

Appendix 4

Watershed Policy Statements

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BLISS CREEK AND HUIZENGA DRAINAGE DISTRICTS

Storm Water Detention

Comply with storm water detention criteria outlined in the Bliss Creek Watershed Management Plan (1995) and the Huizenga Watershed Management Plan (1995). The specific criteria contained in the guidelines of each Drain Commissioner's office shall apply for projects within their respective counties. This includes a "no detention zone" for the Bliss Creek Watershed north of Jackson Street and Canal Street. The City of Wyoming's Storm Water Management Plan provides for a combination of regional and on-site detention.

Floodplain Protection and Mitigation

All existing flood plains in the Bliss Creek and Huizenga Drain Watersheds are assumed critical whether or not they are contiguous to the main channel and tributary drains, unless the developer can demonstrate that no impact to adjacent parcels or storm water discharge would occur from the loss of flood plain.

The developer is required to delineate the extent of the 100-year floodplain subject to review by the Intercounty Drainage Board.

Mitigation of the loss of floodplain shall meet the following criteria.

- Replacement of the loss of floodplain at 1.5-to-1 ratio. This applies to floodplain associated with rainfall events up to 100-year frequency.
- Storm water detention does not apply toward the mitigation volume.
- Mitigation grading volume shall be computed above the seasonal high ground water level only.
- The inflow and outflow rates to the mitigation area shall be consistent with pre-development rates.
- The mitigation-grading plan shall provide for an equivalent volume of storage for floodplains associated with more frequent events (i.e., 10- and 25-year frequency).
- Up to 50 percent of the mitigation volume may be used for snow storage.
- The proximity of the floodplain mitigation shall provide for an equivalent hydrologic impact to the receiving stream and adjacent parcels.

In lieu of the construction of the additional mitigation volume between a 1-to-1 to a 1.5-to-1 ratio, the developer shall have the option of contributing a fee of \$20,000 per acre-foot of mitigation volume to the Intercounty Drainage Board for use on flood control within the watershed.

Drafted by FTC&H for the Bliss and Huizenga Intercounty Drainage Board

DRAIN #28 DRAINAGE DISTRICT

(North of James Street, Holland Twp.)

Storm water detention volume required will be the maximum runoff from a 100-year rainfall for any and all duration from the proposed developed area, less that volume discharged during the same duration at the approved release rate.

All new development shall be required to mitigate the loss of floodplain based on the following criteria:

- The proprietor’s engineer is required to delineate the extent of the 100-year flood plain if riparian to the established drain or its branches and submit this delineation to the Drain Commissioner’s engineer for review and approval.
- Replacement of lost floodplain is required at a 1.25-to-1 ratio for rainfall events up to a 100-year frequency. In lieu of the construction of the additional mitigation volume between a 1-to-1 to a 1.25-to-1 ratio, the developer shall have the option of contributing a fee of \$20,000 per acre-foot of mitigation volume to the Drain #28 Drainage District for use on flood control within the watershed.
- Storm water detention does not apply toward floodplain mitigation volume.
- Floodplain mitigation volume will be computed above the seasonal high water table.

In other parts of this watershed Ottawa County Drain Commissioner's Office Storm Water Management Criteria remain in effect except as amended above.

Drafted by Prein & Newhof, P.C. for the Ottawa County Drain Commission.

HAGER CREEK WATERSHED **OMITTED - Current rules exceed these standards**

(Including parts of the NW ¼ of section 16, NE ¼ of section 17, SE ¼ of section 8, and the SW ¼ of section 9, Georgetown Township)

Extended Detention Basins

Extended storm water detention is required within the Hager Creek Watershed.

The extended detention basin shall be a two-stage design, see example in Appendices.

In-line detention shall not be permitted.

All inlets, outlets, and overflow structures shall be designed to have non-erosive velocities or have adequate protection against erosion and scour. Maximum velocities are given as follows:

<u>Lining Type</u>	<u>Maximum Permissible Velocity (ft/s)</u>
Bare soil	2
Well-vegetated soil	4
Erosion-resistant lining	8

All other requirements for detention basin design shall apply to extended detention basins.

Forebay

All extended detention basins shall have a forebay to capture sediment.

The forebay shall be a separate basin, which can be formed by rock check dam, gabions, or other suitable structure.

The capacity of the forebay shall be equivalent to 5% of the 100-year flood control volume.

The overflow weir between the forebay and detention basin shall convey the design discharge from the inlet pipe(s) without overtopping the berm.

Stream Protection/Water Quality Volume

The initial stage (lower design water elevation) shall be sized to store the stream protection volume (V_{sp}) defined as the routed volume of runoff from the 1.5-year, 24-hour rainfall event (2.16 inches) with post-development conditions. The minimum required stream protection volume is given by the equation:

$$V_{sp} = 5,000 \text{ cft per impervious acre}$$

The maximum release rate to detain this volume for at least 24 hours is 0.05 cfs per impervious acre.

The stream protection volume incorporates the water quality volume (V_{wq}) to treat the "first flush of storm water runoff which typically carries with it the highest concentration of pollutants. Separate design criteria for water quality volume are not required.

Flood Control Volume

The flood control volume (V_{fc}) shall be sized to detain the 100-year rainfall event with a maximum release rate of 0.13 cfs per acre.

The flood control volume must be provided for all acreage contributing to the detention basin.

The forebay and stream protection volume may be included as part of the required flood control volume.

Outlet Design

The multiple-stage outlets may be designed using the orifice equation, rearranged to solve for area.

$$A = \frac{Q}{5\sqrt{2gH}}$$

Where	A	=	Required area (sq-ft)
	Q	=	Required outflow (cfs)
	c	=	Orifice Coefficient (approximately 0.6)
	2g	=	Two times the gravitation constant (g = 32.2 ft/s)
	H	=	Height of design high water level above center of orifice, unless tailwater elevation is higher than center of orifice.

Other outlet devices shall have full design calculations provided for review.

The outlet from the initial stage shall be designed to prevent clogging.

1. Pipes or orifice plates shall have a minimum diameter of 4 inches.
2. Riser pipes with holes or slits less than 4 inches in diameter shall have a stone and gravel filter placed around the outside of the pipe. 24" in diameter is the minimum size allowed for a riser pipe.

Drafted by FTC&H on behalf of the Ottawa County Drain Commission and the Ottawa County Parks and Recreation Commission. Subject to approval by the Georgetown Township Board.

RUSH CREEK DRAINAGE DISTRICT

(12th Ave. upstream to Rush Creek's intersection with Buttermilk Creek)

Compensating excavation will be required for fills that exceed 10 percent of the storage volume available within the flood plain. Filling more than 10 percent of the storage volume will result in a measurable increase in Rush Creek 100-year flood elevation and will not be permitted by the Ottawa County Drain Commission or the State Flood Plain Regulatory Authority. (reference document entitled "Effects of Reduction in Flood Plain Storage on Rush Creek" dated July 12, 1989 prepared by Bruce Menery, P.E., MDEQ, Land and Water Management Division.)

TULIP INTERCOUNTY DRAINAGE DISTRICT

(Revised February 11, 2003)

Effects and Purposes

These standards provide for the establishment of design criteria for storm water controls and facilities within the Tulip Intercounty Drainage District (herein after referred to as DISTRICT), and recognize the need for approval of the Tulip Intercounty Drain Board (herein after referred to as BOARD) in connection with development within the Watershed. As set forth below, such approval may be obtained by a developer for a development site partly or wholly within the Watershed by the developer's commitment to construct acceptable storm water management facilities and/or by the developer's submission of an acceptable drainage plan and/or by payment of Storm Water Management Contributions, when acceptable to the BOARD, in lieu of construction of Storm Water Management facilities.

The purposes of these standards are to minimize flooding, property damage, erosion, nuisances, and to improve drainage and water quality within the Tulip Intercounty Drain (herein after referred to as DRAIN) Watershed.

The basis of these standards arises from the following findings of the BOARD:

The BOARD manages and maintains certain existing drainage facilities in the Watershed, which have been developed over a number of years for the purposes of collection, storage and conveyance of storm water.

These standards are necessary and essential to manage storm water drainage facilities in connection with new development within the Watershed to minimize flooding and to improve drainage from new development.

It will be necessary to construct improvements to and extensions of the existing Storm Water Management System within the Watershed to minimize flooding from new development, to minimize existing periodic flooding from existing development or natural causes, to minimize property damage,

to minimize erosion, to minimize nuisances, to improve water quality, and to defray the cost of such improvements and extensions through the acceptance of Storm Water Management Contributions in connection with certain new development.

Definitions

For purposes of these standards the words and phrases set forth below shall have the meanings provided. Words used in the singular shall include the plural, and in the plural, the singular. Words used in the present tense shall include the future tense. The word "shall" is mandatory and not discretionary. The word "may" is permissive. Words not defined in this Section or elsewhere in these standards shall be given their common, ordinary meaning unless the context requires otherwise.

DEVELOPER means any individual, sub-divider, firm, association, syndicate, partnership, corporation (public or private), trust, or any other legal entity (public or private), intending or proposing to effect the development of land where for self or for another.

DEVELOPMENT SITE means any land on which work is performed or proposed to be performed which will alter its existing storm water drainage characteristics. For purposes of these standards, a development site shall be considered any land improvement not contained or listed in the exemptions below.

DRAINAGE PLAN means a submittal to the BOARD for the review by the Board's Professional Engineer/Consultant which provides information on the location of the development, the development tributary area to each point of discharge from the development site, indication of the method used to calculate the peak discharge rate, hydrologic and hydraulic calculations for the development and any upstream tributary area, calculation of the final peak discharge rate, calculation of any facility or structure size and configuration, the plan of action to be taken to meet the peak discharge criteria, a development drainage drawing showing all drainage related facilities and structures with existing and final grades, an implementation plan for construction of any and all facilities and structures needed to carry out the overall drainage plan, and any other similar information required by relevant watershed or Storm Water Management plan referred to in these standards. The BOARD may require the drainage plan to define the alignment and boundary of the natural drainage courses, existing and proposed drainage facilities, or sub-drainage areas on the land in question, and to include drawings, profiles, and specifications for the construction of channels, conduits, reservoirs, culverts, bridges, and other drainage facilities reasonably necessary to ensure that storm water, including drainage from other lands which will contribute runoff to the property, will be adequately drained, stored, or otherwise controlled. A schedule of the estimated dates of completing construction for storm water facilities shown on the plan shall also be included. Ownership and maintenance responsibility of the proposed storm drainage facilities shall be clearly defined. A plan for the proper maintenance of privately owned facilities shall be included

STORM WATER MANAGEMENT CONTRIBUTIONS mean fees, money or other contributions approved by the BOARD contributed by the developer as provided in these standards for the purpose of defraying the costs of the Storm Water Management System. These Storm Water Management Fees are paid by the developer, at the BOARD'S option, in lieu of constructing drainage facilities.

TULIP INTERCOUNTY DRAINAGE DISTRICT or DISTRICT means the drainage district for the Watershed established pursuant to Chapter 21 of the Drain Code of 1956, as amended, the funds of which are administered by the BOARD.

TULIP INTERCOUNTY DRAIN or DRAIN means the storm water drain or conveyance system established pursuant to Chapter 21 of the Drain Code of 1956, as amended, which is continuously or periodically maintained or administered by the BOARD.

WATERSHED means all property within the natural topographic boundaries of the DRAINAGE DISTRICT as generally described in the Appendices, which is incorporated herein by reference.

Exemptions

These standards shall apply to any development site within the Tulip Watershed which requires approval of a plat, a site condominium, a site development plan, building permit, or any other permit for work which will alter storm water drainage characteristics of the development site, provided, however, that these standards shall not apply to the following:

The construction of, or additions, extensions, or modifications to individual single-family or two-family detached residential structures located outside mobile home parks.

The installation or removal of individual mobile homes within a mobile home park. This exemption shall not be construed to apply to the construction, expansion, or modification of a mobile home park.

Plowing, tilling and drainage for the purposes of agricultural production and the construction of any agricultural buildings not requiring building permits.

Public streets and right-of-way approved on or before the effective date of these standards (January 26, 1999).

Development Site Standards

A developer shall not alter the storm water drainage characteristics of a development site or any portion thereof except in accordance with a drainage plan approved pursuant to these standards or as otherwise permitted under these standards.

Federal, State and Local Requirements

Nothing in these standards shall be construed to relieve the developer from complying with all federal, state and local requirements for design and construction of drainage facilities or from complying with all applicable laws, ordinances, rules or regulations. The BOARD recommends building and/or occupancy permits be issued only when a development site plan is in compliance with Tulip Storm Water Management Standards.

Criteria

All development sites west of M-40 will be required to construct a system for storage and the controlled release of storm water runoff. All development sites east of M-40 that abut the DRAIN will be required to provide either increased floodplain storage or deposit the cost of designing and constructing, including engineering field inspection, an acceptable storm water detention system to the account of the DISTRICT. Those development sites east of M-40 that do not abut the DRAIN and will discharge to a branch drainage system that has adequate capacity either shall deposit the estimated cost of designing and constructing an acceptable storm water detention system to the account of the DISTRICT or they shall construct increased floodplain storage along the DRAIN on off-site land. The funds deposited to the DISTRICT'S account shall be used to design and construct improvements to and extensions of the existing Storm Water Management System within the

Watershed to minimize flooding from new development, to minimize existing periodic flooding from existing development or natural causes, to minimize property damage, to minimize erosion, to minimize nuisances, to improve water quality and to provide a sound scientific basis for such activities through study and survey of the existing DRAIN.

Storm Water Management Design and Criteria shall meet the criteria of the respective County that the development is in.

Developments East of M-40

The purpose of Storm Water Management west of M-40 is to insure that the flow of the DRAIN is maintained at or below the existing flow prior to development. However, as development occurs closer to the outlet of the DRAIN, Storm Water Management might delay the time storm water discharges from the site to the point where it will increase the total peak flow for the DRAIN. Therefore, it is in the best interest of the entire DISTRICT if the storm water from development east of M-40 discharges prior to the time that the DRAIN reaches its peak flow. Since it is also the BOARD'S desire to be fair and equitable to all parties, while at the same time doing everything possible to maintain or lower flood levels within the DISTRICT, new development sites east of M-40, next to the DRAIN, may have an option, exercised by the BOARD'S sole discretion, of construction of increased flood plain storage, or of depositing of an amount of money necessary to design and construct an acceptable Storm Water Management System to the DISTRICT'S account, using the same rules as for the area west of M-40. If increase floodplain storage is provided, it shall be equal to the volume of storm water detention required for the rest of the DISTRICT and shall be measured between the 2 year floodplain elevation and the 100 year floodplain elevation. The floodplain elevation used shall be approved by the Michigan Department of Environmental Quality.

All development sites east of M-40 that are not next to the DRAIN shall either deposit the cost of constructing an acceptable Storm Water Management System, including the cost of the land for the system, to the District's account or shall construct acceptable increased floodplain storage next to the DRAIN on off-site land, as long as the drain or storm sewer system that will carry the site's storm water runoff to the DRAIN has adequate capacity of its own. If the development site's receiving drain or storm sewer system does not have adequate capacity, an on-site Storm Water Management System may be required or the receiving stream may be required to be improved to the capacity needed to pass the total required design flow. All floodplain storage areas shall be within easements in the name of the Tulip Intercounty Drain Drainage District.

Developments Abutting the Tulip Intercounty Drain

All development sites abutting the DRAIN shall include an easement for the DRAIN, in the name of the Tulip Intercounty Drain Drainage District, in care of the Drain Commissioner in whose county the land is located. The easement shall be at least equal to 100' of land on each side of the DRAIN. For development sites east of M-40, the easement shall include sufficient additional land to construct increased floodplain storage.

NOTE: The BOARD reserves the right to require the Developer to furnish additional calculations acceptable to the BOARD including, but not limited to, a comparison of the site's discharge hydrograph to the hydrograph for the DRAIN at the point of discharge. The decision on the need for additional calculations shall be by recommendation of the BOARD'S engineer(s).

Permanent Sedimentation Basins

Permanent sedimentation basins shall be installed on all sites that do not have storm water detention basins (or ponds) at the outlet end of the site's storm sewer system. However, the peak discharge rate from the basin shall reach the drain at the 60% to 70% drain lag time, depending on the accuracy of determining said lag time. The sedimentation basin shall be approvable by the BOARD'S engineer(s).

Development Within the One Hundred Year Flood Plain

It is the BOARD'S position that it is not advisable to place fill within the 100 year floodplain area. However, if the developer shows that it is not feasible to develop a site without placing fill below the 100 year floodplain elevation and the Michigan Department of Environmental Quality approves fill, there shall be a mitigating amount of cut below the 100 year floodplain in an area close to the proposed development, within the same hydraulic drainage area. The amount of cut shall be equal to at least one and a quarter (1.25) times the amount of fill placed below the 100 year floodplain elevation, unless the developer's engineer shows that the incoming and outgoing rate of flow to the flood storage area is approximately equal to the rate prior to development. The BOARD'S reviewing engineer(s) shall make the final decision as to the acceptability of the location of the cut.

Fees

The minimum engineering review fee for development sites within the Tulip Intercounty Drainage District shall be based on the fee structure of the respective County. If the actual cost of the BOARD'S consultant(s) to review the proposed development exceeds the fees collected, additional fees will be charged based on the current actual hourly rate charged to the BOARD by their consultant(s).

SPECIAL NOTE: It should be noted that the compliance to the above standards does not relieve the developer from obtaining any and all other permits or approvals from other reviewing agencies, such as from local units of governments and from State agencies such as the Michigan Department of Environmental Quality.

Drafted by William E. Chappell, P.E. of Driesenga & Associates for the Tulip Intercounty Drainage Board (Effective January 26, 1999)

APPENDIX I - Non-Mandated Detention Zones

(unless required by other federal, state or local standards and specifications), In the following zones:

Storm water retention/detention is the standard for all development in Ottawa County unless the design engineer can adequately satisfy one of the following conditions:

- Verify that the receiving water(s) possess capacity to convey the increased flows safely and with no negative downstream impacts due to increased flow rates, water levels or velocities;
- Verify that the peak flow of the receiving water(s) will not be increased by the proposed development;
- Verify that the proposed development is listed below as a designated non-detention zone.

Although satisfying one or more of the above criteria may relieve a developer from installing storm water detention, the Drain Commissioner reserves the right to water quality improvement features, or specify that additional flood plain storage volume be excavated in lieu of detention. The required volume of increased flood plain storage will be equivalent to that calculated by the standard detention basin methodology, and will be measured in the field as the volume excavated below the 1% annual chance and above the 50% annual chance flood plain elevations of the adjacent water course. No detention is required when outletting directly into the Grand River, Spring Lake or their connecting bayous (sedimentation/water quality basin required). Furthermore, no detention is required for the following jurisdictions at the stated outlet locations when outletting directly into:

Allendale Township

Ottawa Creek east of 40th Avenue (sedimentation/water quality basin required)

Crockery Township

Crockery Creek, riparians downstream of Fitzgerald St. in Section 23

Georgetown Township

Rush Creek, riparians downstream of its intersection with Bliss Creek in Section 24

Bliss Creek, north of Jackson St. subject to Bliss Creek Policy Statement

Grand Haven Township

Vincent Drain downstream of 168th Avenue

Holland City

Lake Macatawa (sedimentation/water quality basin required)

Macatawa River, riparian properties beginning within Section 26, downstream to Lake Macatawa (floodplain protection/enhancement preferred)

Macatawa River, riparian properties beginning within Section 26, downstream to Lake Macatawa (floodplain protection/enhancement preferred)

Tulip Intercounty east of M-40 subject to Tulip Intercounty Policy Statement

Holland Township

Lake Macatawa (sedimentation/water quality basin required)

Macatawa River, riparian properties beginning within Section 26, downstream to Lake Macatawa (floodplain protection/enhancement preferred)

Macatawa River, riparian properties beginning within Section 26, downstream to Lake Macatawa (floodplain protection/enhancement preferred)

Tulip Intercounty east of M-40 subject to Tulip Intercounty Policy Statement

Park Township

Lake Macatawa (sedimentation/water quality basin required)

Harlem Drain, riparian properties beginning at the intersection of Drain 21/31 and the Harlem, Section 13, Park Township, downstream to Lake Macatawa

Polkton Township

Deer Creek, riparians downstream of Mill Road in the NW corner of Section 1

Port Sheldon Township

Pigeon Lake

Pigeon River, properties beginning within Section 14 downstream to Pigeon Lake

Tallmadge Township

Sand Creek riparians downstream of its intersection with Little Sand Creek in Section 27