



CITY OF WILLIAMSTON
RESCHEDULED REGULAR PLANNING COMMISSION MEETING AGENDA
TO BE HELD IN THE CITY HALL COUNCIL CHAMBERS
161 E. GRAND RIVER AVE., WILLIAMSTON, MI 48895
TUESDAY, JANUARY 9, 2024
7:00 p.m.

1. Call to Order
2. Pledge of Allegiance
3. Roll Call
4. Approval of Agenda
5. Audience Participation – Maximum 5 minutes per presentation. Subject matter on non-agenda items only.
6. Planning Commission Regular Meeting Minutes of August 1, 2023
7. Action Items
 - a. Consideration of 2024 Meeting Dates and Times
 - b. Dollar Tree Site Plan
 - c.
 - d.
8. Discussion Items
 - a. Master Plan Update Request for Proposals (RFP)
 - b.
9. Correspondence Received/Information Only
 - a.
10. Staff Reports
 - a.
11. Audience Participation - Maximum 5 minutes per presentation. Subject matter on non-agenda items only.
12. Planning Commissioner Comments
13. Adjourn to the Call of the Chair

In Accordance with Public Act 267 (Open Meetings Act) Posted and Copies Given to Newspapers. Individuals with disabilities requiring special assistance who are planning to attend the meeting should contact the Office of the City Clerk at 517-655-2774, for accommodations. This request must be made two (2) business days in advance of the meeting.

**The next regular meeting of the Williamston Planning Commission will be held on
Tuesday, February 6, 2024 in the City Council Chambers at 7:00 p.m.**

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CITY OF WILLIAMSTON
PLANNING COMMISSION
AUGUST 1, 2023
REGULAR MEETING MINUTES

1. Call to Order:

The meeting was called to order at 7:00 p.m. in the Williamston City Hall Council Chambers by Chairman Jeff Markstrom and the Pledge of Allegiance was recited.

3. Roll Call:

Chairman Jeff Markstrom, Commissioners Noah Belanger, Brandon Gilroy, Brandon Lanyon, Tim Ludwig, and Lee Fisher. Absent: John Magee.

Also Present: City Manager John Hanifan, Deputy City Clerk Barbara Burke, City Attorney Timothy Perrone, Planner Raphael Kasen, Tammy Gilroy, John Bisard, Brooke Locke, Jim Belles, Missy Belles, Dawn-Marie Joseph, Brooke Donnelly-Grzelak, Dollar Tree developer John Hedstrom, and other members of the public.

Motion by **Gilroy**, second by **Lanyon**, to excuse Magee. **Motion passed by voice vote.**

4. Approval of Agenda:

Motion by **Lanyon**, second by **Gilroy**, to approve the agenda as presented. **Motion passed by voice vote.**

5. Audience Participation on Non-Agenda Items:

Chairman Markstrom called for public comments at this time and there were none.

6. Planning Commission Regular Meeting Minutes of June 6, 2023:

Motion by **Lanyon**, second by **Belanger**, to approve the regular meeting minutes of June 6, 2023 as presented. **Motion passed by voice vote.**

7. Action Items

7a. Appointment of Chair and Vice Chair:

Motion by **Gilroy**, second by **Belanger**, to elect Jeff Markstrom as the Planning Commission Chair. **Motion passed by voice vote.**

Motion by **Lanyon**, second by **Gilroy**, to elect John Magee as the Planning Commission Vice Chair. **Motion passed by voice vote.**

7b. Appointment of Zoning Board of Appeals Representative:

Motion by **Belanger**, second by **Lanyon**, to appoint Brandon Gilroy as the Planning Commission's Zoning Board of Appeals Representative. **Motion passed by voice vote.**

7c. Appointment of Parks & Recreation Commission Representative:

Motion by **Gilroy**, second by **Lanyon**, to appoint John Magee as the Planning Commission's Parks & Recreation Commission Representative. **Motion passed by voice vote.**

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7d. Dollar Tree Final Site Plan – 825 W. Grand River Avenue:

Motion by **Lanyon**, second by **Belanger**, to table the Dollar Tree Final Site Plan (parcel ID 33-18-03-35-379-027, located at 825 W. Grand River), to the next Planning Commission meeting with the following issues/items to be addressed:

1. Proof of easement with adjacent property.
2. All building plans must match regarding placement. Some plans provided do not show the building placement in the same location.
3. Based on the placement of the building as mentioned, revised plans on the final proposed circulation plan, must be submitted, and must be approved by the Northeast Ingham Emergency Service Authority (NIESA)
4. Plans/documentation of exterior building materials and treatments.
5. A revised exterior lighting plan with better designated lighting locations, heights from grade, specifications, lamp types, and methods of shielding.
6. Final water and sewer engineered plans for utilities (water and sewer)
7. A revised parking layout including the following as stated in the City of Williamston Zoning Ordinance 74-6.301:
 - a. Perimeter Barrier Required. There shall be a curb or wheel stop provided along the perimeter of a parking lot. The curb or wheel stop shall be at least six inches in height and designed to prevent any portion of a vehicle from encroaching upon a sidewalk, right-of-way, landscaped area, or adjoining property. Curbs shall be continuous except as part of an overall stormwater management design incorporating bioswales and/or rain gardens.
 - b. Maximum Contiguous Spaces. Not more than 20 contiguous spaces may be provided in an uninterrupted row. Longer rows shall provide landscaped breaks (e.g., islands or bioswales) with shade trees. Such breaks shall have a minimum area of 144 square feet and shall contain at least one shade tree.
8. Final grading plans.
9. Final drainage plans.
10. A revised landscaping plan according to both ordinance requirements and the City Engineer's recommendations for plantings along the front property line, as well as the screening requirements per Section 74-7.304 along the west property line adjacent to the Mobile Home district.
11. The final site plan must be reviewed and approved by the City Engineer.

Yes: Lanyon, Ludwig, Markstrom, Fisher, Belanger. No: Gilroy. **Motion passed.**

Planner Kasen would like to see a meeting take place between the architect and City staff to review plans.

8. Discussion Items

8a. Master Plan and Zoning Ordinance Update:

Manager Hanifan said this is not a complete rewrite. The timeline is to have it done in this fiscal year. He is hoping to have a workshop in September.

10. Staff Reports:

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Manager Hanifan said the Parks Commission meets next week and they will start reviewing the Parks Master Plan. This is not a complete rewrite but needs to be done every five years. and must be done to be able to apply for funding. There may be a Zoning Board of Appeals meeting in September to review an application for a non-conforming site on Corwin Road for a mini-storage facility.

11. Audience Participation on Non-Agenda Items:

Chairman Markstrom called for public comments at this time and there were none.

12. Planning Commissioner Comments:

Commissioner Belanger is glad to be back.

Commissioner Lanyon hopes there will be better communication between the developer of Dollar Tree and the City staff.

Chairman Markstrom said it is nice to have a full board.

13. Adjourn to the Call of the Chair:

Chairman Markstrom adjourned the meeting at 7:44 p.m.

Meeting adjourned at 7:44 p.m.

Respectfully Submitted: _____
Barbara J. Burke, Deputy City Clerk

Date approved: _____

7a.
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Planning Commission	
1st Tuesday of the month at 7pm	
January 9 (2nd Tues)	July 2
February 6	August 8 (Thurs)
March 5	September 3
April 2	October 1
May 7	November 7 (Thurs)
June 4	December 3



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Memorandum

TO: City of Williamston Planning Commission
FROM: Jeff Keesler
SUBJECT: 825 W. Grand River - Site Plan Review #5
DATE: January 4, 2024

The applicant, 825 Williamston LLC, is seeking preliminary site plan approval from the City of Williamston Planning Commission for the construction of a Dollar Tree retail store on the property located at 825 W. Grand River (Parcel ID: 33-18-03-35-379-027). The site is currently zoned C-3, Mixed Business District. Retail Sales, including limited outdoor sales not exceeding one square foot of sales area for every four square feet of indoor sales or display area, are a principal permitted use in the C-3 district.

EXISTING CONDITIONS AND SURROUNDING LAND USE

The subject site is located on the south side of Grand River. The adjacent parcels to the west and south of the site are zoned MH, Mobile Home District and are home to the Village Square Manufactured Housing Community. The parcel to the east is zoned C-3 and contains a small retail strip center that is home to a mixture of local and national chain businesses, including three restaurants, two personal service establishments, and one non-profit donation center. The parcels located to the north on the opposite side of Grand River are also zoned C-3 and are currently comprised of single-family residences.

The subject parcel is approximately 66,000 sq. ft. (approx. 1.5 acres) in area and consists of vacant land with no improvements.



825 W. Grand River, Existing Conditions (Source: Ingham County Equalization Viewer, May 2023)

PRELIMINARY SITE PLAN REVIEW

The Site Plan for this project has been reviewed previously and was approved pending approval of the Williamston City Engineer on December 6, 2023. The Site Plan has been reviewed by IMEG engineering consultants and they have found the issues below.

1. Zoning and Use

This has been met in previous versions of the Site Plan.



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2. Dimensional Standards

Dimensional standards have been met in previous versions of the Site Plan.

3. Required Open Space

This has been met in previous versions of the Site Plan.

4. Landscaping and Screening

A review of the site plan by IMEG engineering consultants noted that, "the required interior landscape area is inadequate (calculated as 30 square feet per parking space per Chapter 6 of the Zoning Ordinance). Detailed landscape plans were not included in the final site plan. Unless reviewed by others, landscape plans should be provided."

5. Off-Street Parking

A resubmitted site plan has been reviewed by IMEG engineering consultants and notes the following with regard to off-street parking:

1. The applicant has proposed 6" high curbs at the edges of the parking lot. As such, the parking blocks shown are unnecessary and should be removed.
2. The proposed pavement sections are appropriate for the use. However, the proposed pavement extents should be clarified to show where each section is applicable, and the extent of the pavement between the new and existing buildings.
3. The applicant should provide truck turning movements to verify access into the site.

6. Refuse and Mechanical Equipment

This has been met in previous versions of the Site Plan.

7. Signage

This has been met in previous versions of the Site Plan.

8. Architecture and Design

The design appears to meet the requirements of Section 74-5.205 of the Williamston Zoning Ordinance.

9. Exterior Lighting

A lighting plan was submitted for the December 6, 2023 review that shows lighting reaching 0.0 lumens in most areas at the property line. Please resubmit the lighting plan for engineering review.

10. Sidewalks

As noted in the September 12, 2023, review letter, the sidewalk on the east side of the building should be increased to 7'.

11. Stormwater Management and Utilities

A resubmitted site plan has been reviewed by IMEG engineering consultants and notes the following with regard to Stormwater Management and Utilities:

1. Stormwater management shall follow current Ingham County requirements, including 0.15 cubic



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feet per second (CFS) per acre allowable discharge rate. The calculations should be modified and resubmitted.

2. The City of Williamston standard notes for water and sanitary service should be included in the drawings. These were provided in the September 12, 2023, review letter.
3. The applicant should provide soil borings for the proposed building foundation.

RECOMMENDATIONS

We recommend the City of Williamston Planning Commission deny the preliminary site plan for Parcel ID: 33-18-03-35-379-027, located at 825 W. Grand River, based on the engineering recommendations listed above. The applicant should resubmit a Site Plan with the issues listed above addressed.

Final site plan approval should be contingent on the following:

- The final site plan must address the issues mentioned above and be reviewed and approved by the City Engineer.

Respectfully Submitted,

Jeff Keesler
Associate Planner



KEBS, INC.

November 22, 2023

Scott De Vries
City of Williamston
781 Progress Court
Williamston, Michigan 48895



Re: 825 W. Grand River Ave.

Dear Mr. De Vries:

Please find attached 12 sets of Site Plans prepared in response to your September 12, 2023 review letter. Also attached are drainage calculations and drainage maps for the site.

The attached plans supplement plans previously submitted by the development architect Ron Ireland. KEBS has prepared more detailed Utility, Grading, Soil Erosion Control, and Demolition plans as requested in your review.

Per our discussions, the existing detention pond has been expanded to provide 100-year detention using ICDC's current requirements of ATLAS 14 rainfall data. The outlet restrictor was also checked for sizing and has been revised to have a slightly smaller restricting orifice (7" → 6.75"). As we discussed, the existing stormwater system restricts the outflow and backflows storm water to the detention pond for storage. With the expansion of the detention pond, a sediment sump has been added in the bottom of the pond to help promote sedimentation within the pond.

The existing sanitary main on property and the existing watermain north of Grand River have been added to the plans. The utility plan shows the proposed lead connections to both mains. Utility specifications are shown on the utility plan and the provided City lead connection details have been shown on the detail sheet. A permit will be obtained from MDOT for the water lead bore beneath Grand River prior to lead construction.

A Soil Erosion Control plan is provided as part of the set and will be utilized to obtain a permit from Ingham County prior to construction.

If you should have any questions regarding the plans or need any additional information, please do not hesitate to contact me at (517) 339-1014, or you can email me at ajpatrick@kebs.com.

Sincerely,

Allen J. Patrick, P.E.
KEBS, Inc.



KEBS, INC.

825 W. Grand River (E-101859)

Sheet 1 of 4

Calculated By: Allen Patrick

Date: 11-22-23

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825 W. Grand River Ave. Drainage Calculations

Background

Drainage for 825 & 725 W. Grand River Ave. originally designed in 1994 with a shared drainage network, detention pond, and restricted outlet. The drainage network was designed to restrict the outflow from the site at Ex. CB#6 and backflow storm water to a detention pond at south portion of 825 W. Grand River. The detention pond and outlet were sized for a 50-year storm with an allowable outflow of 1.74 cfs. The drainage network, pond and outlet were installed with the development of 725 W. Grand River.

1994 Design Conditions:

(2) proposed buildings, parking lots and detention pond

0.07 Acre	C=0.87	CA=0.06	
0.37 Acre	C=0.83	CA=0.31	
0.49 Acre	C=0.83	CA=0.41	
0.10 Acre	C=0.88	CA=0.09	
0.37 Acre	C=0.76	CA=0.28	
0.14 Acre	C=0.90	CA=0.13	
0.24 Acre	C=0.77	CA=0.18	
0.14 Acre	C=0.90	CA=0.13	
0.21 Acre	C=0.20	CA=0.04	
0.31 Acre	C=0.90	CA=0.28	Bldg(725 W. Grand River)
<u>0.27 Acre</u>	C=0.90	<u>CA=0.24</u>	Bldg(825 W. Grand River)
2.70 Acre		CA=2.15	

Avg 'C' = 0.80

Proposed Design Conditions:

CB5	0.15 Acre	C=0.80	CA=0.12
CB1	0.33 Acre	C=0.80	CA=0.26
CB11	0.47 Acre	C=0.84	CA=0.39
CB2	0.13 Acre	C=0.89	CA=0.12
ST1	0.68 Acre	C=0.80	CA=0.54
EX CB	0.20 Acre	C=0.61	CA=0.12
CB4	0.50 Acre	C=0.88	CA=0.44
Pond	<u>0.41 Acre</u>	C=0.33	<u>CA=0.14</u>
	2.87 Acre		CA=2.13

Avg 'C' = 0.74

Proposed CA = 2.13 ≤ 2.15 Original Design CA

Use original allowable outflow, Q = 1.74 CFS



KEBS, INC.

Provide 100-Year storage using current ATLAS 14 Rainfall

Proposed Conditions: 2.87 Acres, $C=0.74$, $CA=2.13$, $Q=1.74$ CFS

(See Calculation Sheet 3) \rightarrow 14,783 CFT Storage required

Storage provided to 866.00 in expanded detention pond = 23,414 CFT

100-Year storage elevation in expanded pond = 865.00 (See Calculation Sheet 4)

Sediment sump provided in pond below outlet elevation 862.68 = 6,293 CFT

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Detention Requirement and Discharge Allowance for Small Sites

Storm Outlet: Ex. CB#6 Existing "C" Value 0.57
 Job Name: 825 W. Grand River Proposed "C" Value 0.74
 Job Number: E-101859 Maximum Allowable Outflow (CFS) 1.74
 Drainage Area (Acres) 2.87 Storm Recurrence Interval (Yrs) 100

Duration	A Rainfall (Per ATLAS14)	B 100% Runoff	C Runoff "C"	D Runoff (Ac.-Ft.)	E Outflow (Ac.-Ft.)	F Storage (Ac.-Ft.)
10 min.	1.15	0.275	0.74	0.204	0.048	0.156
15 min.	1.40	0.335	0.74	0.248	0.072	0.176
30 min.	2.02	0.483	0.74	0.358	0.096	0.262
1 hr.	2.73	0.653	0.74	0.483	0.144	0.339
2 hr.	3.44	0.823	0.74	0.609	0.288	0.321
3 hr.	3.89	0.930	0.74	0.688	0.431	0.257
4 hr.	4.10	0.981	0.74	0.726	0.575	0.150
5 hr.	4.31	1.031	0.74	0.763	0.719	0.044
6 hr.	4.52	1.081	0.74	0.800	0.863	-0.063
8 hr.	4.65	1.112	0.74	0.823	1.150	-0.327
10 hr.	4.80	1.148	0.74	0.850	1.438	-0.588
12 hr.	4.95	1.184	0.74	0.876	1.726	-0.850
18 hr.	5.21	1.246	0.74	0.922	2.588	-1.666
24 hr.	5.50	1.315	0.74	0.973	3.451	-2.478

- A) Inches of Rainfall: The numbers provided are taken from the National Weather Service ATLAS #14
- B) 100% Runoff for 2.87 Acres: Divide inches of rainfall by 12 and multiply by number of acres.
- C) Proposed % Runoff: Insert selected "C" value. "C" value of the total site can be adjusted as a ratio of impervious area, plus 0.05 for vacant area.
- D) Runoff: Multiply 100% runoff value by "C" value.
- E) Outflow: Multiply outflow in cfs by duration in hours, then by 3600 and divide by 43,560.
- F) Storage Required: Subtract Outflow from Runoff. Storage value will increase to a peak value and then decrease. The peak (largest) value for storage should be used.

* Maximum allowable Outflow (CFS) $Q=A*0.15$ CFS $Q(CFS)= 0.4305$
 Use 1994 allowable outflow, $Q(CFS)= 1.74$

KEBS INC. 2116 Haslett Road Haslett, MI 48840 (517) 339-1014	Runoff Detention (cft):	By:	Date:
	14783	Allen Patrick	11/22/2023

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Standpipe Dimensions for Detention Pond (First Flush, Bank Full, 100 yr Flood)

Storm Outlet: Ex. CB#6 Existing "C" Value 0.57
 Job Name: 825 W. Grand River Proposed "C" Value 0.74
 Job Number: 825 W. Grand River Maximum Allowable Outflow (CFS) 1.74
 Drainage Area (Acres) 2.87 Required Detention Volume (ft³) 14783

STORAGE PROVIDED

Elevation (ft)	Area (ft ²)	Incremental Volume (ft ³)	Detention Pond Volume (ft ³)
866.0	9420	8675	23414
865.0	7930	7230	14739
864.0	6530	5895	7509
863.0	5260	1614	1614
862.68	4830	0	0
SEDIMENT SUMP			
862.68	4830	2978	6293
862.0	3930	3315	3315
861.0	2700	0	0

Detention Pond Storage Capacity (ft³) 23414

100 yr Flood Storage Requirement (ft³) 14783 Storage Elevation (ft) 865.00

Area = $Q / [0.62 * (\text{SQRT}(2 * g * h))]$
 $Q_{FF} + Q_{BF}$ (CFS) 0.00
 $Q_{100} - (Q_{FF} + Q_{BF})$ (CFS) 1.74
 Discharge Area (ft²) 0.245

A 6.75" diameter hole has an area of 0.2485 ft²
 Use 1 6.75" hole at **862.68**

Bank Full Storage Requirement (ft³) _____ Storage Elevation (ft) _____

$(V_{BF} = 8784.6 \times (\text{Ac}) \times (C))$
 The bankfull storm is the 24 hour, 2 year storm event:

Check first flush holes:
 V_1 (ft³) _____
 h_{ave} (ft) _____
 V_2 (ft³) _____
 Q_{ff} (CFS) _____
 Q_{BF} (CFS) _____
 T_{ff} (hrs) _____
 $(h_{ave} = 2/3 H)$ h_{ave} (ft) _____
 Discharge Area (ft²) _____

A _____ diameter hole has an area of _____ ft²
 Use _____ 2.0" holes at _____

First Flush Storage Requirement (ft³) _____ Storage Elevation (ft) _____

$V_{FF} = 3630 \times \text{Ac}$ The first flush storm is the first 1" of rain over the entire watershed:

Allowable Q_{FF} (CFS) _____
 $(h_{ave} = 2/3 H)$ h_{ave} (ft) _____
 Discharge Area (ft²) _____
 T_{ff} (hrs) _____
 (Area = $Q / [0.62 * (\text{SQRT}(2 * g * h))]$)

A 2.0" diameter hole has an area of 0.0218 ft²
 Use _____ 2.0" holes at _____

KEBS INC. 2116 Haslett Road Haslett, MI 48840 (517) 339-1014	Runoff Detention Required:	By: Allen Patrick	Date: 11/22/2023
	100 Year 14783 CFT		

EXISTING TO GRAND RIVER AVE. DRAIN

1.15 Ae

C = 0.57

CA = 0.66

Tc = ± 30 min T10 = 2.64

Q10 = 0.66 x 2.64 = 1.74 cfs

Existing "CA" to outlet

Existing conditions outflow

HYD 55.20 UP

DN = TOP 15" @ EXIS, = 63.28

L = 40 = ~~4.80%~~

C^H = 1.22

TRY 6" V 7.55 He = $(\frac{7.55^2}{49.4}) \cdot 0.5 \cdot 0.45$

$(55.20 - 0.45) - 63.28$
3.48

Construction plans show an 8" restricter pipe with a 7" orifice (Detail on Sheet 2)

Prop. "CA" to outlet

CA TO STOR = $1.98 + 0.13 + (0.04) = 2.15$

Q0 = ~~0.758~~ 0.809

T = ~~130.179~~ 77.602

Vs = ~~7019.203~~ 5907.454

VT = 40,269 = 12,701

50 yr storage required for CA=2.15 outletting at Q=1.74 cfs(max)

Prop 50yr storage elevation

STOR → 66.36

Q50 = V = 3.88 He = 0.61

HYD SLOPE = 9.62

$63.28 + (9.62\% \times 40) + 0.61$

IE C3.0

		300	
C3.5	1800		
		2020	
C4	2240		
		2780	
C5	3320		
		1810	
C5.5	3820		
		2240	
C6	5120		
		3620	
C6.5	9340		

Storage in NE parking lot

Storage in NW parking lot

Storage available to top of pond

$$12790 + 750 + 213 = 13753$$

$$C6.5 - \frac{(13753 - 12701)}{3620 + 2840 + 1280}$$

NE PARKING

$$= C5.36$$

IE C5.9 -0- -0-

50 year storage elevation

Total storage available to 866.50 elevation

C4	140	
		750
C6.5	2840	

NW

IE C6 -0-

213

C6.5	1280
------	------

STORM DRAINAGE COMPUTATIONS BY:
KYES ENGINEERING & ASSOC., INC.
2163 UNIVERSITY PARK DR. #250
OKEMOS, MI 48864
(517)347-0040

PROJECT _____
SHEET # _____
CALCULATED BY: _____
CHECKED BY: _____ DATE _____

Storm pipe
calculations with
drainage areas
(See Drainage Map)

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STR# 1 TO STR# EXIS
INCREMENT AC. _____ "C"= _____
INCREMENT "CA"= _____ TOT AC.= _____ TOT "CA"= _____ TC= _____ "I"= _____
Q 10 _____ SIZE 15 "V"= _____ LENGTH 110 TIS _____ SLOPE= 0.15 %
INV. UP= 62.09 INV. DOWN 62.03 HYD. % _____ REMARKS _____
HYD EL UP= _____ HYD EL DOWN _____

STR# 1 TO STR# 2
INCREMENT AC. 0.07 "C"= 0.87
INCREMENT "CA"= 0.06 TOT AC.= _____ TOT "CA"= _____ TC= 10 "I"= 4.76
Q 10 ^{-1.50}0.28 SIZE 15 "V"= _____ LENGTH 110 TIS _____ SLOPE= -0.10 %
INV. UP= 62.09 INV. DOWN 62.20 HYD. % _____ REMARKS _____
HYD EL UP= 65.20 HYD EL DOWN 65.24

STR# 3 TO STR# 2
INCREMENT AC. 0.49 "C"= 0.83
INCREMENT "CA"= 0.41 TOT AC.= _____ TOT "CA"= 0.41 TC= 10 "I"= _____
Q 10 1.95 SIZE 12 "V"= 2.49 LENGTH 155 TIS 1.04 SLOPE= 0.20 %
INV. UP= 62.51 INV. DOWN 62.70 HYD. % 0.30 REMARKS _____
HYD EL UP= 65.26 HYD EL DOWN _____

STR# 2 TO STR# 4
INCREMENT AC. 0.37 "C"= 0.83
INCREMENT "CA"= 0.31 TOT AC.= _____ TOT "CA"= 0.28 TC= 11.04 "I"= 4.57
Q 10 ^{3.50-1.50}2.06 SIZE 15 "V"= 1.68 LENGTH 150 TIS 1.48 SLOPE= -0.10 %
INV. UP= 62.20 INV. DOWN 62.35 HYD. % 0.10 REMARKS ± 1.50 CFS
HYD EL UP= _____ HYD EL DOWN _____

STR# 4 TO STR# 5
INCREMENT AC. 0.10 "C"= 0.88
INCREMENT "CA"= 0.09 TOT AC.= _____ TOT "CA"= 0.87 TC= 12.53 "I"= 4.32
Q 10 ^{3.72-1.50}2.22 SIZE 15 "V"= 1.84 LENGTH 110 TIS 0.99 SLOPE= -0.10 %
INV. UP= 62.35 INV. DOWN 62.46 HYD. % 0.12 REMARKS _____
HYD EL UP= _____ HYD EL DOWN 64.48

STR# 6 TO STR# 5
INCREMENT AC. 0.14 "C"= 0.90
INCREMENT "CA"= 0.13 TOT AC.= _____ TOT "CA"= _____ TC= _____ "I"= _____
Q 10 _____ SIZE 12 "V"= _____ LENGTH 212 TIS _____ SLOPE= 0.10 %
INV. UP= 62.57 INV. DOWN 62.46 HYD. % _____ REMARKS _____
HYD EL UP= _____ HYD EL DOWN _____

STORM DRAINAGE COMPUTATIONS BY:
KYES ENGINEERING & ASSOC., INC.
2163 UNIVERSITY PARK DR. #250
OKEMOS, MI 48864
(517)347-0040

PROJECT _____
SHEET # _____
CALCULATED BY: _____ DATE _____
CHECKED BY: _____ DATE _____

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STR# 5 TO STR# 7
INCREMENT AC. 0.31 "C"= 0.80
0.27 0.90
0.37 "C"= 0.76
INCREMENT "CA"= 0.80 TOT AC.= _____ TOT "CA"= 1.80 TC= 13.52 "I"= 4.17
Q 10 7.51-1.50 SIZE 12 "V"= 4.90 LENGTH 104 TIS 0.35 SLOPE= -0.10 %
INV. UP= 67.44 INV. DOWN 67.56 HYD. % 0.86 REMARKS _____
HYD EL UP= 64.98 HYD EL DOWN _____

STR# 7 TO STR# STOR
INCREMENT AC. 0.24 "C"= 0.77
INCREMENT "CA"= 0.18 TOT AC.= _____ TOT "CA"= 1.90 TC= 13.87 "I"= 4.12
Q 10 8.16-1.50 SIZE 12 "V"= 5.43 LENGTH 8 TIS 0.02 SLOPE= -5.90 %
INV. UP= 67.56 INV. DOWN 63.0 HYD. % 1.06 REMARKS _____
HYD EL UP= _____ HYD EL DOWN 64.0

STR# _____ TO STR# _____
INCREMENT AC. _____ "C"= _____
INCREMENT "CA"= _____ TOT AC.= _____ TOT "CA"= _____ TC= _____ "I"= _____
Q 10 _____ SIZE _____ "V"= _____ LENGTH _____ TIS _____ SLOPE= _____ %
INV. UP= _____ INV. DOWN _____ HYD. % _____ REMARKS _____
HYD EL UP= _____ HYD EL DOWN _____

STR# _____ TO STR# _____
INCREMENT AC. _____ "C"= _____
INCREMENT "CA"= _____ TOT AC.= _____ TOT "CA"= _____ TC= _____ "I"= _____
Q 10 _____ SIZE _____ "V"= _____ LENGTH _____ TIS _____ SLOPE= _____ %
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INV. UP= _____ INV. DOWN _____ HYD. % _____ REMARKS _____
HYD EL UP= _____ HYD EL DOWN _____

STORAGE COMPUTATIONS BY:

KEBS INC.
 2116 HASLETT ROAD
 HASLETT, MI 48840
 (517) 339-1014

PROJECT: Williamston Retail - 94-46

SHEET # 1 OF 1

CALCULATED BY: Allen Patrick DATE: 09/07/23

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RECREATED DETENTION
 CALCULATION BASED ON
 HISTORICAL CALCS

ALLOWABLE OUTFLOW (CFS)= 1.74
 DEVELOPED "CA"= 2.15

STORAGE CALCULATIONS FOR A 10yr STORM

$$I = \frac{119}{15 + T}$$

$$Q_o \text{ (cfs)} = \frac{\text{Allowable outflow}}{\text{Acre} \times \text{Runoff coef.}} = 0.809$$

$$\text{Peak Time} = T(\text{min}) = -15 + \text{SQRT}\left(\frac{2677.5}{Q_o}\right) = 42.52$$

$$V_s \text{ (cft/Acre)} = \frac{7140 \times T}{15 + T} - (40 \times Q_o \times T) = 3902$$

$$V_i \text{ (cft)} = V_s \times \text{Acres} \times \text{Runoff} = \underline{8388}$$

STORAGE CALCULATIONS FOR A 50yr STORM

$$I = \frac{200}{33 + T}$$

$$Q_o \text{ (cfs)} = \frac{\text{Allowable outflow}}{\text{Acre} \times \text{Runoff coef.}} = 0.809$$

$$\text{Peak Time} = T(\text{min}) = -33 + \text{SQRT}\left(\frac{9900}{Q_o}\right) = 77.60$$

$$V_s \text{ (cft/Acre)} = \frac{12000 \times T}{33 + T} - (40 \times Q_o \times T) = 5907$$

$$V_i \text{ (cft)} = V_s \times \text{Acres} \times \text{Runoff} = \underline{12701}$$

