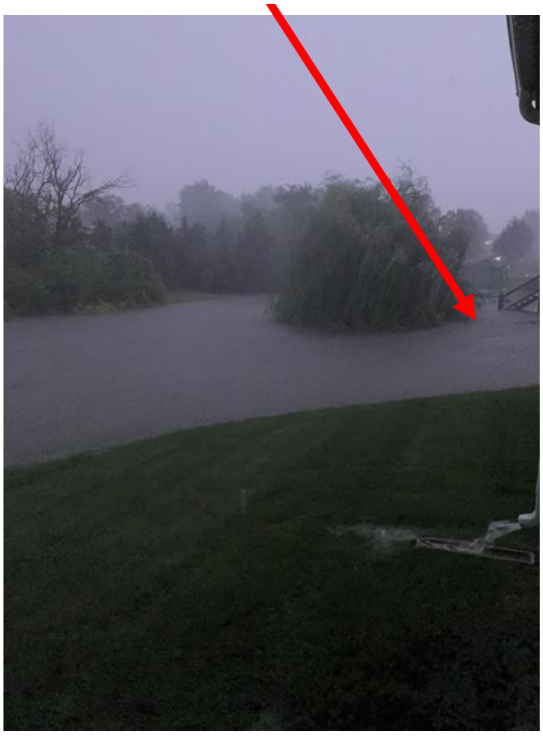
Background

The home at 11236 Race Street in the College Meadows subdivision (Lot 52, Third Plat) was completed in December 2016. Following construction, the home flooded in 2017, 2021, and 2024 and the homeowners have incurred significant costs for cleanup and repair of damages. The following is the timeline of the flooding and the actions taken:

July 26, 2017

- Johnson County's Stormwatch Gauge ML02 - Mill Creek @ College Blvd., located ½ mile east of the home, recorded 5.12" of rainfall in approx. 13 hours with a peak 1-hour intensity of 2.25" in/hr. and a peak 15-minute intensity of 3.2 in/hr.
- Stormwater runoff swamped the subdivision's storm drain system and flooded the rear and side yards around the home 4 to 5 feet deep. The water filled the window well, intruded into the basement to a depth of 3"-4". The drywall was damaged from the floor up to approximately 24". It was cut away and replaced during flood mitigation repairs. Out of pocket - $2,000.
- C.W. Concrete was contacted by the homebuilder, and they re-poured the window well with an extra 3' as the owners were told that was the point of entry into the house for the water.
- The City of Olathe deemed that the flood was because of the foundation issue.



2017 Flooding

August 13, 2021

- Stormwatch Gauge ML02 recorded 7.96” of rainfall in approx. 13 hours with a peak 1-hour intensity of 2 in/hr. and a peak 15-minute intensity of 2.5 in/hr.
- The owner’s basement flooded fully again with 3”-4” of water, but water did not breach the raised window well. The owner’s witnessed the water coming in at the slab level, with some water trickling over the top of the foundation walls. The drywall was again damaged from the floor up to approximately 24”. It was cut away and replaced during flood mitigation repairs. Out of pocket - $4,000.
- The owner’s met with Rob Beilfuss, Olathe Stormwater Manager and J. Michael Wilkes, Olathe City Manager, following the flooding and they expressed that the amount of water that gathers against the home was acceptable and that the real issue is the low foundation level. The owner’s reported that Mr. Beilfuss told them that that “the flooding is because of the foundation. Should you repair that and the house still floods, then it’s a City issue.”
- In 2023, the owners paid Taylored Homes to repair the entire side and back of the house at the foundation line to stop water from overtopping the foundation. The siding was removed, and several layers of waterproofing and caulking were installed. The siding was then put back. Taylored Homes covered most of these costs with the owners paying $2000.

2021 Flood

Image 5 - Water level seen in lighting strike of the “shallow” end of the created pond.

Image 6 - Fence line barely visible on the SE side of the house and this was not the max level. The new higher window well was not breached.

July 1, 2024

- Stormwatch Gauge ML02 recorded 5.32” of rainfall in approx. 4.5 hours with a peak 1-hour intensity of 2.8 in/hr. and a peak 15-minute intensity of 3.6 in/hr.
- The owner’s basement flooded fully again, but water did not breach the raised window well. The owner’s witnessed the water coming in at the slab level as the perimeter drain tile and sump pump were overwhelmed with standing water. No water entered at the top of the foundation walls because of repairs made in 2023 to the exterior to seal it. The owner’s looked into installing an interior drain system across the side and back of our home and a large sump pump to manage the water seeping into the foundation, but engineers

decided that there is no solution to handle the vast amount of water against the home, and that the only viable solution was to divert the water away from the home.

It should be noted that all three storms were very large events that ranged from the 10-year storm (10% probability) to the 100-year storm (1% probability).

2024 Flood

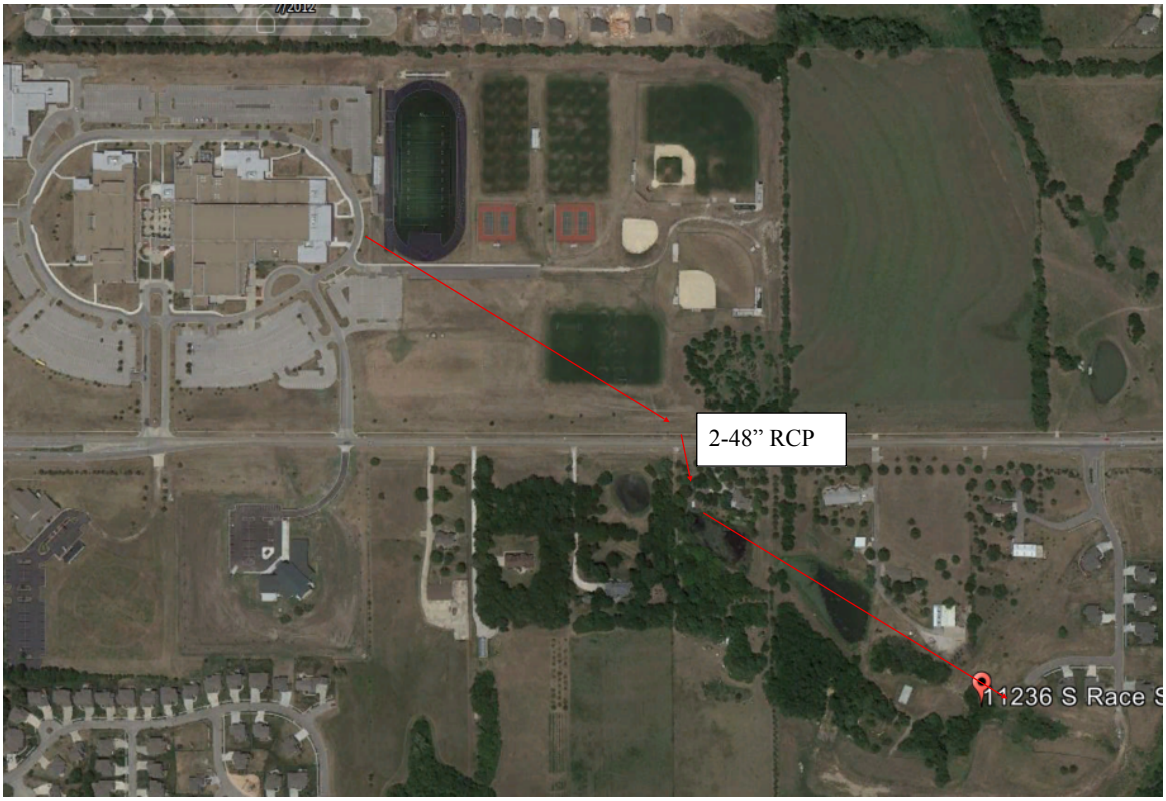
Image 10 - Water level not yet at peak while raining.

Image 12 – Side of house with standing water at 4'+.

Pre-Construction Conditions

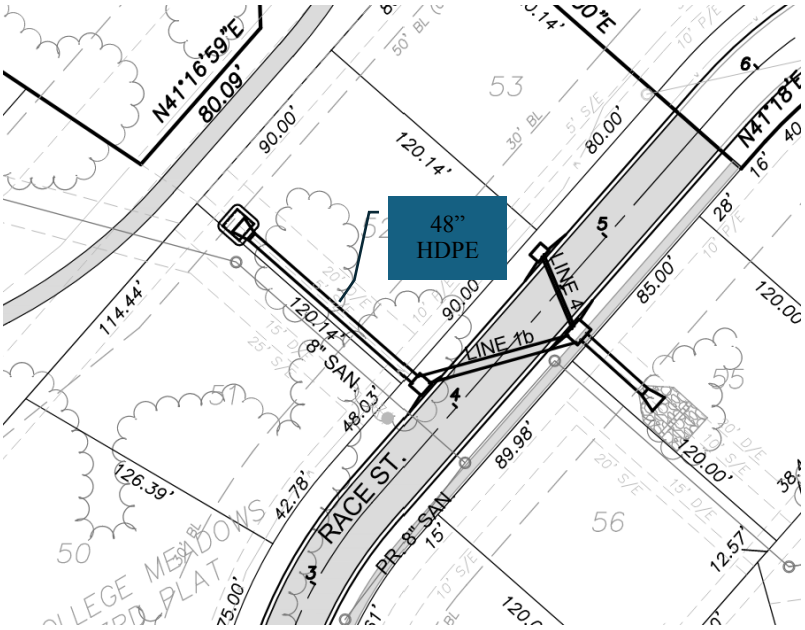
Images from 2012 were obtained from Google Earth and Johnson County AIMS to demonstrate conditions prior to development of the 3rd Plat of the College Meadows subdivision (see next page). Development within the watershed upstream of future 11236 S Race Street was limited to Olathe Northeast High School and homes on large lots south of College Blvd. College Blvd. was a two lane road in 2012 and most stormwater runoff from the road and high school was collected by an enclosed storm drain system and conveyed to the south via 2-48" RCP culverts under College Blvd. Stormwater then flowed in a southeastern direction through a series of ponds and a low area and into a channel that ran through the future phase of the College Meadows subdivision to a tributary of Mill Creek. The historic channel ran through Lot 52 of the subdivision and would have been located along the south side of the future home.

2012 Aerial Photography from Google Earth

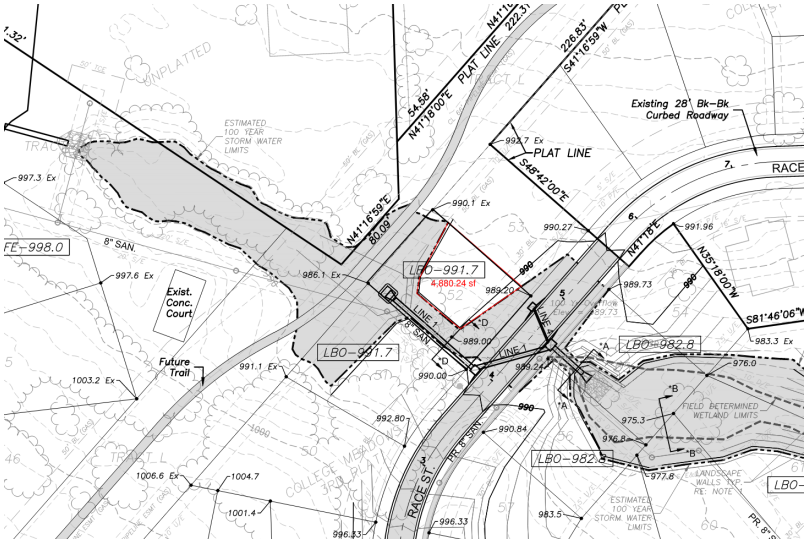


Design and Construction

Street and storm sewer plans for the 3rd Plat were developed in 2014 by Gary T Spehar Engineering and Planning, and the storm sewer plans called for replacement of the channel through Lot 52 and under Race Street with a 48” diameter HDPE pipe as shown below. The pipe was to have a flared end section at the upstream end, and it was
designed to convey runoff flows from the 10-year storm and a portion of the flow from the 100-year storm. The remainder of the flows from the 100-year storm were to be conveyed over land and across Race Street with a depth of less than 6”.



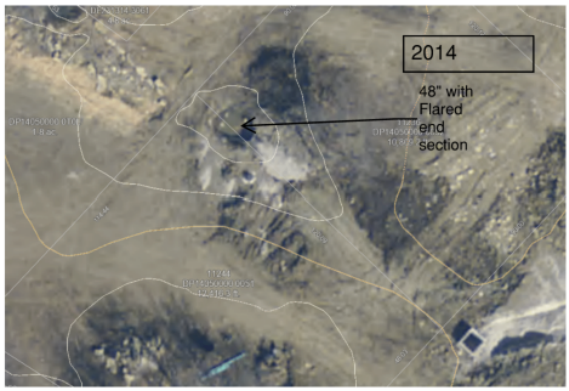
The grading plan shown below was prepared by the engineer and it shows the extent of potential flooding during the large storm events. It indicates that nearly 55% lot 52

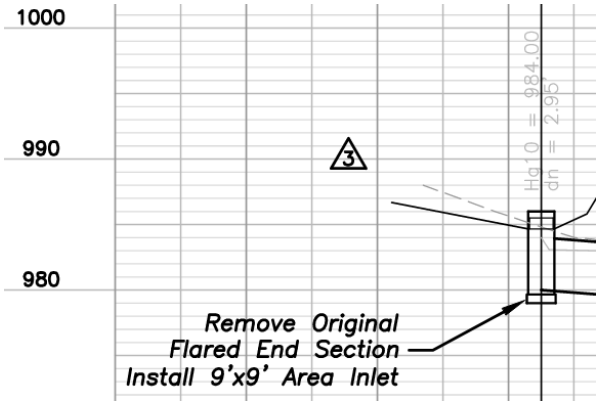


was predicted to be flooded with only the footprint of the future home above the flood level. Lot 51 shows similar flooding, though not to the same extent.

The grading plans also show that the future home should have a low building opening (LBO) of 991.7' to avoid direct entry of flood waters into the home. This LBO would have required the first-floor elevation of the home to be approximately 995' or six feet higher than the street grade in front of lot 52. Grading the lot to achieve this would have been very difficult and undesirable for a future homeowner.

Construction of the 3rd Plat took place in 2014 and 2015, and the pipe and end section were installed as permitted. However, the developer replaced the flared end section with a 9' x 9' field inlet during construction and recorded this on "As-Constructed" drawings submitted in August 2015. No reason was given for the change, but it was likely due to issues with grading lots 51 and 52.





The photo below from 2016 shows the field inlet that replaced the flared end section.

Review of Design by Others

In 2022, the City of Olathe contracted HNTB Corporation to perform a drainage analysis of the College Meadows Subdivision. The scope of work performed is shown below:

Results of Hydrology and Hydraulics Analysis

Scope and Location

This memo contains the results and observations as performed by HNTB relating to the drainage conditions in the vicinity of S. Race Street and S. Crestone Street in Olathe, Kansas. The project area includes the stream, low water crossing, and area inlet in the backyard of 11236 S Race Street, the enclosed system crossing under S. Race Street, the stream between S. Race Street and S. Crestone Street, and the culvert crossing under S. Crestone Street. The specific scope of this investigation includes:

- Hydrologic analysis of the drainage areas to a City of Olathe area inlet in the backyard of 11236 S Race Street, and the drainage area to the enclosed system under S. Race Street.
- Hydraulic analysis as to the performance (hydraulic capacity and depth of flow) for the area inlet and downstream enclosed system crossing under S. Race Street.
- Analysis to ensure that improvements do not create a hydraulic issue at the downstream culvert crossing under S. Crestone Street.
- On-site data collection to gather critical elevations.
- On-site discussion with property owners.
- A recommendation to improve the performance of the drainage system to reduce ponding in the backyard and lower the water surface elevations around the window well and foundations of 11236 S Race Street.

Figure 1 illustrates the location of the area inlet near S. Race Street (Point A) and the hydrologic elements

The analysis concluded that the backyards of lots 51 and 52, in combination with the field inlet and the low area to the west, were acting as a detention pond for stormwater flows up to 992' as shown in the screen capture from the report shown on the following page. It also concluded that the home flooded because it was built 2.46' lower than the proposed elevation shown in the development plan and water could enter thought the LBO prior to construction of the window well extension. The analysis also identified several discrepancies associated with the design of the stormwater system including:

- The area inlet and 48" pipe ae undersized due to differences in watershed area and time of concentration
- The street overflow weir was not constructed as designed. This results in a higher headwater elevation than shown on the plans.
- The Race Street crossing was modeled as a culvert, not an enclosed system with consideration of the hydraulic losses associated with the curb inlets and bends.
- Replacement of the flared end section with the field inlet did not affect the peak flood stages, but it contributes to inundation of the owner's lot during more frequent events.

These discrepancies resulted in larger flows and higher flooding elevations for the 10- and 100-year events than shown by the design engineer.

HNTB's analysis showed that flooding could be relieved by replacing the 48" pipe and inlet with an 8' x 4' concrete box culvert and new field inlet with open cell grating on the top. The box culvert has nearly 3 times the cross-sectional area of the 48" pipe. The cost of the improvements was estimated to be $466,000.

The backyard was modeled in civil storm as a detention pond. The pond was depicted using an elevation-area table, which is listed in Table 3.

Table 3: Pond Elevation-Areas

Backyard Ponding Area	
elevation	area
ft	ac
986.0	0.10
988.0	0.32
990.0	0.62
992.0	0.92

The plan view of the backyard, with elevations is shown in Figure 5.

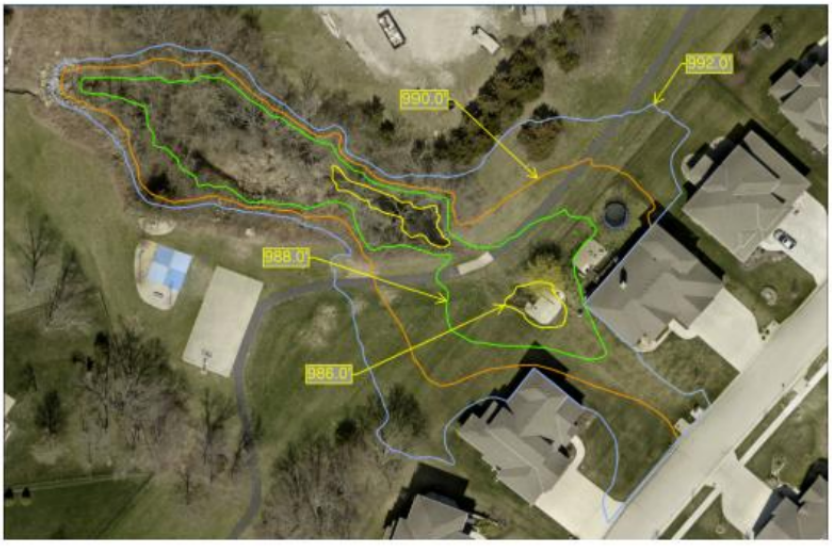


Figure 5: Pond Elevations

Design Review by David Silverstein

Insufficient information was available to perform a detailed review of the design and the 2022 HNTB study, but based on the information provided the following observations were made:

- The methodologies used by both the design engineer and HNTB were too simplistic for a watershed of this size and complexity. Modeling software that allows the incorporation of sub-watersheds with and without storm sewers, interconnected ponds, road crossings, open channels, and tailwater restrictions would be more appropriate than use of the Rational method.
- The design engineer appears to have designed all pipes assuming open channel flow with no consideration for bends or tailwater. The calculations indicate that the 48” pipe is conveying 200 cfs during the 100-year storm. The downstream crossing at Crestone Street is reported to have a headwater elevation of 980.18’ during this event. With no

change in the water surface profile between Crestone and Race Streets, the outlet of the 48" pipe would be fully submerged. The required head to pass 200 cfs of flow through the 48" pipe considering the bends and length would be nearly 14' or an upstream elevation of 994.18'. Therefore, at the design water level of 990.18 as shown on the plans, the pipe has 10 feet of head and can pass only 170 cfs.

- The required head needed to pass water through the 48" pipe fully submerges the field inlet's orifices and the effective head available to pass flow through them is reduced. This results in restricted flow through the orifices.
- The design engineer should have reviewed the extent of the upstream storm drain system and if this had been done, he would have noted that 2-48" RCP's conveyed flow under College Blvd. Justification would have been needed to reduce conveyance capacity downstream to a single 48" under Race Street.
- The design engineer designed the system to allow lots 51 and 52 to flood during most storm events. Although the plans noted the LBOs for both lots, most of them were designed to flood during larger storm events. This would not be considered normal engineering practice to allow for occupied structures to be mostly flooded on their perimeters. The two lots, but especially lot 52, should not have been developed or permitted by the City of Olathe for home construction given this condition.
- The design of the storm drain system allowed the main roads to be flooded during events larger than the 10-year storm. This resulted in the southern portion of the subdivision being cut off from access without vehicles entering the flooded streets. This is not good engineering practice given that hydrologic and hydraulic predictions are typically not that accurate.

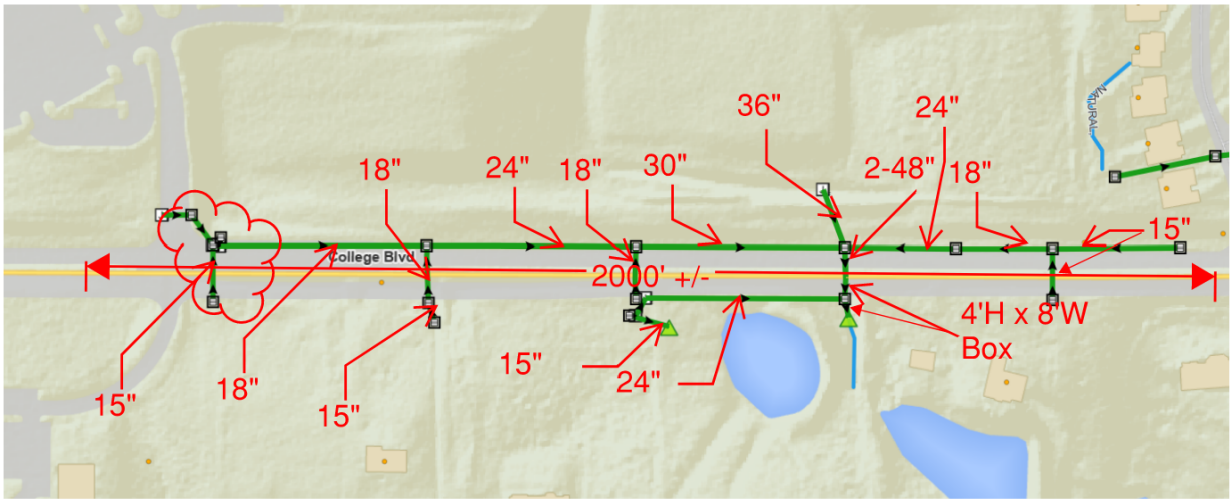
Other Considerations That May Affect Peak Runoff Rates

As stated previously, College Blvd. was only two lanes prior to construction of the 3rd Plat of the subdivision. The road was expanded to 4 lanes in 2016 and 2017. "As-Built" plans for the road expansion were obtained from the City of Olathe and review of these plans indicated the following:

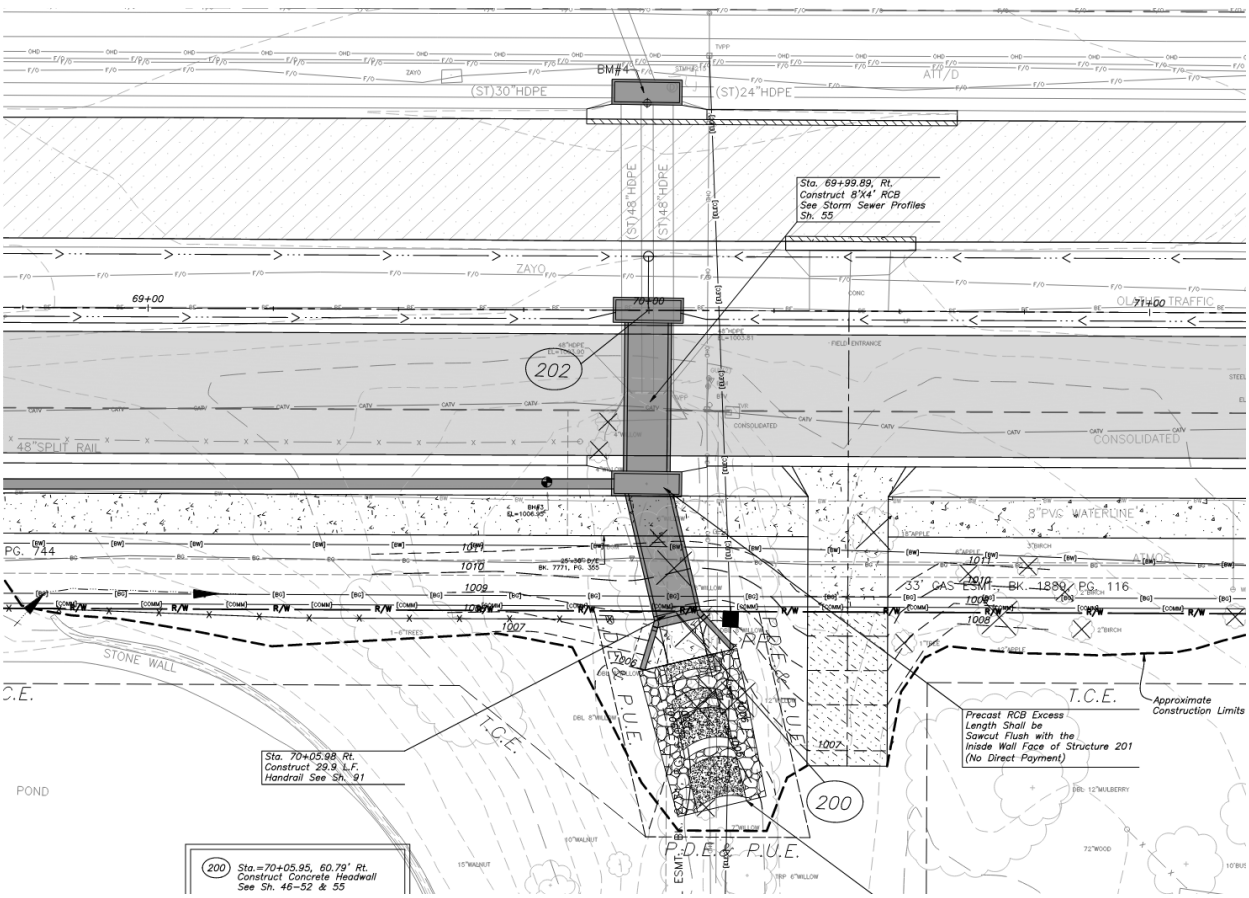
1. The road was widened to 4 lanes with turn lanes, a raised median and a bike path on the south side of the expanded road. The addition of these features more than doubled the previous and semi-impervious surface associated with the road. Approximately 2 acres of impervious surfaces were added by the road expansion.
2. Approx. 2000' of the expanded road is contained within the watershed upstream of the development and runoff from the road is collected in an expanded storm drainage system as shown below. The 2-48" RCPs under the westbound lanes are now connected to an 8' wide by 4' high RCB under the eastbound lanes.
3. No provisions appear to have been included in the design to mitigate the effect of the increased impervious surfaces on downstream flows.

Hydrologic and hydraulic modeling would be required to determine the effect of road expansion on peak runoff rates. However, it is logical to conclude that the increase in the impervious surface area and the construction of an expanded enclosed storm drain system would result in increased flows seen in the downstream system at Race Street. The design engineer would not have taken this into account when preparing the plans for the subdivision because the road was not designed until after the subdivision was permitted.

College Blvd Storm Drain System Within Watershed



Historic and Expanded Storm Drain System Under College Blvd.



2025 Mitigation Design Prepared by HNTB

The City of Olathe contracted with HNTB in 2025 to investigate the feasibility of flood proofing 11236 S Race Street utilizing a berm. The report states that the flooding occurs with an expected high-water duration of a matter of hours. The report also states that the home's foundation does not appear to have been designed for direct contact by ponding for long durations. HNTB proposed the following to address the foundation flooding in lieu of modifications to the storm drain system:

- Construction of a 4' tall, 4' wide berm with an impervious core against the entire side and back of the home.
- The berm has a 4:1 grade from the top to the current backyard. This 25% slope is considered a moderate to steep grade for walking.
- A 65' long, 5' tall, concrete wall that runs the length of the side of the home and then cuts across the current fence line at a 45-degree angle, intruding into the yard approximately 22'.
- Improvements to the foundation drain and sump pump system

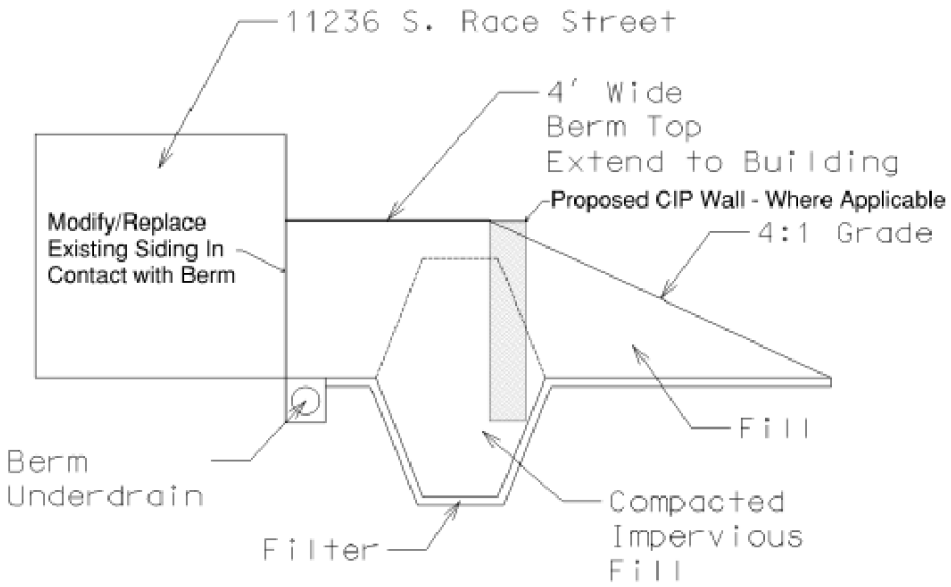
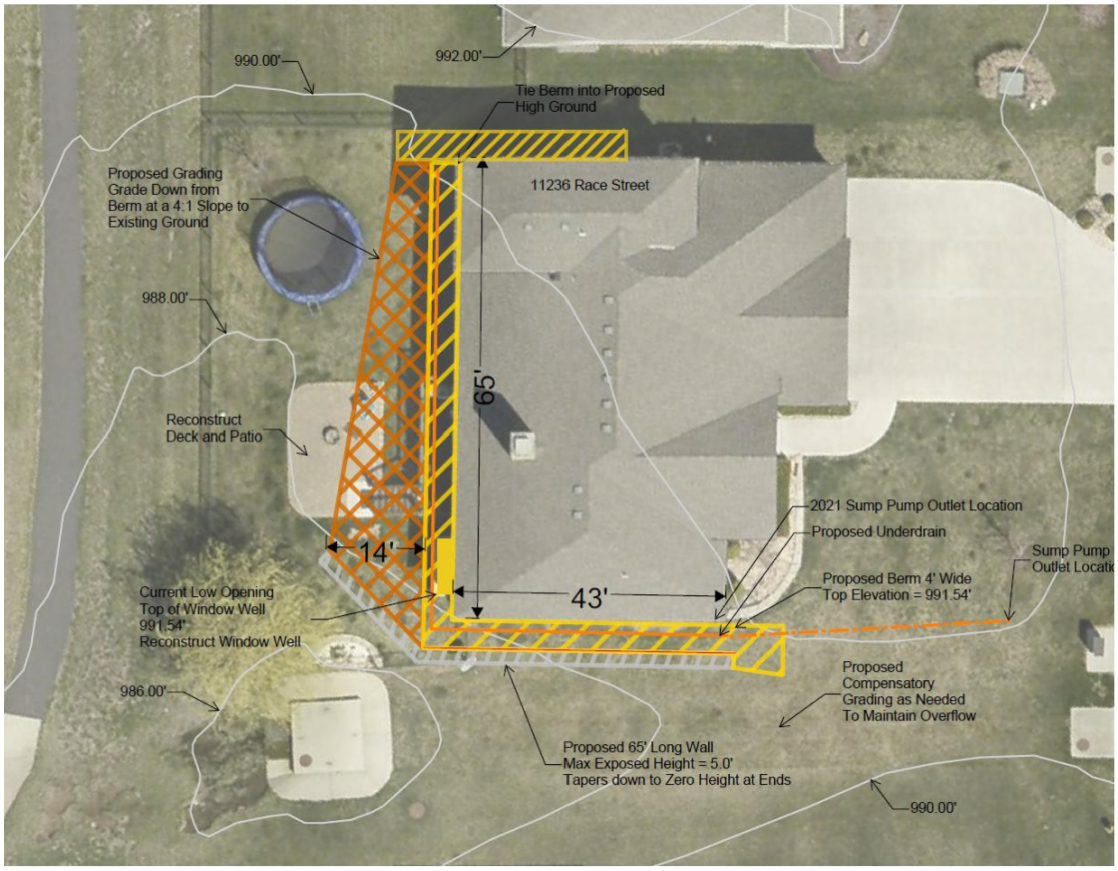


Figure 1: Proposed Berm



The estimated cost of the improvements is $140,000 and the city proposed spitting the costs with the owners. Although the improvements are potentially feasible, they are undesirable for the following reasons:

- The root causes of the flooding are not being addressed. The owner's yard will continue to flood during large storm events.
- The berm and wall will make a large portion of the back and side yards unusable.
- The existing deck and patio will have to be torn out and the patio will have to be located near the rear fence.
- The proposed improvements will not guarantee that water will not intrude into the home.

Conclusions

Review of the design drawings and subsequent reports indicated that mistakes were made during the design, permitting, and construction of the storm drain system and home at 11236 S. Race Street. The fact that the home was constructed with a LBO lower than planned contributed to the initial flooding. However, given that the basement slab would have been well below the flood elevations seen to date, flooding through the wall/slab construction joint would have likely occurred due to water being ponded up against the home. Construction of the home at the lower elevation made sense because it would have been somewhat un-constructable at the elevations listed on the plans.
It appears that the engineer and developer included lots 51 and 52 in the plat without consideration of the long-term issues that would occur. It is clear from the plans that both lots, and especially lot 52, were designed to serve as defacto stormwater detention facilities. The owners would not have known of the potential for flooding when they purchased the lots.

Numerous miscalculations were made in the development of the storm drain system. This resulted in the peak rates being higher and flooding durations longer than planned.

The expansion of College Blvd. has increased peak rates above those considered by the design engineer. Detention facilities for the expanded road section should have been provided as part of the road expansion project.

The proposed berm and flood wall are not acceptable solutions to the flooding problems.

The City of Olathe should acknowledge that the flooding issues are not the fault of the owners and steps should be taken to correct the issues at no cost to the owners.