURE
IN	IN	INLET STRUCTURE
CB	CB	CATCHBASIN STRUCTURE
ES	ES	END-SECTION
GV	GV	GATEVALVE STRUCTURE
HY	HY	HYDRANT
UP	UP	UTILITY POLE
SN	SN	SANITARY SEWER
SL	SL	SANITARY LEAD
FM	FM	FORCE MAIN
PS	PS	PRESSURE SEWER
ST	ST	STORM SEWER
WM	WM	WATER MAIN
WL	WL	WATER LEAD
FO	FO	FIBER OPTIC
OH	OH	OVERHEAD WIRE
C	C	CABLE
E	E	ELECTRIC
G	G	GAS
T	T	TELEPHONE
		MANHOLE
		INLET / CATCHBASIN
		FLARED END-SECTION
		GATE VALVE
		HYDRANT
		UTILITY POLE
		SIGN
		CONCRETE
		ASPHALT
		GRAVEL
		SILT FENCE
		DRAINAGE AREA LIMIT
		MATCH LINE
		CARPORT



TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
NO SCALE

SOIL EROSION CONTROL NOTES:

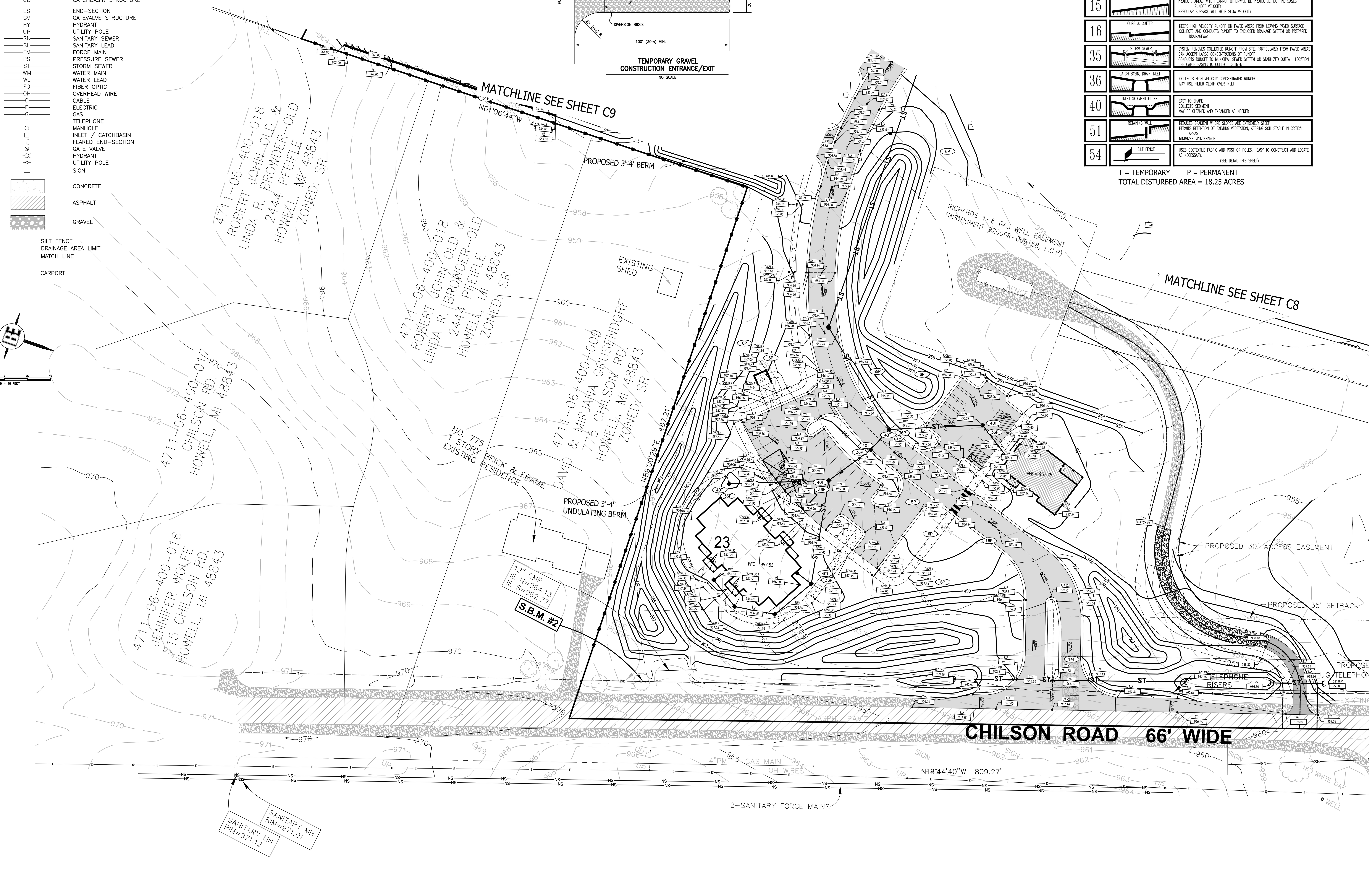
1. ALL CATCH BASINS TO HAVE INLET SEDIMENT FILTERS (40T)
2. ALL DISTURBED AREAS TO BE TOPSOILED, SEEDED, AND MULCHED.

SOIL EROSION CONTROL MEASURES:

No.	Measure	Description
6	SEEDING WITH MULCH AND/OR MATTING	FACILITATES ESTABLISHMENT OF VEGETATIVE COVER EFFECTIVE FOR DRAINAGEWAYS WITH LOW VELOCITY EASILY PLACED IN SMALL QUANTITIES BY INEXPERIENCED PERSONNEL SHOULD INCLUDE PREPARED TOPSOIL BED
14	AGGREGATE COVER	STABILIZES SOIL SURFACE, THUS MINIMIZING EROSION PERMITS CONSTRUCTION TRAFFIC IN ADVERSE WEATHER MAY BE USED AS PART OF PERMANENT BASE CONSTRUCTION OF PAVED AREAS
15	PAVING	PROTECTS AREAS WHICH CANNOT OTHERWISE BE PROTECTED, BUT INCREASES RUNOFF VELOCITY IRREGULAR SURFACE WILL HELP SLOW VELOCITY
16	CURB & GUTTER	KEEPS HIGH VELOCITY RUNOFF ON PAVED AREAS FROM LEAVING PAVED SURFACE COLLECTS AND CONDUCTS RUNOFF TO ENCLOSED DRAINAGE SYSTEM OR PREPARED DRAINAGEWAY
35	STORM SEWER	SYSTEM REMOVES COLLECTED RUNOFF FROM SITE, PARTICULARLY FROM PAVED AREAS CAN ACCEPT LARGE CONCENTRATIONS OF RUNOFF CONDUCTS RUNOFF TO MUNICIPAL SEWER SYSTEM OR STABILIZED OUTFALL LOCATION USE CATCH BASINS TO COLLECT SEDIMENT
36	CATCH BASIN, DRAIN INLET	COLLECTS HIGH VELOCITY CONCENTRATED RUNOFF MAY USE FILTER CLOTH OVER INLET
40	INLET SEDIMENT FILTER	EASY TO SHAPE COLLECTS SEDIMENT MAY BE CLEANED AND EXPANDED AS NEEDED
51	RETAINING WALL	REDUCES GRADIENT WHERE SLOPES ARE EXTREMELY STEEP PERMITS RETENTION OF EXISTING VEGETATION, KEEPING SOIL STABLE IN CRITICAL AREAS MINIMIZES MAINTENANCE
54	SILT FENCE	USES GEOTEXTILE FABRIC AND POST OR POLES. EASY TO CONSTRUCT AND LOCATE AS NECESSARY. (SEE DETAIL THIS SHEET)

T = TEMPORARY   P = PERMANENT

TOTAL DISTURBED AREA = 18.25 ACRES



THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171 (TOLL FREE)

BOSS Engineering
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
800.246.6735 FAX 517.548.1670

PROJECT: **LAKESHORE VILLAGE APARTMENTS – PHASE 3**

PREPARED FOR: **THE LOCKWOOD COMPANIES**
27777 FRANKLIN ROAD, SUITE 1410
SOUTHFIELD, MI 48034
248.433.7401

TITLE: **GRADING, DRAINAGE, & SOIL EROSION CONTROL PLAN**

NO	BY	REVISION PER	DATE
3	TE	PER CLIENT	2/22/18
1	RD	TOWNSHIP ENGINEER, FIRE DEPT., PLANNER	2/24/2016

DESIGNED BY: TD
DRAWN BY: RD
CHECKED BY:
SCALE 1" = 40'
JOB NO. 16-010
DATE 2-3-2016
SHEET NO. C7

LEGEND

PROPOSED (PR)	EXISTING (EX)	
900	900	CONTOUR
		STORM DRAINAGE FLOW
T/C XXX.XX	+ 922.08	SPOT ELEVATION
FF	FF	FINISHED FLOOR ELEVATION
FG	FG	FINISHED GRADE ELEVATION
T/A	T/A	TOP OF ASPHALT
T/C	T/C	TOP OF CURB / CONCRETE
T/G	T/G	TOP OF GRAVEL
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PS	PS	PRESSURE SEWER
ST	ST	STORM SEWER
WM	WM	WATER MAIN
WL	WL	WATER LEAD
FO	FO	FIBER OPTIC
OH	OH	OVERHEAD WIRE
C	C	CABLE
E	E	ELECTRIC
G	G	GAS
T	T	TELEPHONE
		MANHOLE
		INLET / CATCHBASIN
		FLARED END-SECTION
		GATE VALVE
		HYDRANT
		UTILITY POLE
		SIGN
		CONCRETE
		ASPHALT
		GRAVEL
		SILT FENCE
		DRAINAGE AREA LIMIT
		MATCH LINE

SOIL EROSION CONTROL NOTES:

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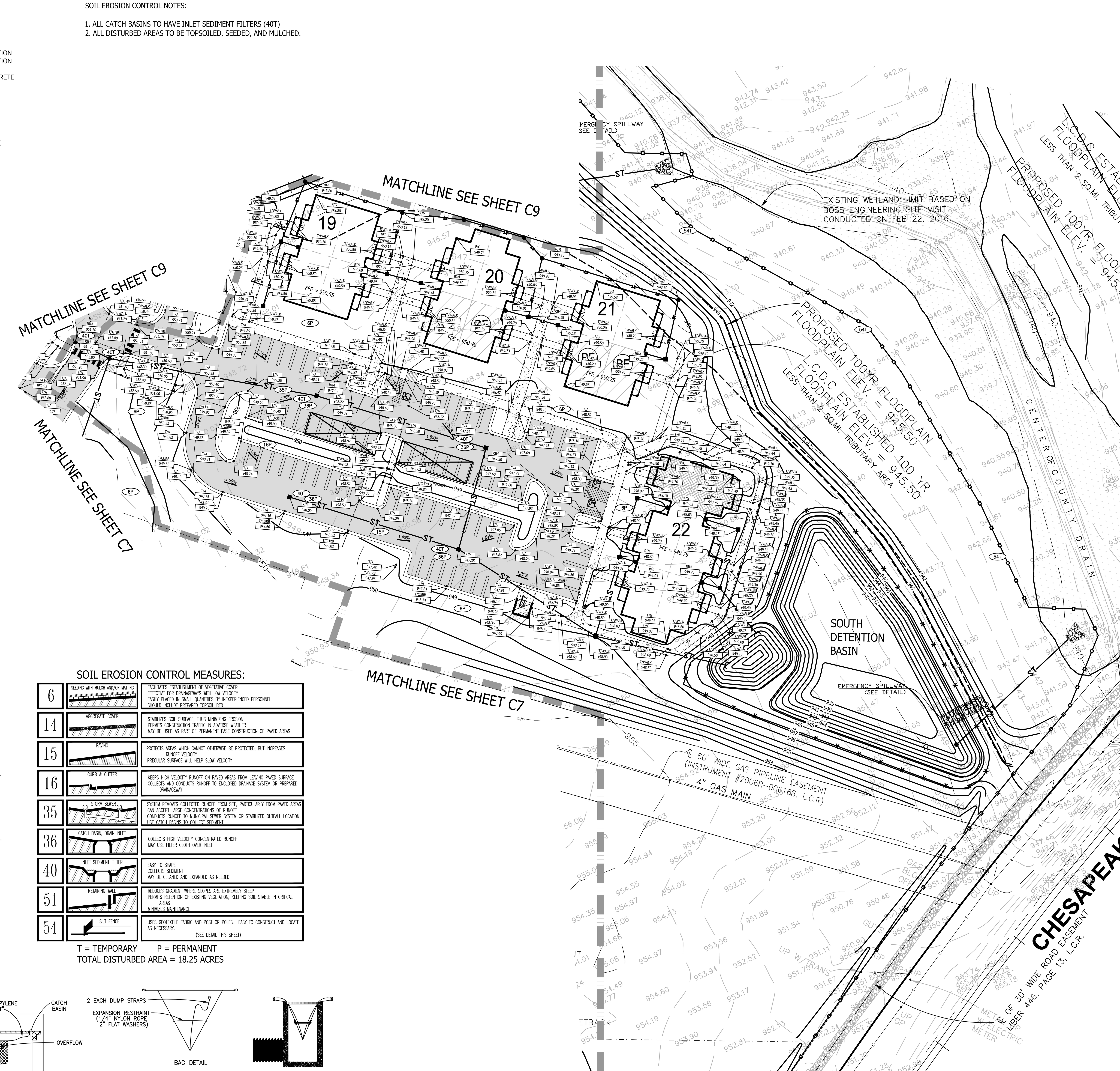
2. ALL DISTURBED AREAS TO BE TOPSOILED, SEEDED, AND MULCHED.



SOIL EROSION CONTROL MEASURES:

No.	Measure	Description
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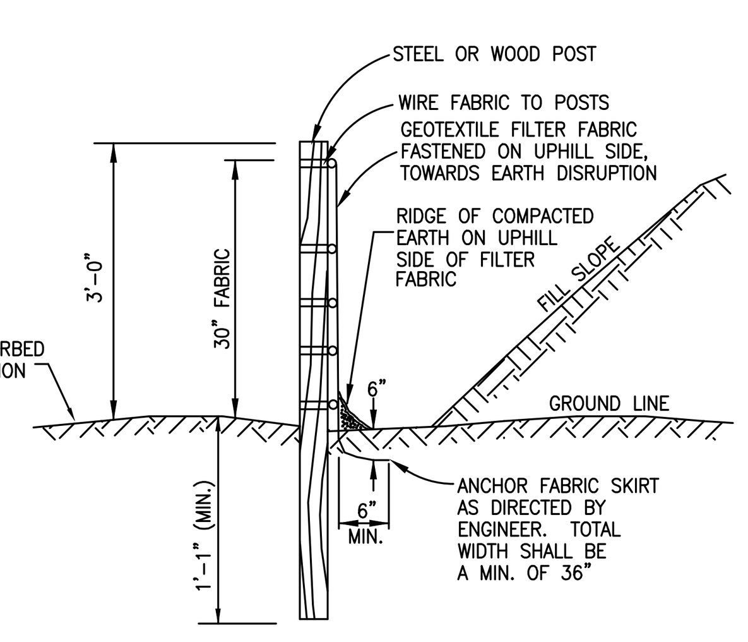
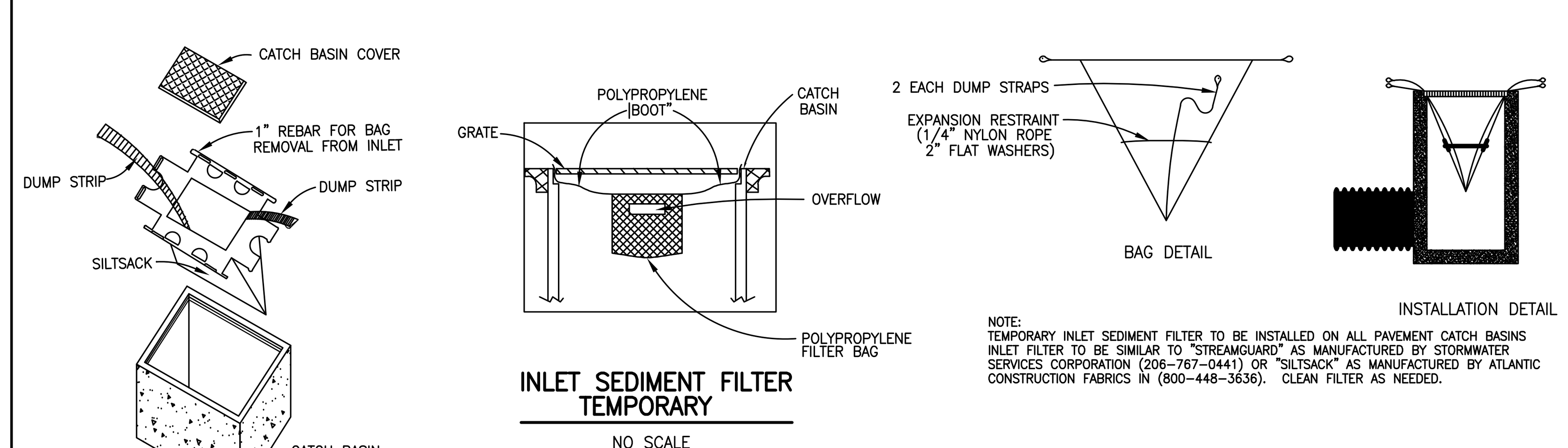
T = TEMPORARY P = PERMANENT

TOTAL DISTURBED AREA = 18.25 ACRES



SILT FENCE DETAIL

NO SCALE



INLET SEDIMENT FILTER TEMPORARY

NO SCALE

NOTE:
TEMPORARY INLET SEDIMENT FILTER TO BE INSTALLED ON ALL PAVEMENT CATCH BASINS INLET FILTER TO BE SIMILAR TO "STREAMGUARD" AS MANUFACTURED BY STORMWATER SERVICES CORPORATION (206-767-0441) OR "SILTSACK" AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRICS IN (800-448-3636). CLEAN FILTER AS NEEDED.

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

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3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
800.246.6735 FAX 517.548.1670

PROJECT: LAKESHORE VILLAGE APARTMENTS – PHASE 3

PREPARED FOR: THE LOCKWOOD COMPANIES, 27777 FRANKLIN ROAD, SUITE 1410, SOUTHFIELD, MI 48034, 248.433.7401

TITLE: GRADING, DRAINAGE, & SOIL EROSION CONTROL PLAN

NO	BY	REVISION PER	DATE
3	TE	PER CLIENT	2/22/18
1	RD	TOWNSHIP ENGINEER, FIRE DEPT., PLANNER	2/24/2016

DESIGNED BY: TD
DRAWN BY: RD
CHECKED BY:
SCALE 1" = 40'
JOB NO. 16-010
DATE 2-3-2016
SHEET NO. C8

SEE OFF-SITE UTILITY PLAN SHEET C13

LAKESHORE VILLAGE LDHA, LC
2777 FRANKLIN RD., SUITE 1410
SOUTHFIELD, MI 48034-8209

PROPERTY ADDRESS:
2812 ONTARIO CT.
HOWELL, MI 48843
ZONED: MDR

LEGEND

PROPOSED (PR)	EXISTING (EX)	
900	900	CONTOUR
T/C		STORM DRAINAGE FLOW
XXX.XX	+ 922.08	SPOT ELEVATION
FF	FF	FINISHED FLOOR ELEVATION
FG	FG	FINISHED GRADE ELEVATION
T/A	T/A	TOP OF ASPHALT
T/C	T/C	TOP OF CURB / CONCRETE
T/G	T/G	TOP OF GRAVEL
T/P	T/P	TOP OF PIPE
B/P	B/P	BOTTOM OF PIPE
RIM	RIM	RIM ELEVATION
INV	INV	INVERT ELEVATION
MH	MH	MANHOLE STRUCTURE
IN	IN	INLET STRUCTURE
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ES	ES	END-SECTION
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PS	PS	PRESSURE SEWER
ST	ST	STORM SEWER
WM	WM	WATER MAIN
WL	WL	WATER LEAD
FO	FO	FIBER OPTIC
OH	OH	OVERHEAD WIRE
C	C	CABLE
E	E	ELECTRIC
G	G	GAS
T	T	TELEPHONE
●	○	MANHOLE
■	□	INLET / CATCHBASIN
(	(	FLARED END-SECTION
⊗	⊗	GATE VALVE
✦	✦	HYDRANT
-o-	-o-	UTILITY POLE
⊥	⊥	SIGN
		CONCRETE
		ASPHALT
		GRAVEL
		WETLAND LIMIT
		LCDC FLOODPLAIN

SCALE: 1 INCH = 60 FEET

CONNECT TO EXISTING 8" WATERMAIN IN LAKESHORE VILLAGE PHASE 2

SAME OWNER

SANITARY SEWER LEAD DATA TABLE				
UNIT	RISER (FT)	LENGTH (FT)	SLOPE (%)	DIST. FROM DOWNSTREAM STRUCTURE
1	4	17	2.00%	75.19
2	3	17	2.00%	184.55
3	0	17	2.00%	293.91
4	0	94	1.00%	0.00
5	3	197	2.00%	120.98
6	2	19	2.00%	9.53
7	6	18	3.00%	21.10
8	6	38	3.00%	84.40
9	8	53	3.00%	52.07
10	8	27	3.00%	161.80
11	5	67	2.00%	26.01
12	4	58	2.00%	72.28
13	4	49	2.00%	85.50
14	2	37	2.00%	0.00
CLUB HOUSE	2	260	2.00%	0.00

SANITARY SEWER PIPE SCHEDULE						
PROPOSED PIPES (LABEL BASED ON UPSTREAM STRUCTURE)						
PIPE	LENGTH		SIZE		TYPE	SLOPE
2	123	FT.	8	IN.	PVC SDR 26	0.50%
3	375	FT.	8	IN.	PVC SDR 26	0.50%
4	236	FT.	8	IN.	PVC SDR 26	0.50%
5	180	FT.	8	IN.	PVC SDR 26	0.50%
6	161	FT.	8	IN.	PVC SDR 26	0.50%
7	145	FT.	8	IN.	PVC SDR 26	0.50%
8	45	FT.	8	IN.	PVC SDR 26	0.50%
9	161	FT.	8	IN.	PVC SDR 26	1.00%
10	250	FT.	8	IN.	PVC SDR 26	1.25%
11	160	FT.	8	IN.	PVC SDR 26	0.00%
12	151	FT.	8	IN.	PVC SDR 26	1.50%
13	213	FT.	8	IN.	PVC SDR 26	1.50%
14	299	FT.	8	IN.	PVC SDR 26	1.00%

STORM SEWER PIPE SCHEDULE				
PROPOSED PIPES (LABEL BASED ON UPSTREAM STRUCTURE)				
PIPE	LENGTH	SIZE	TYPE	SLOPE
1	99 FT.	24 IN.	RCP C-76 CLIV	0.50%
2	121 FT.	24 IN.	RCP C-76 CLIV	0.50%
3	132 FT.	12 IN.	RCP C-76 CLIV	0.32%
4	78 FT.	21 IN.	RCP C-76 CLIV	0.50%
5	132 FT.	18 IN.	RCP C-76 CLIV	0.50%
6	157 FT.	18 IN.	RCP C-76 CLIV	0.50%
7	28 FT.	12 IN.	RCP C-76 CLIV	0.32%
8	158 FT.	18 IN.	RCP C-76 CLIV	1.00%
9	44 FT.	12 IN.	RCP C-76 CLIV	0.32%
10	39 FT.	12 IN.	RCP C-76 CLIV	0.32%
11	190 FT.	15 IN.	RCP C-76 CLIV	1.50%
12	24 FT.	12 IN.	RCP C-76 CLIV	1.50%
13	45 FT.	12 IN.	RCP C-76 CLIV	2.00%
13A	87 FT.	12 IN.	RCP C-76 CLIV	1.00%
14	91 FT.	12 IN.	RCP C-76 CLIV	2.00%
14A	8 FT.	8 IN.	PVC SCH40	2.00%
14B	32 FT.	8 IN.	PVC SCH40	2.00%
15	81 FT.	12 IN.	RCP C-76 CLIV	1.00%
15A	76 FT.	8 IN.	PVC SCH40	1.00%
17	104 FT.	30 IN.	RCP C-76 CLIV	0.35%
18	100 FT.	30 IN.	RCP C-76 CLIV	0.35%
19	28 FT.	24 IN.	RCP C-76 CLIV	1.50%
20	36 FT.	24 IN.	RCP C-76 CLIV	1.00%
20A	74 FT.	6 IN.	PVC SCH40	1.25%
20B	102 FT.	6 IN.	PVC SCH40	1.25%
20C	40 FT.	6 IN.	PVC SCH40	1.00%
20D	101 FT.	6 IN.	PVC SCH40	1.00%
21	133 FT.	21 IN.	RCP C-76 CLIV	1.00%
22	60 FT.	18 IN.	RCP C-76 CLIV	1.00%
22A	62 FT.	6 IN.	PVC SCH40	3.50%
22B	96 FT.	6 IN.	PVC SCH40	3.50%
22C	72 FT.	6 IN.	PVC SCH40	1.00%
22D	102 FT.	6 IN.	PVC SCH40	2.50%
23	100 FT.	24 IN.	RCP C-76 CLIV	0.35%
23A	50 FT.	6 IN.	PVC SCH40	2.75%
23B	94 FT.	6 IN.	PVC SCH40	5.00%
23C	78 FT.	6 IN.	PVC SCH40	2.75%
23D	99 FT.	6 IN.	PVC SCH40	2.75%
24	134 FT.	18 IN.	RCP C-76 CLIV	0.50%
24A	47 FT.	6 IN.	PVC SCH40	2.50%
24B	94 FT.	6 IN.	PVC SCH40	4.00%
24C	74 FT.	6 IN.	PVC SCH40	2.50%
24D	92 FT.	6 IN.	PVC SCH40	2.50%
25	87 FT.	18 IN.	RCP C-76 CLIV	0.30%
26	188 FT.	15 IN.	RCP C-76 CLIV	0.30%
27	131 FT.	12 IN.	RCP C-76 CLIV	0.32%
28	50 FT.	12 IN.	RCP C-76 CLIV	0.32%
28A	52 FT.	6 IN.	PVC SCH40	1.00%
28B	50 FT.	6 IN.	PVC SCH40	1.00%
29	92 FT.	12 IN.	RCP C-76 CLIV	0.32%
29A	24 FT.	6 IN.	PVC SCH40	1.00%
29B	47 FT.	6 IN.	PVC SCH40	1.00%
30	107 FT.	12 IN.	RCP C-76 CLIV	0.50%
32	121 FT.	12 IN.	RCP C-76 CLIV	0.50%
101	29 FT.	8 IN.	PVC SCH40	1.00%
102	64 FT.	8 IN.	PVC SCH40	1.00%
201	39 FT.	8 IN.	PVC SCH40	1.00%
202	37 FT.	8 IN.	PVC SCH40	1.00%
203	67 FT.	8 IN.	PVC SCH40	1.00%
204	40 FT.	8 IN.	PVC SCH40	1.00%
205	64 FT.	8 IN.	PVC SCH40	1.00%
206	48 FT.	8 IN.	PVC SCH40	1.00%
301	28 FT.	8 IN.	PVC SCH40	1.00%
302	46 FT.	8 IN.	PVC SCH40	1.00%
303	63 FT.	8 IN.	PVC SCH40	1.00%
304	46 FT.	8 IN.	PVC SCH40	1.00%
305	64 FT.	8 IN.	PVC SCH40	1.00%
306	46 FT.	8 IN.	PVC SCH40	1.00%

NOTE:
STORM SEWER AND WATER MAIN ARE INSTALLED AS OF 2/16/18

UTILITY DATA:
A RATIO OF 0.57 R.E.U.'S PER UNIT WAS DEVELOPED BY THE TOWNSHIP FOR PHASE 3.
144 UNITS x 0.57 = 82 REU'S

CHILSON ROAD 66' WIDE

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PROJECT
LAKESHORE VILLAGE APARTMENTS - PHASE 3

PREPARED FOR
THE LOCKWOOD COMPANIES
27777 FRANKLIN ROAD, SUITE 1410
SOUTHFIELD, MI 48034
248.433.7401

TITLE
UTILITY PLAN

NO	BY	REVISION PER	DATE
3	TE	PER CLIENT	2/22/18
1	RD	TOWNSHIP ENGINEER, FIRE DEPT., PLANNER	2/24/2016

DESIGNED BY: TD
DRAWN BY: RD
CHECKED BY:
SCALE 1" = 60'
JOB NO. 16-010
DATE 2-3-2016
SHEET NO. C12

BOSS Engineering

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PIPE	FROM	TO	DRAIN AREA	ACRES A	AREA IMPERV 0.9	AREA PERV 0.2	RUNOFF COEFF C	EQUIV. AREA A * C	INTEN-SITY I	TIME OF CONC. T_C	ADD'L RUNOFF Q	RUNOFF (CFS) Q	PIPE LENGTH (LF)	PIPE DIA. (IN)	VELOCITY FLOWING FULL (FPS)
14	CB14	CB13	14	0.14	0.01	0.13	0.26	0.0377	4.37	15.06	0.43	0.84	91	12	1.07
13	CB13	CB12	13	0.23	0.20	0.04	0.79	0.1838	4.34	15.30	0.14	1.78	45	12	2.27
12	CB12	CB11	12	0.84	0.16	0.68	0.33	0.28	4.33	15.42		3.00	24	12	3.82
11	CB11	MH08	11	0.40	0.21	0.20	0.56	0.2246	4.32	15.49	0.81	4.77	103	15	3.89
8	MH08	CB06	8	-	-	-	-	-	4.28	15.86		4.77	267	15	3.89
6	CB06	CB05	6	0.29	0.08	0.22	0.38	0.1128	4.18	16.84	0.51	5.76	157	18	3.26
5	CB05	CB04	5	0.39	0.27	0.12	0.69	0.2681	4.12	17.46		6.86	132	18	3.88
4	CB04	CB02	4	0.49	0.32	0.17	0.65	0.3212	4.07	17.98		8.17	78	21	3.40
2	CB02	MH01	2	1.54	0.55	1.00	0.45	0.6897	4.05	18.26	1.58	12.54	121	24	3.99
1	MH01	FES00	1	-	-	-	-	-	4.01	18.65	0.34	12.89	99	24	4.10
3	CB03	CB02	3	1.11	0.20	0.91	0.33	0.3622	4.38	15.00		1.58	132	12	2.02
7	CB07	CB06	7	0.18	0.12	0.06	0.66	0.1164	4.38	15.00		0.51	28	12	0.65
32	OCS32	FES33	-	-	-	-	-	-	-	-		0.92	115	12	1.17
27	CB27	CB26	27	0.45	0.21	0.23	0.54	0.2394	4.38	15.00		1.05	131	12	1.33
26	CB26	CB25	26	0.37	0.21	0.17	0.59	0.218	4.28	15.85	1.69	3.67	188	15	2.99
25	CB25	CB24	25	0.25	0.23	0.02	0.85	0.2108	4.16	17.04	1.09	5.65	87	18	3.19
24	CB24	CB23	24	0.39	0.22	0.17	0.60	0.2348	4.12	17.52	0.51	7.12	134	18	4.03
23	CB23	CB18	23	0.32	0.21	0.11	0.66	0.2101	4.06	18.12	1.49	9.46	100	24	3.01
18	CB18	CB17	18	0.22	0.20	0.02	0.84	0.1879	4.02	18.51	12.93	23.15	100	30	4.72
17	CB17	FES16	17	0.35	0.28	0.08	0.75	0.2641	3.99	18.85		24.20	114	30	4.93
22	CB22	CB21	22	5.59	0.09	5.50	0.21	1.1805	4.38	15.00	0.68	5.85	60	18	3.31
21	CB21	CB20	21	0.56	0.38	0.19	0.67	0.377	4.36	15.17	2.09	9.58	133	18	5.42
20	CB20	CB19	20	0.38	0.29	0.09	0.73	0.2786	4.32	15.54		10.78	36	18	6.10
19	CB19	CB18	19	0.85	0.24	0.61	0.40	0.3411	4.31	15.63		12.25	28	18	6.93
29	CB29	CB26	29	0.32	0.25	0.07	0.75	0.2398	4.38	15.00	0.64	1.69	92	12	2.15
28	CB28	CB25	28	0.29	0.14	0.15	0.53	0.1524	4.38	15.00	0.43	1.09	50	12	1.39
30	OCS30	FES31	-	-	-	-	-	-	-	-		1.27	96	12	1.61

PIPE	HYDRAULIC GRADIENT SLOPE %	ACTUAL SLOPE USED	MANNING FLOW CAPACITY	MANNING'S VELOCITY (FT/SEC)	TIME (MIN)	HG ELEV UPPER END	HG ELEV LOWER END	RIM ELEV UPPER END	INVERT UPPER END	INVERT LOWER END	DROP DISTANCE (FT)	RIM-INV	RIM-HG >1	PIPE COVER >2.667	FLOW THRU COVER
14	2.00%	2.00%	5.05	6.43	0.24	953.30	951.47	956.15	952.50	950.67		3.65	2.85	2.65	0.16
13	2.00%	2.00%	5.05	6.43	0.12	951.47	950.57	955.50	950.67	949.77		4.83	4.03	3.83	0.80
12	1.50%	1.50%	4.38	5.57	0.07	950.57	950.21	954.70	949.77	949.41		4.93	4.13	3.93	1.21
11	0.54%	0.75%	5.61	4.57	0.38	950.21	949.44	954.70	949.21	948.44		5.49	4.49	4.24	0.97
8	0.54%	0.75%	5.61	4.57	0.97	949.44	947.44	956.50	948.44	946.44	1.65	8.06	7.06	6.81	0.00
6	0.50%	0.50%	7.45	4.21	0.62	945.79	945.00	951.70	944.59	943.80		7.11	5.91	4.01	0.47
5	0.42%	0.50%	7.45	4.21	0.52	945.00	944.34	947.95	943.80	943.14		4.15	2.95	2.65	1.11
4	0.50%	0.50%	11.23	4.67	0.28	944.34	943.95	947.30	942.94	942.55		4.36	2.96	2.61	1.31
2	0.50%	0.50%	16.04	5.11	0.39	943.95	943.35	947.35	942.35	941.75		5.00	3.40	3.00	2.79
1	0.50%	0.50%	16.04	5.11	0.32	943.35	942.85	949.00	941.75	941.25		7.25	5.65	5.25	0.00
3	0.50%	0.50%	2.53	3.22	0.68	945.00	944.34	948.00	944.20	943.54		3.80	3.00	2.80	1.58
7	1.00%	1.00%	3.57	4.55	0.10	946.07	945.79	951.70	945.27	944.99		6.43	5.63	5.43	0.51
32	0.50%	0.50%	2.53	3.22	0.59	940.80	940.23	947.00	940.00	939.43		7.00	6.20	6.00	0.00
27	0.32%	0.32%	2.02	2.57	0.85	946.05	945.63	951.50	945.01	944.59		6.49	5.45	5.49	1.05
26	0.32%	0.25%	3.24	2.64	1.19	945.63	945.03	950.30	944.39	943.92		5.91	4.67	4.66	0.93
25	0.29%	0.25%	5.27	2.98	0.49	945.03	944.78	948.75	943.72	943.50		5.03	3.72	3.53	0.88
24	0.46%	0.40%	6.66	3.77	0.59	944.78	944.17	947.80	943.50	942.97		4.30	3.02	2.80	0.97
23	0.35%	0.35%	13.42	4.27	0.39	944.17	943.82	948.55	942.57	942.22	0.10	5.98	4.38	3.98	0.85
18	0.32%	0.35%	24.33	4.96	0.34	943.72	943.39	949.20	941.72	941.36		7.48	5.48	4.98	0.76
17	0.35%	0.32%	23.27	4.74	0.40	943.39	943.00	948.40	941.36 941.36	941.00		7.04	5.01	4.54	1.05
22	1.00%	1.00%	10.53	5.96	0.17	946.52	945.92	951.50	945.32	944.72		6.18	4.98	4.68	5.16
21	0.83%	1.00%	10.53	5.96	0.37	945.92	944.59	951.50	944.72	943.39		6.78	5.58	5.28	1.64
20	1.05%	1.25%	11.78	6.66	0.09	944.59	944.14	950.80	943.39	942.94		7.41	6.21	5.91	1.20
19	1.35%	1.50%	12.90	7.30	0.06	944.14	943.72	949.20	942.94	942.52		6.26	5.06	4.76	1.47
29	0.32%	0.32%	2.02	2.57	0.60	945.69	945.39	948.85	944.89	944.59		3.96	3.16	2.96	1.05
28	0.32%	0.32%	2.02	2.57	0.32	945.08	944.92	948.45	944.28	944.12		4.17	3.37	3.17	0.67
30	0.50%	0.50%	2.53	3.22	0.50	940.80	940.32	946.00	940.00	939.52		6.00	5.20	5.00	0.00

STORM SEWER INVENTORY

FES 00		
FLARED END SECTION W/ ANIMAL GRATE		
RIM	N/A	
INVERT	24	941.25

MH01		
4' DIA MANHOLE, COVER 'A'		
RIM	949.00	
INV. S	24	941.75
INV. N	24	941.75
INV. E	6	942.95

CB02		
4' DIA CATCH BASIN, COVER 'D'		
RIM	947.35	
INV. S	24	942.35
INV. E	21	942.55
INV. N	12	943.54
2' SUMP		

CB03		
2' DIA CATCH BASIN, COVER 'D'		
RIM	948.00	
INV. S	12	944.20
2' SUMP		

CB04		
4' DIA CATCH BASIN, COVER 'D'		
RIM	947.30	
INV. W	21	942.94
INV. N	18	943.14
2' SUMP		

CB05		
4' DIA CATCH BASIN, COVER 'D'		
RIM	947.95	
INV. S	18	943.80
INV. N	18	943.80
2' SUMP		

CB06		
4' DIA CATCH BASIN, COVER 'K'		
RIM	951.70	
INV. SE	18	944.59
INV. SW	15	946.44
INV. N	12	944.99
2' SUMP		

CB07		
2' DIA CATCH BASIN, COVER 'K'		
RIM	951.70	
INV. S	12	945.27
2' SUMP		

MH08		
4' DIA. MANHOLE, COVER 'A'		
RIM	956.50	
INV. E	15	948.44
INV.W	15	948.44

*NOTE: STRUCTURES 9 AND 10 INTENTIONALLY OMMITTED

CB11		
4' DIA CATCH BASIN, COVER 'K'		
RIM	954.70	
INV. E	15	949.21
INV.N	12	949.41
INV. S	12	949.41
2' SUMP		

CB12		
4' DIA CATCH BASIN, COVER 'K'		
RIM	954.70	
INV. E	12	949.77
INV. W	12	949.77
2' SUMP		

CB13		
4' DIA CATCH BASIN, COVER 'D'		
RIM	955.50	
INV. SW	12	950.67
INV. NW	6	951.07
INV. W	12	951.07
2' SUMP		

CB14		
4' DIA CATCH BASIN, COVER 'E'		
RIM	956.15	
INV. E	12	952.50
INV. NW	6	952.90
INV. N	6	952.90
2' SUMP		

CB15		
4' DIA CATCH BASIN, COVER 'K'		
RIM	955.10	
INV. N	12	950.23
INV. W	8	950.49
2' SUMP		

FES 16		
FLARED END SECTION W/ ANIMAL GRATE		
RIM	N/A	
INVERT	30	941.00

CB17		
5' DIA CATCH BASIN, COVER 'D'		
RIM	948.40	
INV. SE	30	941.36
INV. NW	30	941.36
2' SUMP		

CB18		
5' DIA CATCH BASIN, COVER 'K'		
RIM	949.20	
INV. SE	30	941.72
INV. E	24	942.22
INV. W	18	942.52
INV. N	6	942.92
2' SUMP		

CB19		
4' DIA CATCH BASIN, COVER 'K'		
RIM	949.20	
INV. E	18	942.94
INV. W	18	942.94
2' SUMP		

CB20		
4' DIA CATCH BASIN, COVER 'D'		
RIM	950.80	
INV. E	18	943.39
INV.NW	18	943.39
2' SUMP		

CB21		
4' DIA CATCH BASIN, COVER 'D'		
RIM	951.50	
INV. SE	18	944.72
INV. NW	18	944.72
2' SUMP		

CB22		
4'CB, COVER 'EJIW 1581 TYPE M FLAT GRATE'		
RIM	951.50	
INV. SE	18	945.32
INV. N	6	946.12
2' SUMP		

CB23		
4' DIA CATCH BASIN, COVER 'D'		
RIM	948.55	
INV. E	24	942.57
INV.NW	18	942.97
INV. N	6	943.77
INV. S	6	943.77
2' SUMP		

CB24		
4' DIA CATCH BASIN, COVER 'D'		
RIM	947.80	
INV. E	18	943.50
INV.NW	18	943.50
INV. N	6	944.30
2' SUMP		

CB25		
4' DIA CATCH BASIN, COVER 'D'		
RIM	948.75	
INV. SW	18	943.72
INV.N	15	943.92
INV. E	12	944.12
2' SUMP		

CB26		
4' DIA CATCH BASIN, COVER 'D'		
RIM	950.30	
INV.S	15	944.39
INV. W	12	944.59
INV. E	12	944.59
2' SUMP		

CB27		
2' DIA CATCH BASIN, COVER 'D'		
RIM	951.50	
INV. E	12	945.01
2' SUMP		

CB28		
4' DIA CATCH BASIN, COVER 'D'		
RIM	948.45	
INV. W	12	944.28
INV. NE	6	944.68
INV. SE	6	944.68
2' SUMP		

CB29		
4' DIA CATCH BASIN, COVER 'D'		
RIM	948.85	
INV. W	12	944.89
INV. E	6	945.29
INV. S	6	945.29
2' SUMP		

OCS30		
OUTLET CONTROL STUCTURE		
RIM	945.00	
INVERT	12	940.00

FES31		
FLARED END SECTION		
RIM	N/A	
INVERT	12	939.52

OCS32		
OUTLET CONTROL STUCTURE		
RIM	945.00	
INVERT	12	940.00

FES33		
FLARED END SECTION W/ ANIMAL GRATE		
RIM	N/A	
INVERT	12	939.43

LIVINGSTON COUNTY DETENTION BASIN CALCULATIONS

SOUTH BASIN

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
3.00	0.9	2.70
0.00	0.7	0.00
8.03	0.2	1.61

COMPOUND C: 0.39
TOTAL DRAINAGE AREA: 11.03 ACRES

K1 = AxC (Design Constant) 4.3017
Qa=MAX ALLOW OUTFLOW (0.083 CFS / ACRE 0.915 CFS

DURATION MINUTES	DURATION SECONDS	INTENSITY (IN/HR)	INCHES	INFLOW VOLUME IN. RUNOFF x A x C	OUTFLOW DURATION x Qo	STORAGE VOLUME INFLOW - OUTFLOW
5	300	9.17	2750	11830	275	11555
10	600	7.86	4714	20279	549	19730
15	900	6.88	6188	26617	824	25793
20	1200	6.11	7333	31546	1098	30448
30	1800	5.00	9000	38715	1647	37068
60	3600	3.24	11647	50102	3294	46808
90	5400	2.39	12913	55548	4941	50607
120	7200	1.90	13655	58740	6588	52152
180	10800	1.34	14488	62322	9882	52440

REQUIRED 100 YEAR DETENTION VOLUME = 52440 CF

FOREBAY VOLUME
V(F) = 5% OF THE 100-YEAR STORM VOLUME BASED ON THE AREA TRIBUTARY TO THE INLET

V(F)= (.05)(V100)
V(F)= 2622 CF
FOREBAY STORAGE VOLUME REQUIRED: 2622 CF

FOREBAY STORAGE VOLUME PROVIDED:

ELEV	*AREA*	*VOLUME*	*CUMMULATIVE VOLUME*	
945	1587	**1368**	**3407**	**DESIGN HIGHWATER ELEVATION**
944	1149	**959**	**2039**	
943	769	607	**1080**	
942	445	473	**473**	
941	501	0	**0**	BOTTOM OF FOREBAY
940	251	0	**0**	
939	76	0	**0**	

BANKFULL FLOOD VOLUME
V_{BF} = 5160 x A x C= **22197 CF**

FIRST FLUSH VOLUME
V_{FF} = 1815 x A x C= **7808 CF**

BASIN STORAGE PROVIDED

ELEV.	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
946	21075.79	1	18,673	80,126	FREEBOARD ELEVATION
945	16270	1	15,437	**61,453**	**DESIGN HIGHWATER ELEVATION**
944	14604	1	13,804	46,016	
943	13003	1	12,233	32,212	
942	11464	1	10,716	19,979	
941	9967	1	9,263	9,263	
940	8559		0	0	

BOTTOM OF BASIN = 940.00
FIRST FLUSH X_{FF} = 940.84
BANKFULL X_{BF} = 942.17
100 YEAR X_{100} = 944.42

OUTLET CONTROL STRUCTURE

FIRST FLUSH OF RUNOFF
THE AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 0.5" OVER AREA OF SITE IN 24 HRS.

$Q_{FF} = V_{FF}$ x (1/24HRS) x (1HR/3600SEC)= 0.090 CFS

PLACE OPENINGS IN STANDPIPE AT BOTTOM OF BASIN = **940.00**

HEAD = $h_{FF} = X_{FF}$ - BOTTOM BASIN ELEV = 0.84 FT

$A = Q_{FF} / (0.62 \times (2 \times 32.2 \times h_{FF})^{0.5})$ = 0.020 FT^2

A 1 INCH DIAMETER ORIFICE HAS AN AREA OF 0.0055 SF

A/ 0.0055 = 3.63

THEREFORE, USE THE FOLLOWING NUMBER OF 1 INCH DIAMETER HOLES
3.00 HOLES, AT ELEV. 940.00
Q_{FF}MAX = 0.171 CFS

BANKFULL FLOOD
FOR THE ALLOWABLE RELEASE RATE OF 24-40 HOURS, CHECK THE DISCHARGE THROUGH THE FIRST FLUSH ORIFICE TO SEE IF ADDITIONAL HOLES ARE NECESSARY.

HEAD = h = X_{BF} - BOTTOM OF BASIN = 2.17 FT

$Q_{90.0}$ = 0.62x #HOLES x (AREA EACH $HOLE_{FF}$) x $(2 \times 32.2 \times h)^{0.5}$ = 0.120 CFS
$T_{90.0}$ = (1SEC / $Q_{90.0}$) x V_{BF} x (1HR / 3600SEC) = 51.41 HRS

BECAUSE THE HOLDING TIME EXCEEDS 40 HRS, ADDITIONAL ORIFICES IN THE STANDPIPE ARE REQUIRED.

VOLUME THROUGH 3 1 INCH DIAMETER HOLES IN 24 HOURS:
V=Q90.0x24HRSx3600SEC/HR = 10362 CF
REMAINING VOL. = 11834 CF
QBF = REMAINING VOLUME x (1 / 24HRS) x (1 / 3600SEC) = 0.137 CFS

PLACE OPENINGS AT FIRST FLUSH ELEVATION = 940.84
HEAD = hBF = XBF -XFF = 1.33 FT
A = QBF / (O.62 * (2*32.2*hBF)^0.5) = 0.024 SF

A 1 INCH DIAMETER ORIFICE HAS AN AREA OF 0.0055 SF
A/ 0.0055 = 4.38
THEREFORE, USE 4 1 INCH DIAMETER HOLES AT ELEV. = 940.84
Q_{BF}MAX = 0.205 CFS

100 YEAR FLOOD

Q_a = ALLOWABLE RELEASE RATE x AREA SITE IN ACRES= 0.915 CFS

Q_a IS A PEAK OR MAXIMUM FLOW. CALCULATE THE MAXIMUM FLOW PASSING THROUGH FIRST FLUSH AND BANKFULL ORIFICES, USING THE TOTAL HEAD, AND SUBTRACT FROM Q_a TO DETERMINE THE ORIFICE SIZE TO RELEASE THE 100 YEAR STORM VOLUME:

$Q_{FF}MAX + Q_{BF}MAX$ = 0.38 CFS

$Q_a - (Q_{FF}MAX + Q_{BF}MAX)$ = 0.54 CFS

$A = Q_a / (0.62 * (2 * 32.2 * (X_{100} - X_{BF}))^{0.5})$ = 0.072 SF

A 1.5 INCH DIAMETER ORIFICE HAS AN AREA OF 0.012 SF

A/ 0.012 = 5.89

THEREFORE, USE THE FOLLOWING NUMBER OF 1.5 INCH DIAMETER HOLES:
5 HOLES AT ELEV. = 942.17

Q_{100} = 0.458 CFS
$Q_O = Q_{100} + Q_{BF}MAX + Q_{FF}MAX$ 0.834 CFS

SUMMARY OF REQUIRED STANDPIPE HOLES:			
ELEVATION	**# OF HOLES**	**DIAMETER OF HOLES**	
942.17	**5**	**1.5**	**INCHES**
940.84	**4**	**1**	**INCHES**
940.00	**3**	**1**	**INCHES**

LIVINGSTON COUNTY DETENTION BASIN CALCULATIONS

NORTH BASIN

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
4.71	0.9	4.24
0.00	0.7	0.00
10.28	0.2	2.06

COMPOUND C: 0.42
TOTAL DRAINAGE AREA: 14.99 ACRES

K1 = AxC (Design Constant) 6.2958
Qa=MAX ALLOW OUTFLOW (0.083 CFS / ACRE 1.244 CFS

DURATION MINUTES	DURATION SECONDS	INTENSITY (IN/HR)	INCHES	INFLOW VOLUME IN. RUNOFF x A x C	OUTFLOW DURATION x Qo	STORAGE VOLUME INFLOW - OUTFLOW
5	300	9.17	2750	17313	373	16940
10	600	7.86	4714	29680	746	28934
15	900	6.88	6188	38955	1120	37836
20	1200	6.11	7333	46169	1493	44676
30	1800	5.00	9000	56662	2239	54423
60	3600	3.24	11647	73328	4478	68849
90	5400	2.39	12913	81298	6718	74580
120	7200	1.90	13655	85970	8957	77013
180	10800	1.34	14488	91212	13435	77777

REQUIRED 100 YEAR DETENTION VOLUME = 77777 CF

FOREBAY VOLUME
V(F) = 5% OF THE 100-YEAR STORM VOLUME BASED ON THE AREA TRIBUTARY TO THE INLET

V(F)= (.05)(V100)
V(F)= 3889 CF
FOREBAY STORAGE VOLUME REQUIRED: 3889 CF

FOREBAY STORAGE VOLUME PROVIDED:

ELEV	*AREA*	*VOLUME*	*CUMMULATIVE VOLUME*	
945	**2339**	**2064**	**5352**	**DESIGN HIGHWATER ELEVATION**
944	1788	1541	3289	
943	1293	1073	1748	
942	852	676	676	
941	499	369	369	
940	239	0	0	

BANKFULL FLOOD VOLUME
V_{BF} = 5160 x A x C= **32486 CF**

FIRST FLUSH VOLUME
V_{FF} = 1815 x A x C= **11427 CF**

BASIN STORAGE PROVIDED

ELEV.	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
946	29815	1	27,010	113,823	FREEBOARD ELEVATION
945	**24205**	1	**23,073**	**86,813**	**DESIGN HIGHWATER ELEVATION**
944	21941	1	20,829	63,740	
943	19717	1	18,645	42,911	
942	17572	1	16,526	24,266	
941	15480	1	7,740	7,740	
940	13520		0	0	

BOTTOM OF BASIN = 940.00
FIRST FLUSH X_{FF} = 941.22
BANKFULL X_{BF} = 942.42
100 YEAR X_{100} = 944.61

OUTLET CONTROL STRUCTURE

FIRST FLUSH OF RUNOFF
THE AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 0.5" OVER AREA OF SITE IN 24 HRS.

$Q_{FF} = V_{FF}$ x (1/24HRS) x (1HR/3600SEC)= 0.132 CFS

PLACE OPENINGS IN STANDPIPE AT BOTTOM OF BASIN = **940.00**

HEAD = $h_{FF} = X_{FF}$ - BOTTOM BASIN ELEV = 1.22 FT

$A = Q_{FF} / (0.62 \times (2 \times 32.2 \times h_{FF})^{0.5})$ = 0.024 FT^2

A 1 INCH DIAMETER ORIFICE HAS AN AREA OF 0.0055 SF

A/ 0.0055 = 4.41

THEREFORE, USE THE FOLLOWING NUMBER OF 1 INCH DIAMETER HOLES
4.00 HOLES, AT ELEV. 940.00
Q_{FF}MAX = 0.233 CFS

BANKFULL FLOOD
FOR THE ALLOWABLE RELEASE RATE OF 24-40 HOURS, CHECK THE DISCHARGE THROUGH THE FIRST FLUSH ORIFICE TO SEE IF ADDITIONAL HOLES ARE NECESSARY.

HEAD = h = X_{BF} - BOTTOM OF BASIN = 2.42 FT

$Q_{90.0}$ = 0.62x #HOLES x (AREA EACH $HOLE_{FF}$) x $(2 \times 32.2 \times h)^{0.5}$ = 0.169 CFS
$T_{90.0}$ = (1SEC / $Q_{90.0}$) x V_{BF} x (1HR / 3600SEC) = 53.48 HRS

BECAUSE THE HOLDING TIME EXCEEDS 40 HRS, ADDITIONAL ORIFICES IN THE STANDPIPE ARE REQUIRED.

VOLUME THROUGH 4 1 INCH DIAMETER HOLES IN 24 HOURS:
V=Q90.0x24HRSx3600SEC/HR = 14579 CF
REMAINING VOL. = 17907 CF
QBF = REMAINING VOLUME x (1 / 24HRS) x (1 / 3600SEC) = 0.207 CFS

PLACE OPENINGS AT FIRST FLUSH ELEVATION = 941.22
HEAD = hBF = XBF -XFF = 1.19 FT
A = QBF / (O.62 * (2*32.2*hBF)^0.5) = 0.038 SF

A 1 INCH DIAMETER ORIFICE HAS AN AREA OF 0.0055 SF
A/ 0.0055 = 6.99
THEREFORE, USE 6 1 INCH DIAMETER HOLES AT ELEV. = 941.22
Q_{BF}MAX = 0.300 CFS

100 YEAR FLOOD

Q_a = ALLOWABLE RELEASE RATE x AREA SITE IN ACRES= 1.244 CFS

Q_a IS A PEAK OR MAXIMUM FLOW. CALCULATE THE MAXIMUM FLOW PASSING THROUGH FIRST FLUSH AND BANKFULL ORIFICES, USING THE TOTAL HEAD, AND SUBTRACT FROM Q_a TO DETERMINE THE ORIFICE SIZE TO RELEASE THE 100 YEAR STORM VOLUME:

$Q_{FF}MAX + Q_{BF}MAX$ = 0.53 CFS

$Q_a - (Q_{FF}MAX + Q_{BF}MAX)$ = 0.71 CFS

$A = Q_a / (0.62 * (2 * 32.2 * (X_{100} - X_{BF}))^{0.5})$ = 0.097 SF

A 2 INCH DIAMETER ORIFICE HAS AN AREA OF 0.022 SF

A/ 0.022 = 4.43

THEREFORE, USE THE FOLLOWING NUMBER OF 2 INCH DIAMETER HOLES:
4 HOLES AT ELEV. = 942.42

Q_{100} = 0.643 CFS
$Q_O = Q_{100} + Q_{BF}MAX + Q_{FF}MAX$ 1.175 CFS

SUMMARY OF REQUIRED STANDPIPE HOLES:			
ELEVATION	**# OF HOLES**	**DIAMETER OF HOLES**	
942.42	**4**	**2**	**INCHES**
941.22	**6**	**1**	**INCHES**
940.00	**4**	**1**	**INCHES**

BOSS Engineering
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
800.246.6735 FAX 517.548.1670

PROJECT
LAKESHORE VILLAGE APARTMENTS - PHASE 3

PREPARED FOR
THE LOCKWOOD COMPANIES
27777 FRANKLIN ROAD, SUITE 1410
SOUTHFIELD, MI 48034
248.433.7401

TITLE
CONSTRUCTION DETAILS

NO	BY	REVISION PER	DATE
3	TE	PER CLIENT	2/22/18
1	RD	TOWNSHIP ENGINEER, FIRE DEPT., PLANNER	2/24/2016

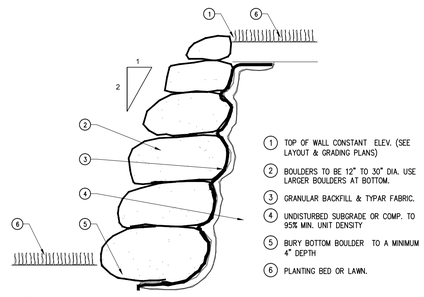
DESIGNED BY:
DRAWN BY: RD
CHECKED BY:
SCALE N/A
JOB NO. 16-010
DATE 2-3-2016
SHEET NO. C17

PLANT LIST- (BS) SR ZONING

QUAN.	KEY	COMMON/ BOTANICAL NAME	SIZE	SPEC.
7	AB12	Autumn Blaze Maple - clump *Acer x. fremanii 'Autumn Blaze'*	12' Ht. 4 stem min	B&B
6	AB	Autumn Blaze Maple *Acer x. fremanii 'Autumn Blaze'*	3" Cal.	B&B
5	CO	Hackberry *Celtis occidentalis*	3" Cal.	B&B
5	GT	Thornless Honeylocust *Gleditsia 'Skyline'*	3" Cal.	B&B
7	QB	Swamp White Oak *Quercus bicolor*	3" Cal.	B&B
8	PA10	Norway Spruce *Picea abies*	10' Ht.	B&B
9	PA6	Norway Spruce *Picea abies*	6' Ht.	B&B
5	PD10	Black Hill Spruce *Picea glauca var. densata*	10' Ht.	B&B
8	PD6	Black Hill Spruce *Picea glauca var. densata*	6' Ht.	B&B
35	CM	Cornelian Cherry - clump *Cornus mas*	4' Ht.	Cont.
40	SV	Common Lilac *Syringa vulgaris*	4' Ht.	Cont.
45	VD	Arrowood Viburnum *Viburnum dentatum*	36" Ht.	Cont.

PLANT LIST - (I) INTERIOR

QUAN.	KEY	COMMON/ BOTANICAL NAME	SIZE	SPEC.
11	AB	Autumn Blaze Maple *Acer x. fremanii 'Autumn Blaze'*	3" Cal.	B&B
4	AB12	Autumn Blaze Maple - clump *Acer x. fremanii 'Autumn Blaze'*	12' Ht. 4 stem min	B&B
9	CO	Hackberry *Celtis occidentalis*	3" Cal.	B&B
34	GT	Thornless Honeylocust *Gleditsia 'Skyline'*	3" Cal.	B&B
10	LT	Tulip Tree *Liriodendron tulipifera*	3" Cal.	B&B
7	UA	Accolade Elm *Ulmus parviflora 'Morton'*	3" Cal	B&B
5	UR	Regal Elm *Ulmus carpinifolia 'Regal'*	3" Cal	B&B
29	PA6	Norway Spruce *Picea Abies*	6' Ht.	B&B
13	PA10	Norway Spruce *Picea Abies*	10' Ht.	B&B
27	PD6	Black Hill Spruce *Picea glauca var. densata*	6' Ht.	B&B
25	PW6	White Spruce *Picea glauca*	6' Ht.	B&B
122	CS	Redtwig Dogwood *Cornus sericea*	36" Ht.	BB
34	FI	Forsythia *Forsythia x. intermedia*	36" Ht.	B&B
57	JK6	Ketler Juniper *J. 'Ketlerii'*	6' Ht.	B&B
66	JSG	Sea Green Juniper *Juniperus 'Sea Green'*	24" Spr.	Cont.
24	LA	Amur Privet *Ligustrum amurense*	36" Ht. Full	B&B
52	SAW	Anthony Waterer Spirea *Spirea 'Anthony Waterer'*	24" Ht.	Cont.
9	JNB	New Blue Tams Juniper *Juniperus t. 'New Blue'*	24" Spr.	Cont.
169	VD	Arrowwood Viburnum *Viburnum dentatum*	36" Ht.	Cont.



2 LS-101 BOULDER RETAINING WALL
NOT TO SCALE

PLANT LIST - (P) PARKING LOT TREES

QUAN.	KEY	COMMON/ BOTANICAL NAME	SIZE	SPEC.
7	GT	Thornless Honeylocust *Gleditsia 'Skyline'*	3" Cal	B&B
9	UA	Accolade Elm *Ulmus parviflora 'Morton'*	3" Cal	B&B
12	UR	Regal Elm *Ulmus carpinifolia 'Regal'*	3" Cal	B&B

PLANT LIST - (F) FRONTAGE TREES

QUAN.	KEY	COMMON/ BOTANICAL NAME	SIZE	SPEC.
2	GT	Thornless Honeylocust *Gleditsia 'Skyline'*	3" Cal.	B&B
8	UA	Accolade Elm *Ulmus parviflora 'Morton'*	3" Cal	B&B
16	PA7	Norway Spruce *Picea abies*	7' Ht.	B&B

PLANT LIST - (D) DETENTION BASINS

QUAN.	KEY	COMMON/ BOTANICAL NAME	SIZE	SPEC.
6	AB12	Autumn Blaze Maple - clump *Acer x. fremanii 'Autumn Blaze'*	12' Ht. 4 stem min	B&B
8	GD	Kentucky Coffee Tree - fully branched *Gymnocladus dioicus*	3" Cal.	B&B
3	GT	Thornless Honeylocust *Gleditsia 'Skyline'*	3" Cal.	B&B
14	QB	Swamp White Red Oak *Quercus bicolor*	3" Cal.	B&B
150	CB	Buttonbush *Cephalacanthus occidentalis*	36" Ht.	B&B
90	CR	Grey Dogwood *Cornus racemosa*	36" Ht.	B&B
70	SC	American Elderberry *Sambucus canadensis*	36" Ht.	B&B

PLANT MIX

PLANTING BEDS TO RECEIVE 70% LOAM TOPSOIL, 10% COMPOST, 20% SAND; EXCAVATE PLANT BED, DISPOSE OF SPOILS OFF SITE, INSTALL PLANT MIX

HAND TILL INTO PLACED PLANT MIX:

(1) 6 CU. FT. BALE CANADIAN PEAT

(1) 40 LB BAG COMPOSTED POULTRY MANURE "CHICK MAGIC" 5-3-2 WWW.CHICKMAGIC.NET (262)495-6220

(1) 10 LB BAG SHEMINS 13-13-13 MULTI PURPOSE FERTILIZER

PER 100 SQ FT BED AREA.

HAND TILL INTO PROVIDED PLANT MIX TO A DEPTH OF 12" MINIMUM

PLANT BEDS

ALL PLANT BEDS TO BE FULLY EXCAVATED TO DEPTH SHOWN ON DETAILS AND AREAS SHOWN ON PLANS, AND TO RECEIVE CONTINUOUS PLANT MIX AS SPECIFIED (NOT INDIVIDUAL PLANT HOLES)

MULCH

MULCH TO BE DOUBLE SHREDDED HARDWOOD BARK MULCH

NO GROUND WOOD PALETTE MULCH PERMITTED

LAWNS:

ALL PROPOSED LAWN AREAS TO BE NON IRRIGATED SEED -- SEE SPECIFICATION 02486 IN THE PROJECT MANUAL.

TOPSOIL

CONTRACTOR TO TILL OR DISK SUBGRADE TO 6" DEPTH AND INSTALL 4" COMPACTED DEPTH TOPSOIL IN ALL LAWN AREAS - FROM ONSITE STOCKPILE OR PROVIDED TO COMPLETE THE PROJECT

LANDSCAPE EDGING

ALL LANDSCAPE EDGES ARE SHOVEL CUT

PLANT SPACING

FILL BED WITH PLANTS SPECIFIED. KEEP PLANTS AWAY FROM BUILDING 12" MATURE SIZE

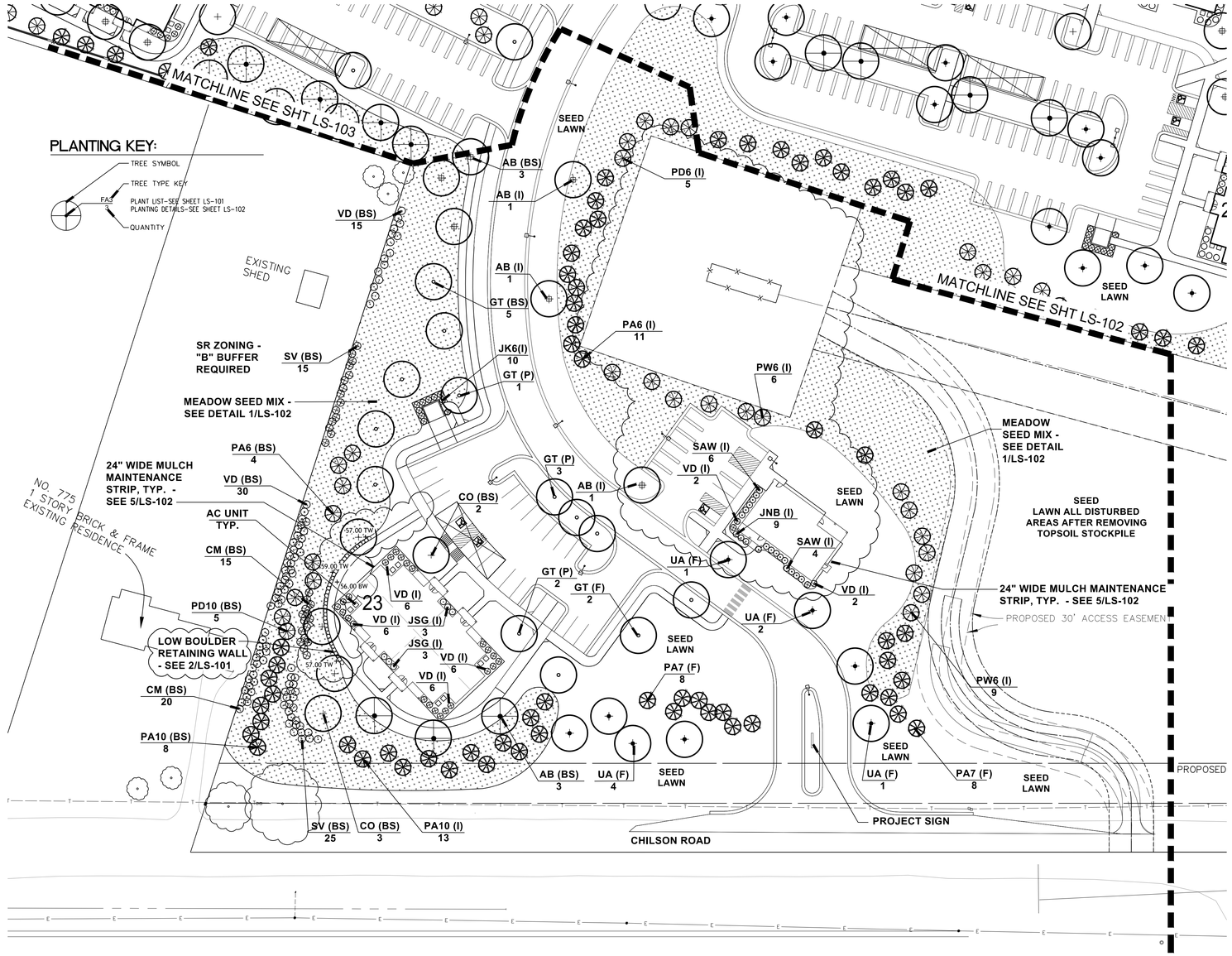
WATERING

CONTRACTOR RESPONSIBLE FOR WATERING ALL PLANTINGS THROUGH THE CONSTRUCTION PERIOD, AND FOR ONE YEAR FROM THE START OF THE WARRANTY PERIOD.

PLANTINGS THAT PERISH DUE TO LACK OF WATER/ TOO MUCH WATER DO NOT QUALIFY AS THE ONE REQUIRED REPLACEMENT PLANT AS STATED IN THE SPECIFICATION, AND SHALL BE REPLACED.

CONTRACTOR IS ALSO RESPONSIBLE FOR WATERING ALL NEWLY PLANTED LAWN AREAS THROUGH THE CONSTRUCTION PERIOD AND FOR ONE YEAR FROM THE START OF THE WARRANTY PERIOD. NEWLY PLANTED LAWN AREAS THAT PERISH DUE TO LACK OF WATER/ TOO MUCH WATER DO NOT QUALIFY AS THE REQUIRED REPLACEMENT TO ESTABLISH A HEALTHY FULL DENSE LAWN AS STATED IN THE SPECIFICATION, AND SHALL BE REPLACED.

SEE SPECIFICATIONS IN THE PROJECT MANUAL.



1 LS-101 **SITE PLANTING PLAN**
SCALE 1" = 40' NORTH

SEED MIX NOTES

1. THE SEED MIXES SHALL BE APPLIED AT THE SPECIFIED RATE OF FOR EACH MIX.
2. MUST BE INSTALLED TO MANUFACTURER SPECIFICATION AND REQUIREMENTS.

MANUFACTURER: CARDNO NATIVE PLANT NURSERY
605 SOUTH MAIN STREET, #1
ANN ARBOR, MICHIGAN 48104
734-222-9690

SEED MIX KEY:

SEE SHEET LS-102 FOR MIX INFORMATION

- **MEADOW SEED MIX** WITH EROSION FABRIC - SEE 1/LS-102
- **STORM WATER SEED MIX** WITH EROSION FABRIC - SEE 1/LS-102
- **BASIN BOTTOM SEED MIX** WITH EROSION FABRIC - SEE 1/LS-102

HWLA
HAGENBUCH WEIKAL
LANDSCAPE ARCHITECTURE

248 477 3600 TEL
WWW.KW-LA.COM
33203 BIDDESTONE LANE, FARMINGTON HILLS, MI 48334

STATE OF MICHIGAN
KENNETH S. WEIKAL
LANDSCAPE ARCHITECT
No. 1022
REGISTERED LANDSCAPE ARCHITECT

LOCKWOOD COMPANIES
27777 FRANKLIN ROAD
SUITE 1410
SOUTHFIELD, MI 48304

LAKESHORE VILLAGE APARTMENTS PHASE 3

GENOA TWP., MI

LANDSCAPE CONSTRUCTION DOCUMENTS

SHEET

SITE PLANTING PLAN

PRELIMINARY DATE

2016-02-02	SPA
2016-02-24	SPA

ISSUE DATE

2016-03-18	CD

REVISION DATE

2016-05-09	SPA
2016-06-28	REV.
2016-08-18	REVISED
2016-09-20	REVISED
2016-12-05	PERMIT
2018-02-28	TWP. REV.

SHEET NUMBER

LS-101

STORMWATER SEED MIX

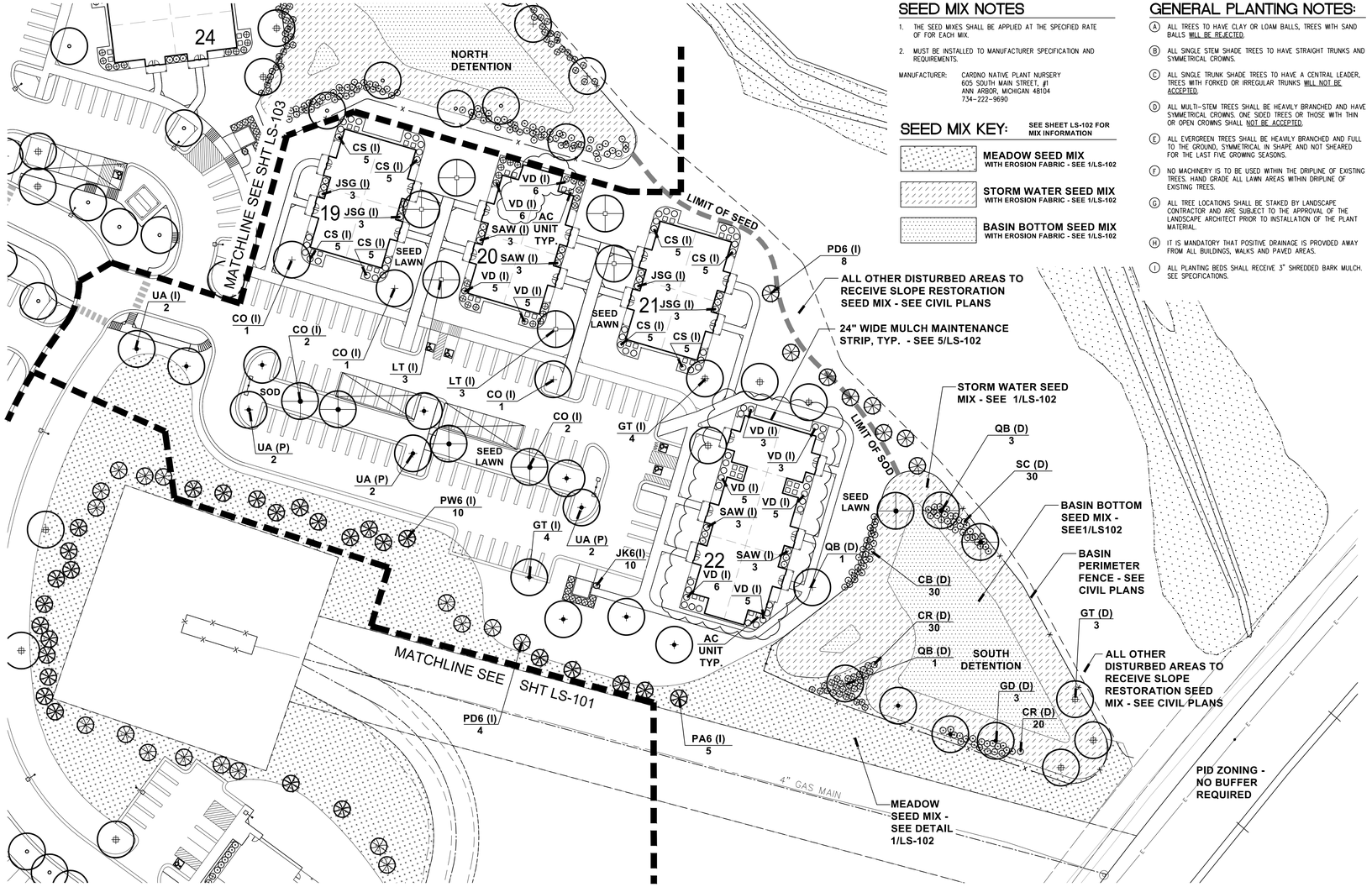
Botanical Name	Common Name	Ounces/Acre	Seeds/Oz	Seeds/SQ FT
Permanent Grasses/Sedges/Rushes:				
Carex crisatella	Crested Oval Sedge	1.00	59000	1.35
Carex lurida	Bottlebrush Sedge	2.00	12000	0.55
Carex vulpinoidea	Brown Fox Sedge	6.00	125000	17.22
Elymus virginicus	Virginia Wild Rye	12.00	4375	1.21
Glyceria striata	Fowl Manna Grass	1.25	125000	3.59
Juncus effusus	Common Rush	1.00	281000	6.45
Juncus torreyi	Torrey's Rush	0.25	1134000	6.51
Leersia oryzoides	Rice Cut Grass	1.00	94500	2.17
Panicum virgatum	Switch Grass	8.00	28356	5.21
Scirpus atrovirens	Dark Green Rush	1.00	187500	4.30
Scirpus cyperinus	Wool Grass	0.50	562500	6.46
Scirpus fluviatilis	River Bulrush	0.25	27500	0.16
Scirpus validus	Great Bulrush	6.00	37813	5.21
	Total	**40.25**		**60.38**
Temporary Cover:				
Avena sativa	Common Oat	360.00	8125	67.15
Lolium multiflorum	Annual Rye	100.00	14188	32.57
	Total	**460.00**		**99.72**
Forbs & Shrubs:				
Alisma spp.	Water Plantain (Various Mix)	4.25	70175	6.85
Asclepias incarnata	Swamp Milkweed	1.50	4540	0.16
Bidens spp.	Bidens (Various Mix)	2.00	14175	0.65
Helenium autumnale	Sneezeweed	2.00	141750	6.51
Lycopus americanus	Common Water Horehound	0.25	235000	1.35
Mimulus ringens	Monkey Flower	1.00	283500	6.51
Penthorum sedoides	Ditch Stonecrop	0.50	36063	0.41
Polygonum pensylvanicum	Pinkweed	4.00	4063	0.37
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	1.00	46000	1.06
Sagittaria latifolia	Common Arrowhead	1.00	56700	1.30
Senna hebacarpa	Wild Senna	1.00	1400	0.03
Thalictrum dasycarpum	Purple Meadow Rue	2.00	13500	0.62
	Total	**20.50**		**25.82**

MEADOW SEED MIX

Botanical Name	Common Name	Ounces/Acre	Seeds/Oz	Seeds/SQ FT
Permanent Grasses:				
Bouteloua curtipendula	Side Oats Grama	10.00	9375	2.15
Carex spp.	Prairie Carex Mix	4.00	33422	3.07
Elymus canadensis	Canada Wild Rye	32.00	4258	3.13
Koeleria cristata	June Grass	1.00	150000	3.44
Panicum virgatum	Switch Grass	1.00	28356	0.65
Schizachyrium scoparium	Little Bluestem	32.00	8800	6.46
	Total	**80.00**		**18.91**
Temporary Cover:				
Avena sativa	Common Oat	360.00	8125	67.15
Lolium multiflorum	Annual Rye	100.00	14188	32.57
	Total	**460.00**		**99.72**
Forbs:				
Anemone cylindrica	ThimbleWeed	0.50	20938	0.24
Asclepias tuberosa	Butterfly MilkWeed	2.00	3500	0.16
Aster ericoides	Heath Aster	0.25	140000	0.80
Aster laevis	Smooth Blue Aster	0.75	48000	0.83
Aster novae-angliae	New England Aster	0.25	76000	0.44
Baptisia lactea	White Wild Indigo	2.00	1600	0.07
Chamaecrista fasciculata	Partridge Pea	14.00	3800	1.22
Coreopsis lanceolata	Sand Coreopsis	5.00	12500	1.43
Coreopsis palmata	Prairie Coreopsis	1.00	11500	0.26
Dalea candida	White Prairie Clover	1.50	26250	0.90
Dalea purpurea	Purple Prairie Clover	1.50	20000	0.69
Echinacea purpurea	Broad-Leaved Purple Coneflov	7.00	6600	1.06
Eryngium yuccifolium	Rattlesnake Master	2.50	8000	0.46
Lespedeza capitata	Round-Head Bush Clover	2.00	10000	0.46
Liatris aspera	Rough Blazing Star	0.50	13000	0.15
Lupinus perennis	Wild Lupine	2.00	1000	0.05
Monarda fistulosa	Wild Bergamot	0.75	78000	1.34
Parthenium integrifolium	Wild Quinine	1.00	6800	0.16
Penstemon digitalis	Foxglove Beard Tongue	0.50	115000	1.32
Pycnanthemum virginianum	Common Mountain Mint	1.00	331250	7.60
Ratibida pinnata	Yellow Coneflower	4.00	25250	2.32
Rudbeckia hirta	Black-Eyed Susan	5.00	110000	12.63
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	1.00	46000	1.06
Silphium integrifolium	Rosin Weed	3.00	4000	0.28
Silphium terebinthinaceum	Prairie Dock	0.50	1100	0.01
Solidago remoralis	Old-Field Goldenrod	0.50	240000	2.75
Solidago rigida	Stiff Goldenrod	1.00	46000	1.06
Tradescantia ohiensis	Common Spiderwort	0.75	8000	0.14
Vernonia spp.	Ironweed (Various Mix)	1.75	24000	0.96
Veronicastrum virginianum	Culvers Root	0.25	750000	4.30
	Total	**63.75**		**45.16**

BASIN BOTTOM SEED MIX

Botanical Name	Common Name	Ounces/Acre	Seeds/Oz	Seeds/SQ FT
Permanent Grasses/Sedges:				
Andropogon gerardii	Big Bluestem	4.00	8188	0.75
Carex comosa	Bristly Sedge	2.50	41183	2.36
Carex cristatella	Crested Oval Sedge	2.00	59000	2.71
Carex lurida	Bottlebrush Sedge	2.50	12000	0.69
Carex spp.	Prairie Sedge Mix	8.00	33422	6.14
Carex vulpinoidea	Brown Fox Sedge	4.00	125000	11.48
Elymus virginicus	Virginia Wild Rye	8.00	4375	0.80
Glyceria striata	Fowl Manna Grass	1.00	125000	2.87
Panicum virgatum	Switch Grass	2.00	28356	1.30
Scirpus atrovirens	Dark Green Rush	2.00	187500	8.61
Scirpus cyperinus	Wool Grass	1.00	562500	12.91
Spartina pectinata	Prairie Cord Grass	3.00	15750	1.08
	Total	**40.00**		**51.71**
Temporary Cover:				
Avena sativa	Common Oat	360.00	8125	67.15
Lolium multiflorum	Annual Rye	100.00	14188	32.57
	Total	**460.00**		**99.72**
Forbs:				
Alisma spp.	Water Plantain (Various Mix)	1.00	70175	1.61
Asclepias incarnata	Swamp Milkweed	2.00	4540	0.21
Coreopsis tripteris	Tall Coreopsis	1.00	11500	0.26
Eutrochium maculatum	Spotted Joe-Pye Weed	0.25	78125	0.45
Iris virginica	Blue Flag	4.00	1400	0.13
Liatris spicata	Marsh Blazing Star	1.00	12000	0.28
Lobelia cardinalis	Cardinal Flower	0.25	437000	2.51
Lobelia siphilitica	Great Blue Lobelia	0.50	520000	5.97
Lycopus americanus	Common Water Horehound	0.25	235000	1.35
Pycnanthemum virginianum	Common Mountian Mint	0.50	331250	3.80
Rudbeckia triloba	Brown-Eyed Susan	0.50	33000	0.38
Sagittaria latifolia	Common Arrowhead	0.25	56700	0.33
Senna hebecarpa	Wild Senna	1.00	1400	0.03
Silphium terebinthinaceum	Prairie Dock	1.00	1100	0.03
Symphyotrichum novae-angliae	New England Aster	1.00	76000	1.74
Verbena hastata	Blue Vervain	1.50	125000	4.30
Zizia aurea	Golden Alexanders	0.75	12000	0.21
	Total	**16.75**		**23.37**



SEED MIX NOTES

1. THE SEED MIXES SHALL BE APPLIED AT THE SPECIFIED RATE OF FOR EACH MIX.
2. MUST BE INSTALLED TO MANUFACTURER SPECIFICATION AND REQUIREMENTS.

MANUFACTURER: CARDNO NATIVE PLANT NURSERY
605 SOUTH MAIN STREET, #1
ANN ARBOR, MICHIGAN 48104
734-222-9690

SEED MIX KEY:

SEE SHEET LS-102 FOR MIX INFORMATION

- MEADOW SEED MIX WITH EROSION FABRIC - SEE 1/LS-102
- STORM WATER SEED MIX WITH EROSION FABRIC - SEE 1/LS-102
- BASIN BOTTOM SEED MIX WITH EROSION FABRIC - SEE 1/LS-102

GENERAL PLANTING NOTES:

A. ALL TREES TO HAVE CLAY OR LOAM BALLS, TREES WITH SAND BALLS WILL BE REJECTED.

B. ALL SINGLE STEM SHADE TREES TO HAVE STRAIGHT TRUNKS AND SYMMETRICAL CROWNS.

C. ALL SINGLE TRUNK SHADE TREES TO HAVE A CENTRAL LEADER, TREES WITH FORKED OR IRREGULAR TRUNKS WILL NOT BE ACCEPTED.

D. ALL MULTI-STEM TREES SHALL BE HEAVILY BRANCHED AND HAVE SYMMETRICAL CROWNS. ONE SIDED TREES OR THOSE WITH THIN OR OPEN CROWNS SHALL NOT BE ACCEPTED.

E. ALL EVERGREEN TREES SHALL BE HEAVILY BRANCHED AND FULL TO THE GROUND, SYMMETRICAL IN SHAPE AND NOT SHEARED FOR THE LAST FIVE GROWING SEASONS.

F. NO MACHINERY IS TO BE USED WITHIN THE DRIPLINE OF EXISTING TREES. HAND GRADE ALL LAWN AREAS WITHIN DRIPLINE OF EXISTING TREES.

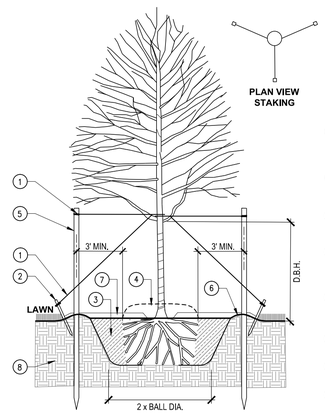
G. ALL TREE LOCATIONS SHALL BE STAKED BY LANDSCAPE CONTRACTOR AND ARE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION OF THE PLANT MATERIAL.

H. IT IS MANDATORY THAT POSITIVE DRAINAGE IS PROVIDED AWAY FROM ALL BUILDINGS, WALKS AND PAVED AREAS.

I. ALL PLANTING BEDS SHALL RECEIVE 3" SHREDDED BARK MULCH. SEE SPECIFICATIONS.

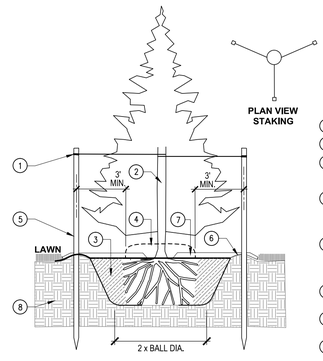
SITE PLANTING PLAN

SCALE 1" = 40' NORTH



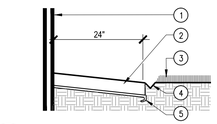
1. STAKE ALL TREES UNDER 4" GUY ALL TREES 4" AND OVER
2. PRUNE ONLY TO REMOVE BROKEN OR DAMAGED BRANCHES
3. PLANT SO THAT TOP OF ROOT FLARE IS EVEN WITH THE FINISHED GRADE
4. NEVER CUT LEADER
5. (1) "ARBORTIE" NYLON STRAPS
6. STAKE ABOVE FIRST BRANCHES OR AS NECESSARY FOR FIRM SUPPORT
7. (2) FOR TREES OVER 4" CAL., (3) 2"X4"X24" PRESS. TREATED STAKES TOP OF STAKE 6" ABOVE GROUND
8. (3) AMEND SOIL PER SPECIFICATION REQUIREMENTS, WATER AND TAMP TO REMOVE AIR POCKETS
9. (4) REMOVE ±4"-8" OF SOIL FROM TOP OF ROOT BALL TO EXPOSE ROOT FLARE. SOIL CAN BE USED IN PLANT MIX. REMOVE TOP 2/3 OF BASKET AND BURLAP
10. (5) METAL STAKES (3) STAKES DRIVEN (MIN. 18") FIRMLY INTO SUBGRADE PRIOR TO BACKFILLING. REMOVE AFTER 1 YEAR
11. (6) FORM SAUCER 6" BEYOND EDGE OF PLANT PIT
12. (7) 3" MULCH, LEAVE 3" CIRCLE OF BARE SOIL AT TRUNK
13. (8) UNDISTURBED SUBSOIL

1 LS-102 DETENTION BASIN AND MEADOW SEED MIXES
ALL SEED MIX AREAS TO HAVE EROSION MAT
SEE 1/LS-103



1. REMOVE ALL TAGS, STRINGS, PLASTICS AND OTHER MATERIALS WHICH ARE UNSIGHTLY OR COULD CAUSE GIRDLING
2. PLANT SO THAT TOP OF ROOT FLARE IS EVEN WITH THE FINISHED GRADE
3. STAKE ALL EVERGREEN TREES UNDER 12' HT.
4. GUY ALL EVERGREEN TREES 12' HT. AND OVER
5. (1) "ARBORTIE" NYLON STRAPS
6. (2) NEVER CUT LEADER
7. (3) AMEND SOIL PER SPECIFICATION REQUIREMENTS, WATER AND TAMP TO REMOVE AIR POCKETS
8. (4) REMOVE ±4"-8" OF SOIL FROM TOP OF ROOT BALL TO EXPOSE ROOT FLARE. SOIL CAN BE USED IN PLANT MIX. REMOVE TOP 2/3 OF BASKET AND BURLAP
9. (5) METAL STAKES (3) STAKES DRIVEN (MIN. 18") FIRMLY INTO SUBGRADE PRIOR TO BACKFILLING. REMOVE AFTER 1 YEAR
10. (6) FORM SOIL SAUCER 6" BEYOND EDGE OF PLANT PIT
11. (7) 3" MULCH, LEAVE 3" CIRCLE OF BARE SOIL AT TRUNK
12. (8) UNDISTURBED SUBSOIL

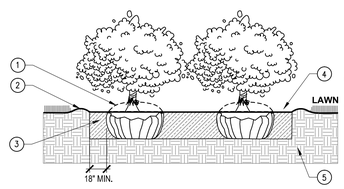
3 EVERGREEN TREE PLANTING
NOT TO SCALE



1. FACE OF BUILDING
2. 4" DEEP SHREDDED HARDWOOD MULCH
3. LAWN AREA
4. SHOVEL CUT EDGE
5. TYPAR FILTER / WEED BARRIER

NOTES:
ALL BUILDINGS TO HAVE A 24" WIDE PERIMETER MAINTENANCE STRIP IN AREAS WHERE PLANT BEDS ARE NOT PROPOSED

5 LS-101 MULCH MAINTENANCE STRIP DETAIL
NOT TO SCALE



1. REMOVE TOP 1/3 OF BURLAP FROM ROOTBALL
2. MOUND TO FORM SAUCER FORM SOIL SAUCER WITH 3" HT. CONTINUOUS RIM
3. SPECIFIED PLANTING MIX – WATER & TAMP TO REMOVE AIR POCKETS – 12" MIN. DEPTH OR DEPTH OF ROOT BALL.
4. 3" DEPTH MULCH – 6" BARE AT TRUNK – DO NOT BURY CROWN OF PLANT
5. UNDISTURBED SUBSOIL

NOTES:
PRUNE BRANCHES TO THIN OR MATCH, RETAIN NORMAL PLANT SHAPE. PRUNE DEAD BRANCHES

SHRUBS SHALL BEAR THE SAME RELATIONSHIP TO FINISH GRADE AS THEY BORE TO ORIGINAL GRADE.

REMOVE ALL FIBER, PLASTIC OR METAL CONTAINERS.

4 SHRUB BED PLANTING DETAIL
NOT TO SCALE

HWLA
HAGENBUCH WEIKAL
LANDSCAPE ARCHITECTURE

248 477 3600 TEL
WWW.KWLA.COM
33203 BIDDESTONE LANE, FARMINGTON HILLS, MI 48334

KENNETH S. WEIKAL LANDSCAPE ARCHITECT No. 1022

LOCKWOOD COMPANIES
27777 FRANKLIN ROAD
SUITE 1410
SOUTHFIELD, MI 48304

LAKESHORE VILLAGE APARTMENTS PHASE 3

GENOA TWP., MI

LANDSCAPE CONSTRUCTION DOCUMENTS

SHEET

SITE PLANTING PLAN

PRELIMINARY DATE

2016-02-02	SPA
2016-02-24	SPA

ISSUE DATE

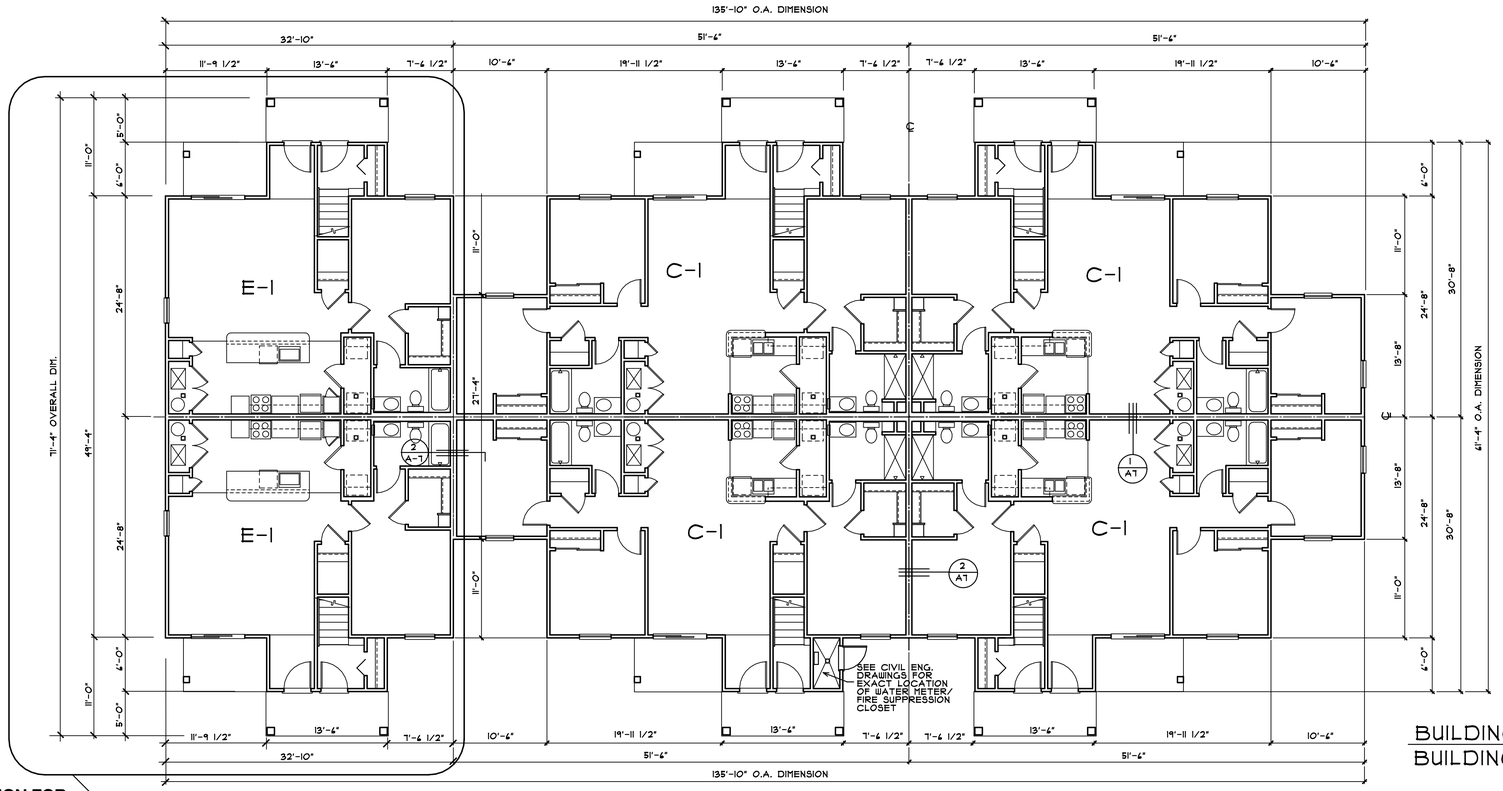
2016-03-18	CD

REVISION DATE

2016-05-09	SPA
2016-06-28	REV.
2016-08-18	REVISED
2016-09-20	REVISED
2016-12-05	PERMIT
2018-02-28	TWP. REV.

SHEET NUMBER

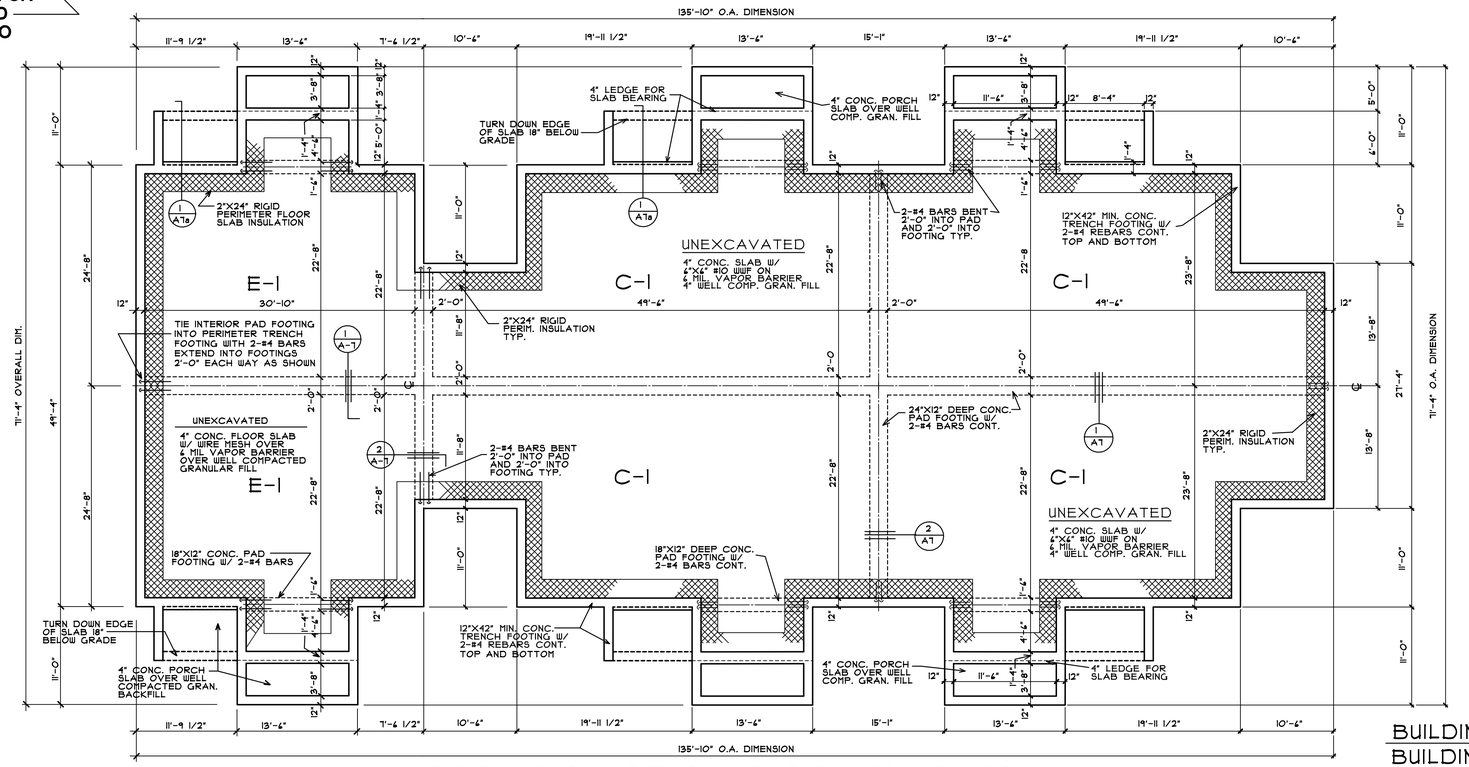
LS-102



NOTE:
SEE 1/4" SCALE UNIT PLANS FOR EXACT LAYOUT, ADDITIONAL NOTES, DIMENSIONS AND DETAILS.

BUILDING FIRST FLOOR PLAN
BUILDING TYPE VII SCALE 1/8"=1'-0"

BUILDING MODIFICATION FOR SITE PLAN APPROVAL ADD 4 ONE BEDROOM UNITS TO BUILDING #22



BUILDING FOUNDATION PLAN
BUILDING TYPE VII SCALE 1/8"=1'-0"
BUILDING #22

PARKING LOT SIDE OF BUILDING

BLD-VII FF

Coponen Architects
Coponen Architects PC
architecture and planning
8002 west grand river
suite A
brighton, michigan 48114
telephone 810-225-4141

Lakeshore Village Apartments
Phase III
Genoa Township, Livingston County, Michigan

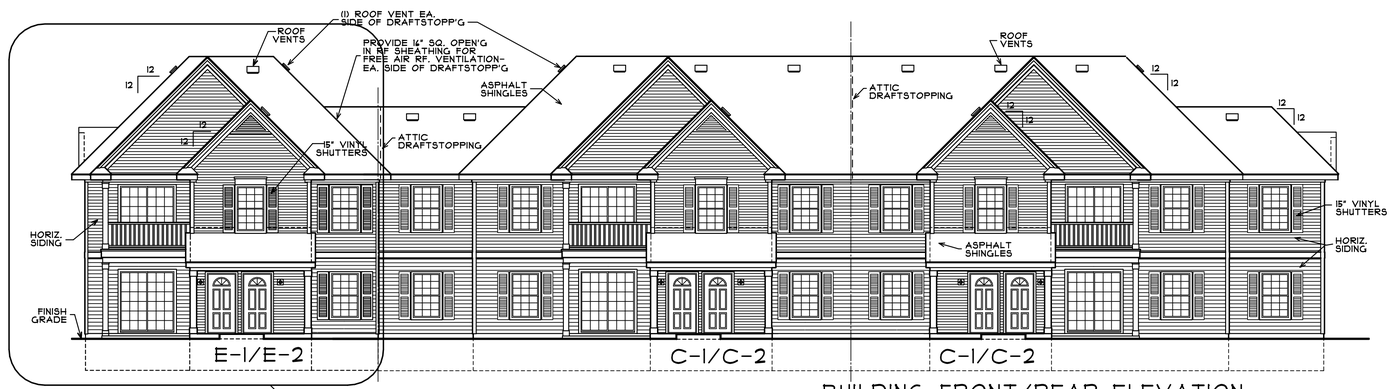
sheet
BUILDING TYPE VII
BUILDING PLANS

drawing revisions

WALTER F. COPONEN
ARCHITECT
No. 27014
STATE OF MICHIGAN
LICENSED ARCHITECT

issue date
FEBRUARY 12, 2018

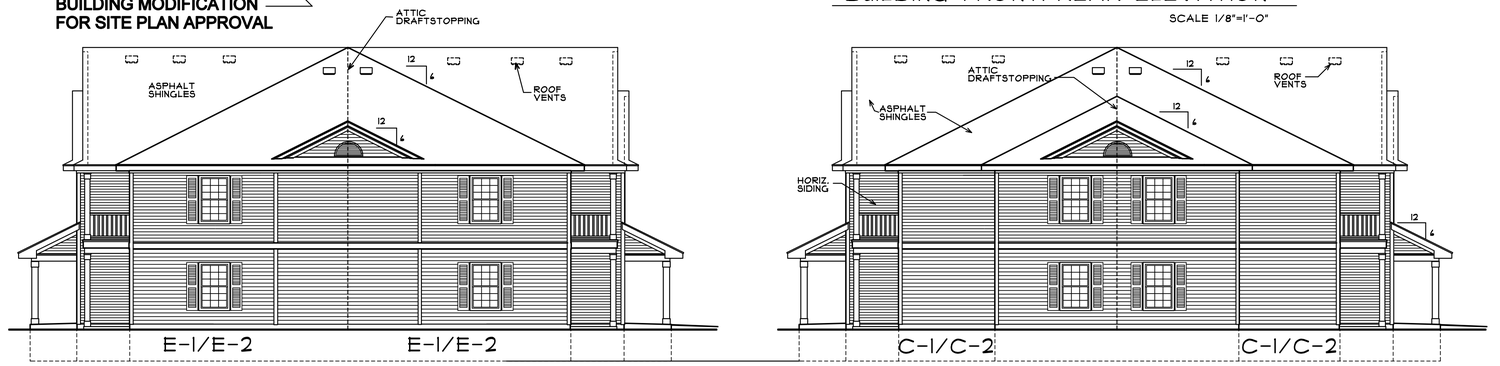
sheet number
A29



BUILDING MODIFICATION FOR SITE PLAN APPROVAL

BUILDING FRONT/REAR ELEVATION

SCALE 1/8"=1'-0"



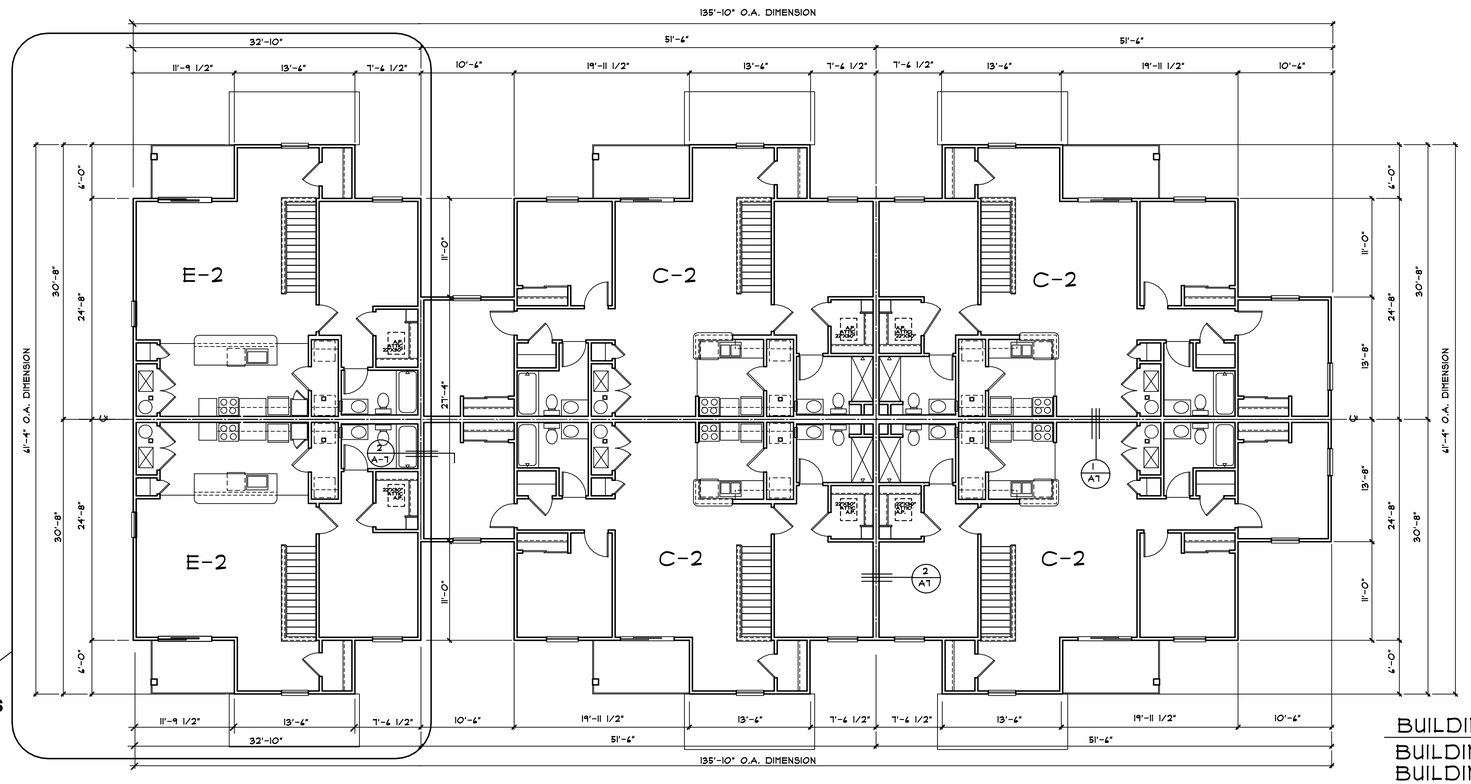
BUILDING LEFT END ELEVATION

SCALE 1/8"= 1'-0"

BUILDING RIGHT END ELEVATION

SCALE 1/8"=1'-0"

SEE DETAILED 1/4" SCALE BUILDING ELEVATIONS SHEET A-4 FOR ADDITIONAL NOTES AND DIMENSIONS.



BUILDING MODIFICATION FOR SITE PLAN APPROVAL ADD 4 ONE BEDROOM UNITS TO BUILDING #22

NOTE:
SEE 1/4" SCALE UNIT PLANS FOR EXACT LAYOUT, ADDITIONAL NOTES, DIMENSIONS AND DETAILS.

BUILDING SECOND FLOOR PLAN

BUILDING TYPE VII
BUILDING #22

SCALE 1/8"=1'-0"

BLD-VII SF

Coponen Architects
Coponen Architects PC
architecture and planning
8002 west grand river
suite A
brighton, michigan 48114
telephone 810-225-4141

Lakeshore Village Apartments
Phase III
Genoa Township, Livingston County, Michigan

sheet
BLDG. TYPE VII
BUILDING PLAN
+ ELEVATIONS

WALTER F. COPONEN
STATE OF MICHIGAN
ARCHITECT
No. 27014
LICENSED ARCHITECT

drawing revisions

issue date
FEBRUARY 12, 2018

sheet number
A30