

MEMORANDUM

Date: August 3, 2026
To: Alun Thomas
From: Abe Salinas, PE, CFM; Maritza Almada, PE
Re: Drainage Evaluation and Planning-Level Mitigation Options,
307 Inwood Road / Bettis Boulevard Area

Overview

HW Lochner, Inc., serving as City Engineer for the City of Rollingwood, has been requested to review the reported flooding condition near 307 Inwood Road and Bettis Boulevard and provide planning-level input regarding potential mitigation options.

The primary goal of this evaluation is to identify potential improvements that reduce ponding on Bettis Boulevard and prevent runoff from overtopping or bypassing the eastern curb and entering the rear yard of 307 Inwood Road toward the residence.

Based on resident observations and video documentation, runoff initially ponds near the Bettis Boulevard sag point and may extend southeast toward Riley Road. When the ponding extends beyond the existing temporary berm, runoff is reported to overtop the curb and enter the rear portion of 307 Inwood Road. The location, depth, and frequency of this overtopping has not been confirmed through detailed survey and hydraulic analysis.

Figure 1 illustrates the study area including contours, existing drainage features, flow arrows, and resident-provided flooding conditions. The reported flooding appears to be caused by street and overland runoff overtopping or bypassing the curb at a low point on Bettis Boulevard near 307 Inwood Road. Once runoff leaves the roadway section, the ground falls toward the residence and porch at 307 Inwood Road. The existing curb cut and culvert are likely constricting flow across the roadway. Contours indicate the roadway is at approximately Elevation 578 near the overtopping location, while the porch is at approximately Elevation 573. As shown by the flow direction arrows in Figure 1, overtopping flow is generally directed to the residential structure, which is approximately 5 feet below street grade.



*Figure 1 – Project Location and Observed Flooding.
(Photographs 1 and 2 show flooding on April 30, 2026, and were provided by the resident of 307 Inwood)*

Existing Drainage Patterns

The drainage area contributing to the Bettis Boulevard sag point near 307 Inwood Road is approximately 15.2 acres. Runoff reaches the sag from Almarion Drive to the north, Rollingwood Drive to the west, and Riley Road to the southeast, as shown in Figure 2. The watershed is predominantly developed with single-family residential properties. Runoff is conveyed overland across lots and along street surfaces, generally from northwest to southeast, before converging at the Bettis Boulevard sag point.

Previous drainage analysis, performed by others, estimates peak flows reaching the sag point of approximately 55 cfs (2-year), 90 cfs (10-year), 115 cfs (25-year), and 153 cfs (100-year). These flows are substantial for a local residential street. The flooding is therefore not simply a localized yard-drainage issue; it is the result of watershed-scale runoff concentrating at a roadway low point where the historic drainage path has been urbanized without a defined public system to safely convey flow downstream.

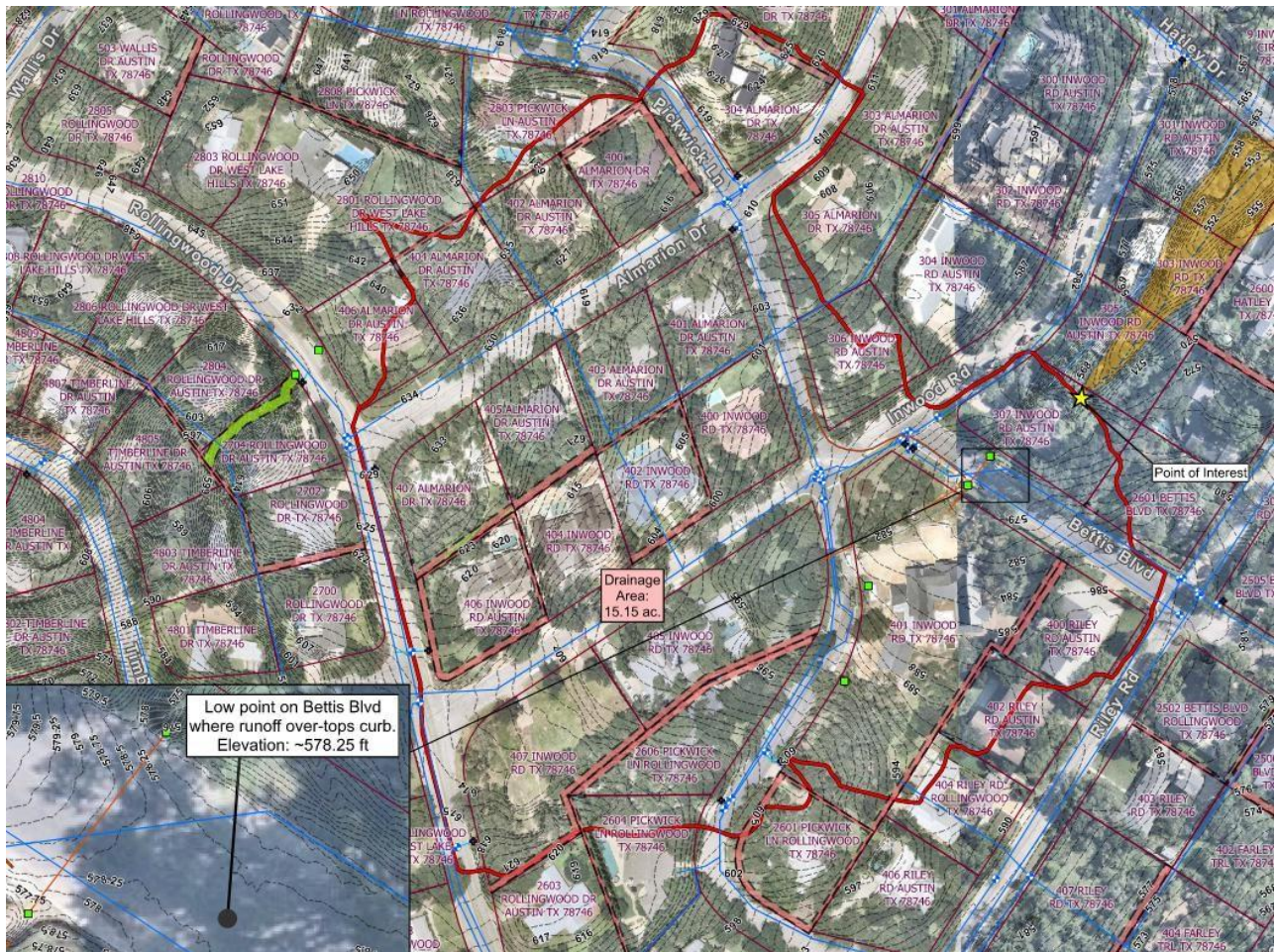


Figure 2 - Drainage Area Map

Drainage Considerations + Constraints

Several site constraints affect the feasibility, cost, and risk of potential improvements.

307 Inwood Located Below Bettis Boulevard Along a Natural Drainage Path

The affected porch area at 307 Inwood Road is approximately 5 feet below Bettis Boulevard and lies along a natural low point in the surrounding terrain (Figure 1). Once runoff overtops the roadway, the topography directs flow toward the property, where it is conveyed between the house and garage and around the residence toward the rear porch area (Figure 3).



Figure 3 - 307 Inwood Residence

Because the existing structures occupy or constrict the natural drainage path, grading or drainage modifications on the property could redirect flow or create adverse impacts to the residence, garage, adjacent properties, or downstream areas. A public improvement should therefore focus on intercepting runoff before it overtops the curb or retaining and conveying the flow within the roadway section to a safe overflow point.

The City cannot construct drainage improvements or perform grading on private property without appropriate property rights. Improvements constructed by the City within 307 Inwood Road would require a drainage easement, temporary construction easement, or other written authorization from the property owner. The property owner could also independently construct private-side improvements, but the work should be coordinated with any public improvement to avoid increasing ponding or redirecting runoff toward other properties.

Lack of an Available Storm Drain Connection or Drainage Easement

As shown in Figure 1, there is no existing storm drain system within the public right-of-way and no identified drainage easement across the adjacent private properties. Consequently, there is no readily available system or drainage path to receive runoff captured by a new inlet or other constructed drainage improvement.

One option considered was installing an inlet at the Bettis Boulevard sag point and conveying the captured runoff around the residence at 307 Inwood Road within public right-of-way. However, this option would require construction of a new storm drain extending several hundred feet along Bettis Boulevard and Inwood Road. The alignment would be constrained by significant depths, existing utilities, private property, and the need for a hydraulically adequate outfall. For these

reasons, this option was considered difficult and potentially infeasible.

Culvert and Inlet Constraints at Bettis Boulevard

Runoff collected at the Bettis Boulevard sag is conveyed through a small culvert beneath the roadway. When the culvert capacity is exceeded or inflow to the culvert is restricted, water ponds within Bettis Boulevard and may overtop or bypass the eastern curb toward 307 Inwood Road.

Field observations and resident-provided video indicate that the drainage intake on the 401 Inwood side of Bettis Boulevard does not efficiently capture the approaching roadway flow (Figure 1). The existing sawtooth curb opening (Figure 4) appears more restrictive than the previous curb cut (Figure 5), and the recently installed safety screen may further restrict inflow to the culvert (Figure 6). These conditions may increase roadway ponding and the potential for runoff to extend beyond the existing temporary berm and enter the rear yard of 307 Inwood Road (Figure 7).

Potential improvements should include evaluation of a widened or reconfigured curb opening, removal or modification of the safety screen, and an inlet near 401 Inwood Road that would convey runoff directly to the existing or an enlarged Bettis Boulevard culvert.



Figure 4 – Recently installed curb cut on Bettis Blvd., facing upstream to the northwest.



Figure 5 - Bettis Blvd curb cut prior to the recently installed drainage infrastructure (February 2024).



Figure 6 – Recently installed safety screen on the upstream headwall conveying flow across Bettis Blvd toward 307 Inwood



Figure 7 - Bettis Blvd curb cut downstream side (facing east)

Limitations of Raising the Bettis Boulevard Curb

Observed flooding, as shown in Figure 1, indicates that runoff overtops the eastern curb of Bettis Boulevard and flows toward 307 Inwood Road. To reduce overtopping, the property owner has placed mulch bags along the curb to temporarily retain runoff within the roadway and direct it toward the street sag point (Figure 8).

This temporary measure is providing some benefits by reducing flood risk to 307 Inwood. However, retaining additional runoff within the roadway may shift the overflow to another location. Before a permanent curb raise or similar improvement is implemented, the resulting ponding and overflow conditions should be evaluated to confirm that flood risk is not increased for adjacent properties, driveways, or the roadway.



Figure 8 - Bags of Mulch placed to increase berm height and mitigate curb overtopping

Potential Options

Any constructed improvement should begin with a feasibility study phase followed by design. The feasibility phase should include survey, confirmation of the existing storm drain system, hydrologic and hydraulic analysis, drainage design, and preparation of construction plans. This work is recommended before constructing any potential improvement.

Lochner has identified three potential options for consideration:

Option 1: Maintenance / Minor Modifications

Under this option, the City would not pursue a capital drainage improvement at this time. Work would be limited to routine maintenance or minor repair items such as debris removal, localized curb repair, pavement repair, or maintenance of existing roadside drainage features where applicable. This option may include the removal of the sawtooth curb cut and removal or modification of the upstream headwall safety screen, which is considered to be a point of flow constriction.

This option has the lowest immediate cost, but it does not correct major flooding issues. Runoff would continue to concentrate at the Bettis Boulevard sag point, and street flow would likely continue to overtop or bypass the curb toward 307 Inwood Road during larger storm events.

Option 2: Curb and Gutter Reconstruction / Roadway Containment

Under this option, the City would improve the ability of the Bettis Boulevard roadway section to capture, contain, and convey runoff near the sag point. Potential improvements could include replacement of approximately 200 linear feet curb with approximately 9-inch curb along the eastern side of Bettis Boulevard, construction of a permanent earthen berm along the curb line, improvement of the drainage intake near 401 Inwood Road, removal or modification of the upstream safety screen, and enlargement of the existing culvert if supported by hydraulic analysis.

The permanent curb and berm configuration should account for the effective height and extent of the mulch-bag berm currently maintained by the property owner, including the location where the berm terminates toward Riley Road. The improvement should be designed to reduce the potential for Bettis Boulevard runoff to overtop or bypass the curb and enter the rear yard of 307 Inwood Road.

The feasibility study should also evaluate installation of an inlet near 401 Inwood Road that would convey roadway runoff directly to the existing or an improved Bettis Boulevard culvert.

This option should be considered a limited risk-reduction measure, and would not ultimately solve the problem. This option may be appropriate if the City wants to limit work to public right-of-way and available funding for construction is less than approximately \$150,000.

Option 3: Conveyance Around Residence at 307 Inwood

Under this option, runoff would be intercepted near the Bettis Boulevard sag point and conveyed around the residence at 307 Inwood Road, generally following the existing low area between the house and garage toward the downstream drainageway. Potential improvements could include raising the curb or berm, as in Option 2, and modifying or enlarging the existing culvert crossing, installing an inlet, and constructing a graded swale or channel across the property, as illustrated in Figure 9.

This option may provide a more comprehensive solution because it addresses both increased flow through the culvert and the need to safely convey overtopping flow across the property.

Because a portion of the improvement would be located on private property, City construction would require a drainage easement or potentially a temporary drainage easement. In the absence of those rights, the property owner could independently pursue the improvement at their own expense. The

City could provide the findings of this feasibility evaluation for the owner's consideration, but the private improvements would need to be designed, permitted as applicable, and constructed by the property owner and their retained engineer or contractor.



Figure 9 - Option 3 Drainage Channel Concept

Other Concepts Considered

Detention / Surface Storage

Detention does not appear to be a practical primary solution for this location. The contributing flow reaching the Bettis Boulevard sag point is substantial, and meaningful attenuation would likely require several acre-feet of storage. Based on a planning-level estimate, limiting the 25-year discharge from approximately 115 cfs to a 25 cfs release rate could require on the order of 3 to 6 acre-feet of storage, depending on the inflow hydrograph, outlet configuration, and allowable ponding depth.

A potential storage area for detention is located at the northern portion of the 401 Inwood Road lot (Figure 10). However, the apparent available footprint is approximately 8,600 square feet. At an average storage depth of 4 feet, this would provide approximately 0.8 acre-feet of storage, before accounting for freeboard, side slopes, retaining walls, outlet structures, tree preservation, maintenance access, and grading inefficiencies.

As a result, the available storage area appears substantially smaller than the volume likely needed to materially attenuate the larger storm events. Detention would also require significant private-property disturbance at 401 Inwood, likely tree removal, drainage easement, long-term maintenance responsibility, and a reliable outlet. It also would not eliminate the need to address how runoff is routed around the house and garage at 307 Inwood. For these reasons, detention should be considered only as a supplemental measure if a feasible conveyance/outfall solution is identified, not as the primary solution.

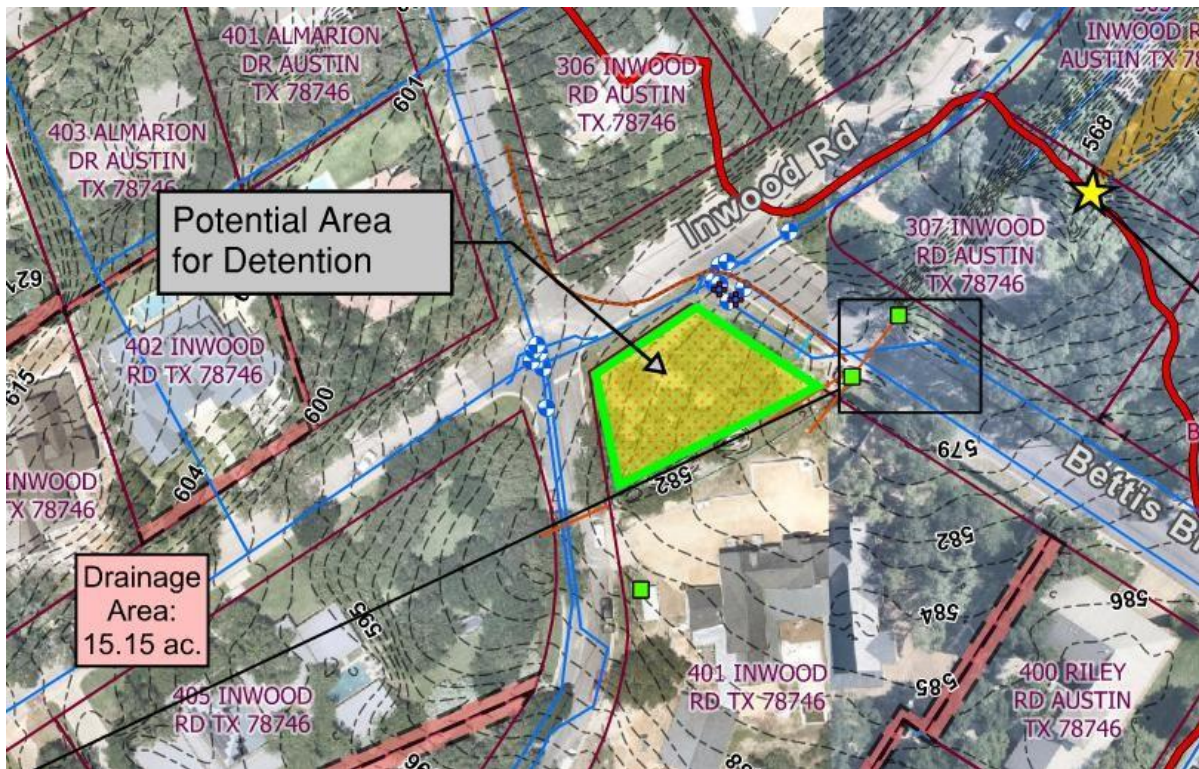


Figure 10 - Potential Detention Area at 401 Inwood

Major Storm Drain Extension

A more extensive storm drain improvement could be considered, but it would likely be a substantially larger project. Because there does not appear to be a defined public drainage easement or nearby storm drain system to tie into, a storm drain solution may need to extend a significant distance to reach an outfall. Depending on the confirmed downstream route, this could require extending improvements approximately 2,000 linear feet to discharge toward the Colorado River or to reconnect with an existing drainage channel. Potential routes could be along Inwood or Riley Road.

This concept would require detailed hydraulic analysis, downstream impact evaluation, utility coordination, easement or right-of-way review, outfall protection, and confirmation that the discharge

would not create adverse impacts. While this option could provide a more complete public conveyance solution, it would likely be much more costly and disruptive than the localized alternatives. Based on the information currently available, it should be treated as a long-term major capital improvement concept rather than a near-term localized repair.

Summary of Options

Option	Effectiveness	Easement Needs	Planning-Level Cost ¹	Primary Risks
Maintenance / Minor Modifications	Low	No	\$0 to \$10,000	Flooding remains
Curb and gutter reconstruction / culvert constriction modifications	Moderate for frequent events	Likely no	<\$150k	May increase street ponding or transfer risk
Conveyance improvements through 307 Inwood	Moderate to high if easement and outfall are feasible	Yes, unless owner-constructed	\$200k to \$500k	Easement, owner agreement, tree removal, constructability, downstream impacts
Detention	Supplemental only	Yes	\$500k to \$1M	Insufficient storage, tree removal, private-property impacts, outlet still needed
Major storm drain extension	High if feasible	Maybe	> \$2M	Long alignment, outfall, easements, utilities, downstream impacts

Recommendations

Lochner recommends that the City consider the following three options presented in this memorandum:

1. Maintenance / minor modifications of the existing drainage features;
2. Curb, gutter, and culvert improvements within the public right-of-way; or
3. Curb, gutter, and culvert improvements combined with conveyance improvements around the residence at 307 Inwood Road.

Option 3 is the most comprehensive alternative because it would address both the roadway overtopping condition and the need to safely convey runoff downstream. However, this option would require property-owner agreement, appropriate easements or other property rights, and confirmation that the proposed improvements would not create adverse downstream impacts.

If Option 3 is not pursued, Option 2 would be the next recommended alternative. Option 2 could provide meaningful flood-risk reduction for 307 Inwood Road, but further evaluation would be required to confirm that increased roadway ponding or redirected overflow would not adversely affect nearby properties or roadway areas.

If the City elects to proceed with a drainage improvement, the next steps should include detailed survey and hydraulic analysis, development of the selected alternative, final design, and preparation of construction plans and cost estimates.