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CITY OF CAMBRIDGE  
COMMUNITY DEVELOPMENT DEPARTMENT

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IRAM FAROOQ  
Assistant City Manager for  
Community Development

To: Planning Board  
From: Jeff Roberts, Land Use and Zoning Planner  
Date: May 17, 2016  
Re: **Rainwater Separation from Flat Roofs Zoning Petition**

On May 24, the Board will hear a City Council zoning petition that is a refiled and slightly revised version of a zoning petition heard by the Board in 2013. Attached to this cover memo are the Board's recommendation on that prior petition, along with past materials provided by staff. An explanatory package from Nicolai Cauchy, an advocate for the petition, is also provided.

### **Overview**

The proposed zoning petition would allow the Board of Zoning Appeal (BZA) to grant a special permit to authorize, within limitations, the construction of a partial top story on an existing residential building with a flat or concave roof, if such construction would enable the disconnection of an existing storm drain line from the City's sewer system. This allowance would be available in any district for any residential building with the existing condition described above. The concept is that such a change would reduce stress on public infrastructure, but would not be economically advantageous for a property owner to undertake without some other improvement to the property.

The current petition maintains the previously proposed limitations that any addition can be no more than 10 feet above the existing roof line, cannot increase the FAR on the property by more than 20%, and cannot constitute a new dwelling unit. In addition, the current petition proposes a new requirement that the added top story be stepped back at least 6 feet from the front roof edge and at least 3 feet from all other roof edges.

### **Comments**

As noted in the attached Planning Board recommendation, the key consideration is the balance between the environmental benefits of removing drain connections and the potential impact of adding stories to buildings in residential neighborhoods that may have a fairly consistent established height. The added requirement for step-backs might help to mitigate this impact. It is difficult to determine exactly how many buildings would be eligible for additions under this proposal, but the information previously provided by the Department of Public Works shows that within neighborhoods, there are highly varied existing conditions, and therefore some buildings would be eligible for the proposed special permit while many others would not.

Also, the attached 2013 report from the City Engineer notes that there would be some public benefit to separating storm drains, but the benefit is modest in relation to other priority improvements that are being undertaken by the City.



CITY OF CAMBRIDGE, MASSACHUSETTS

# PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

Date:	September 3, 2013
Subject:	Craig Kelley Petition (Flat Roofs / Rainwater Separation)
Recommendation:	The Planning Board <b>DOES NOT RECOMMEND</b> adoption of the proposed zoning amendment, but suggests alternative approaches.

To the Honorable, the City Council,

The Planning Board considered this proposed zoning amendment at a public hearing on June 18, 2013 and continued deliberation on September 3, 2013. The proposal would create a new Section 5.55, which would allow increases in the Gross Floor Area and height of existing residential buildings by special permit as an incentive for property owners to remove internal drainage connections to the City sewer from buildings with flat roofs. The Planning Board heard testimony from Nicolai Cauchy, a resident who supports the petition, and from Owen O’Riordan, the City Engineer and Acting Commissioner of Public Works.

The Planning Board recognizes the environmental benefit of removing these direct central drain connections, which would reduce rainwater intake into the combined sewer system and help to mitigate the impacts on water quality that result from sewer system overflows. In addition, allowing rainwater to collect into the ground rather than being directed into the sewer system would promote groundwater recharge, which would benefit watershed protection. However, the Board also acknowledges that the environmental benefits would be modest, given that only a fraction of rainwater is collected on rooftops, and that most rainwater runoff from rooftops would continue to enter the sewer system eventually.

It is not typical in Cambridge to allow buildings to add an extra story above the height limit, particularly in close-knit neighborhoods where buildings with flat roofs are most common and the prevailing height tends to be three stories. Allowing those buildings to add a story would significantly increase property values for some owners, by providing greater floor area and views, while other owners in the same neighborhood would not be able to enjoy those benefits and would be impacted by the increased size and height of nearby buildings.

Therefore, the Planning Board believes that the public benefit to be gained by the removal of central storm drains would not justify the impact of allowing the construction of an extra story on residential buildings.

On the other hand, the Board believes that there is merit in allowing some modest zoning flexibility to facilitate the removal of central storm drains where the property owner wishes to do

so. Allowing property owners a few feet of height relief by special permit, rather than a variance, could facilitate the alteration of a concave roof that collects rainwater into a pitched roof that allows water to run off onto the property. As a modest incentive, additional Gross Floor Area could be allowed by special permit for the creation of a small roof deck, so that the owner could increase the value of the property by adding some usable open space and views in the process of making the necessary roof alterations. This incentive would be better scaled to the resulting public benefit, and would avoid some of the impacts of adding significant height and mass to an existing building in an established neighborhood. Potential concerns around privacy, noise and other impacts would still need to be considered in the special permit review process.

The Board suggests that the Council consider this strategy as an alternative to the proposed zoning amendment.

Respectfully submitted for the Planning Board,

A handwritten signature in black ink, appearing to read "H Russell", with a stylized flourish at the end.

Hugh Russell, Chair.



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CITY OF CAMBRIDGE  
COMMUNITY DEVELOPMENT DEPARTMENT

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BRIAN MURPHY  
Assistant City Manager for  
Community Development

To: Planning Board  
From: CDD Staff  
Date: August 28, 2013  
Re: **Craig Kelley Zoning Petition (Stormwater Separation)**

In response to the Planning Board's discussion at the June 18 meeting, we have prepared information on the following topics:

- The range of properties affected by the proposed zoning
- Possible alternatives to increased FAR and height as an incentive to eliminate central drain lines

#### **Affected Properties**

The properties that might take advantage of the proposed zoning include existing buildings with flat roofs and drain pipes that collect water runoff from the roof and discharge it directly into the City sewer line.

Data sources maintained by the City with information on existing buildings are not detailed enough to make an accurate accounting of the number of buildings that fall into these categories. In the memo to the Planning Board dated June 18, 2013, the Department of Public Works (DPW) provided some analysis of a small area in the vicinity of Concord and Huron Avenues that was performed as part of the City's Alewife Sewer Separation Program. DPW inspected 690 properties in the area and found 67 residential buildings (approximately 10% of the total) with flat roofs and internal drain systems connecting to the City sewer.

There are approximately 11,000 residential buildings across all of Cambridge. If the overall building stock is assumed to be comparable in its mix of building types, the number of buildings with flat roofs and direct drain connections would be approximately 1,000.

However, briefly scanning an aerial view of Cambridge reveals that the Concord/Huron area has a smaller proportion of flat-roofed buildings than neighborhoods in the eastern portion of the city, such as East Cambridge and Cambridgeport. While there are some neighborhoods that have a similar building stock to the Concord/Huron area, there are others where the proportion of flat-roofed buildings is likely around half or more.

Therefore, the actual number of affected properties throughout the city is likely to be greater than 1,000, possibly numbering between 2,000 and 3,000.

### **Alternative Incentives**

Allowing an increase in allowed height and floor area to build an additional story on existing residential buildings would be a substantial benefit to property owners. The cost and disruption that would be required to modify an existing drain line would also be substantial, but many property owners may be enticed to make those improvements given the increase in value that would result. However, as the Planning Board noted in its discussion, allowing ten-foot increases in height would potentially have negative impacts not just on abutters, but on the character of entire neighborhoods where there is currently a uniform prevailing height.


One possibility that was raised is the allowance of usable decks or green spaces on rooftops. Such spaces are currently allowed under zoning. However, usable open spaces that are located above the second floor of buildings are counted as Gross Floor Area (GFA) on the lot, and therefore owners typically do not provide such spaces in favor of maximizing the GFA provided within the building. Also, roof decks usually require a stairway and headhouse for users to access them, which are not exempt from height limitations and therefore can be an impediment to building a roof deck. In situations where owners have sought zoning relief to build roof decks, neighbors have often opposed the request because of concerns about noise and privacy impacts.

Aside from relief on height, floor area or rooftop open space, it is difficult to conceive of a zoning incentive that would be appropriate to the type of modification that is desired. Possibly, a few feet of additional height could be granted to facilitate the improvement of roof drainage systems while providing more spacious top floors and possibilities for skylighting without having to seek a variance. This would provide some modest benefit to property owners while minimizing potential impacts on direct neighbors and avoiding the overall impacts of increased floor area within neighborhoods. However, it is possible that the increased value of additional height without additional floor area would not be sufficient to offset the cost of the improvements.



June 18, 2013

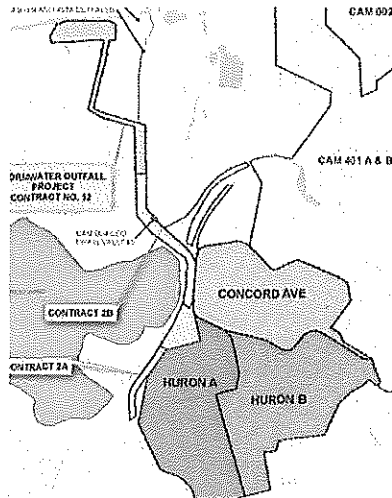
To: Brian Murphy,  
Assistant City Manager for Community Development

From: Owen O' Riordan   
City Engineer

**Re: Flat Roof Zoning Petition**

I have been asked to provide comments on the zoning change proposed vis-à-vis flat roofs that contribute extraneous stormwater discharge to the City sewer systems. At the outset it should be stated that the Department of Public Works is broadly supportive and wants to encourage, to the extent that it is reasonable, the elimination of all sources of extraneous flow to our municipal sewer system. Extraneous flow, be it from rainfall or groundwater, contributes to combined sewer overflows polluting our rivers and streams. It is also causative of sanitary sewer overflows and back-ups into homes and basements causing public health issues for homeowners and businesses. Finally, every drop of additional water discharging to our sewer systems has to be paid for, as the Massachusetts Water Resources Authority wholesale charges are partially based on flow received from contributing communities.

The municipal drainage system in Cambridge was originally constructed as a combined sewer system. The City has a well established program to separate sewer and drainage lines throughout the City. At this time approximately 65% of the municipal system continues to function as a combined sewer system. The Department of Public Works is presently in the middle of a large program in the Alewife watershed to separate the combined sewer system. After the work in this neighborhood is completed the number of times combined sewerage discharges (CSOs) to the Alewife and volume associated with these occurrences will be reduced from 60 times a year to 7 times per year and from 50 million gallons per year to 7.8m gallons per year respectively. The reductions achieved as a result of this effort will meet the Environmental Protection Agency (EPA) goals for combined sewer overflow control for the Alewife Brook. The analysis completed in designing the new separate systems in this watershed provides some details that assist in illuminating the issues that are the subject of this petition, but given the different goals associated with the sewer separation project and the zoning petition the data may be insufficiently detailed to answer all questions that may be asked.



Alewife Sewer Separation Program

A twin goal for the City in completing this work is to improve sewer and stormwater service levels in these areas. As a result of an incremental analysis the City determined that in order to achieve the CSO standards demanded and to eliminate sewer system back-ups except in the most extreme circumstances it will be necessary to eliminate 75% of the private sources on inflow to the municipal sewer system. After completing a house to house inspection of 90% of the 690 properties in the watershed area associated with this program we have identified those properties where inflow removal is both cost effective and minimally disruptive to residents. To that end 176 properties have been targeted for inflow removal, none include properties where stormwater and sanitary waste combine in one pipe stack constructed through the center of the property.

The attached maps illustrate the extent of the investigations completed by DPW as part of this effort. We have identified sixty seven (67) flat roof buildings within the overall area. Of those buildings forty eight (48) have two internal pipe systems, one for sanitary waste and one for rainfall conveyance. Of the forty eight buildings identified with two pipe systems, thirty one (31) have been selected for inflow removal. Of the nineteen (19) buildings with a single stack conveying stormwater and sanitary waste in one pipe down through the building, none of these have been selected for sewer separation. These buildings were not selected due to the significant work required to either internally separate these pipes or reconstruct the pitch of the roofs.

In summary, The Department of Public Works is not opposed to this petition; removing stormwater from sewer systems is an important goal of the City. However, we recognize that there are complexities associated with this proposal. The City expects to achieve a level of inflow removal in the Alewife watershed to meet the requirements of our EPA permit for CSO control. This will be achieved by completing a sewer separation program throughout the neighborhood which will include eliminating approximately 75% of the private sources of stormwater and groundwater inflow to our sewer systems. None of the private properties identified for inflow removal are of the type which is the subject of this petition. The primary reasons for not including these properties are that the work required to internally separate the systems is too expensive and the work would be too disruptive to those living in these buildings.

cc: Lisa Peterson; Commissioner of Public Works



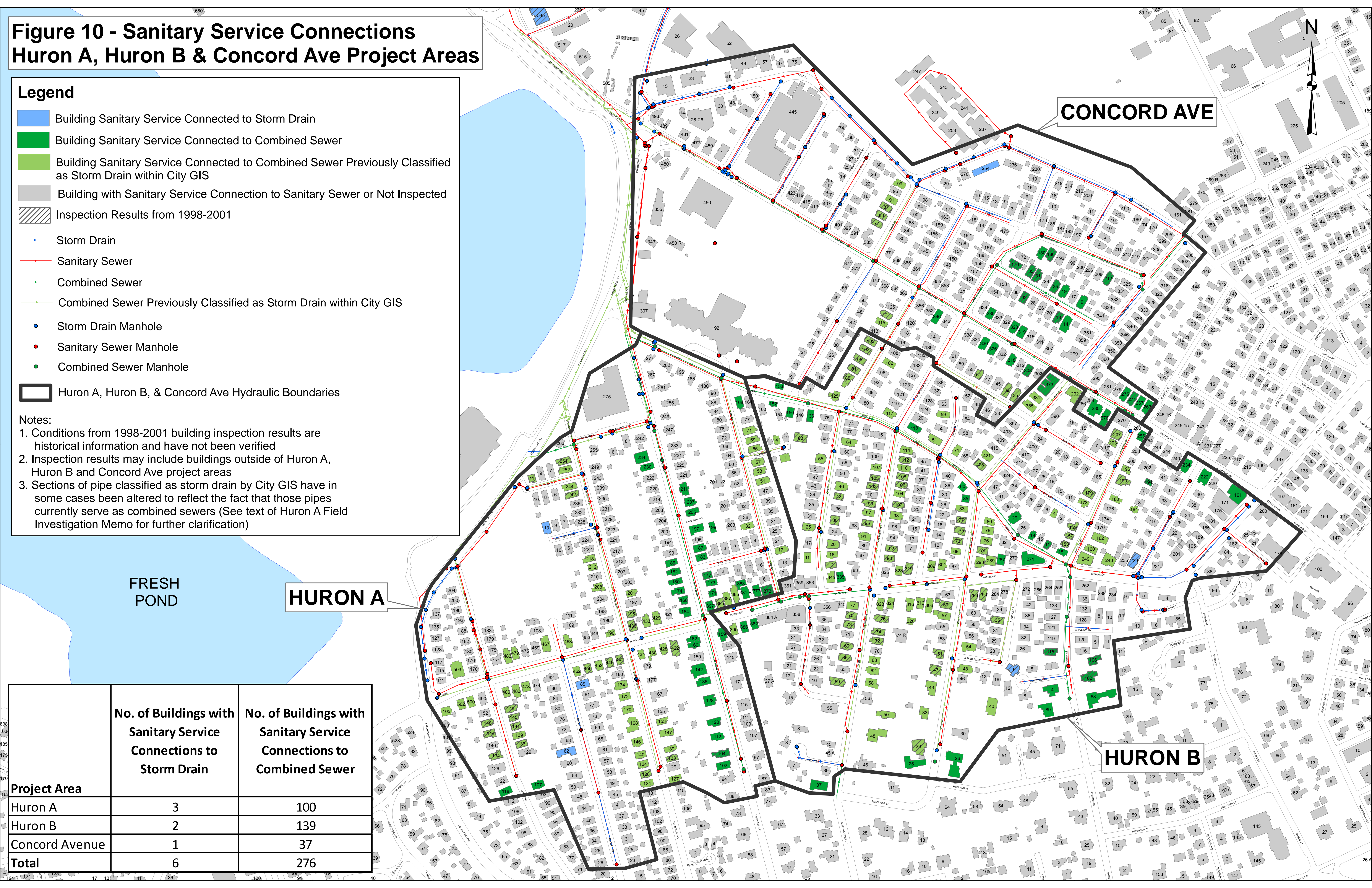
**Figure 10 - Sanitary Service Connections  
Huron A, Huron B & Concord Ave Project Areas**

**Legend**

- Building Sanitary Service Connected to Storm Drain
- Building Sanitary Service Connected to Combined Sewer
- Building Sanitary Service Connected to Combined Sewer Previously Classified as Storm Drain within City GIS
- Building with Sanitary Service Connection to Sanitary Sewer or Not Inspected
- Inspection Results from 1998-2001
- Storm Drain
- Sanitary Sewer
- Combined Sewer
- Combined Sewer Previously Classified as Storm Drain within City GIS
- Storm Drain Manhole
- Sanitary Sewer Manhole
- Combined Sewer Manhole
- Huron A, Huron B, & Concord Ave Hydraulic Boundaries

**Notes:**

1. Conditions from 1998-2001 building inspection results are historical information and have not been verified
2. Inspection results may include buildings outside of Huron A, Huron B and Concord Ave project areas
3. Sections of pipe classified as storm drain by City GIS have in some cases been altered to reflect the fact that those pipes currently serve as combined sewers (See text of Huron A Field Investigation Memo for further clarification)



Project Area	No. of Buildings with Sanitary Service Connections to Storm Drain	No. of Buildings with Sanitary Service Connections to Combined Sewer
Huron A	3	100
Huron B	2	139
Concord Avenue	1	37
<b>Total</b>	<b>6</b>	<b>276</b>



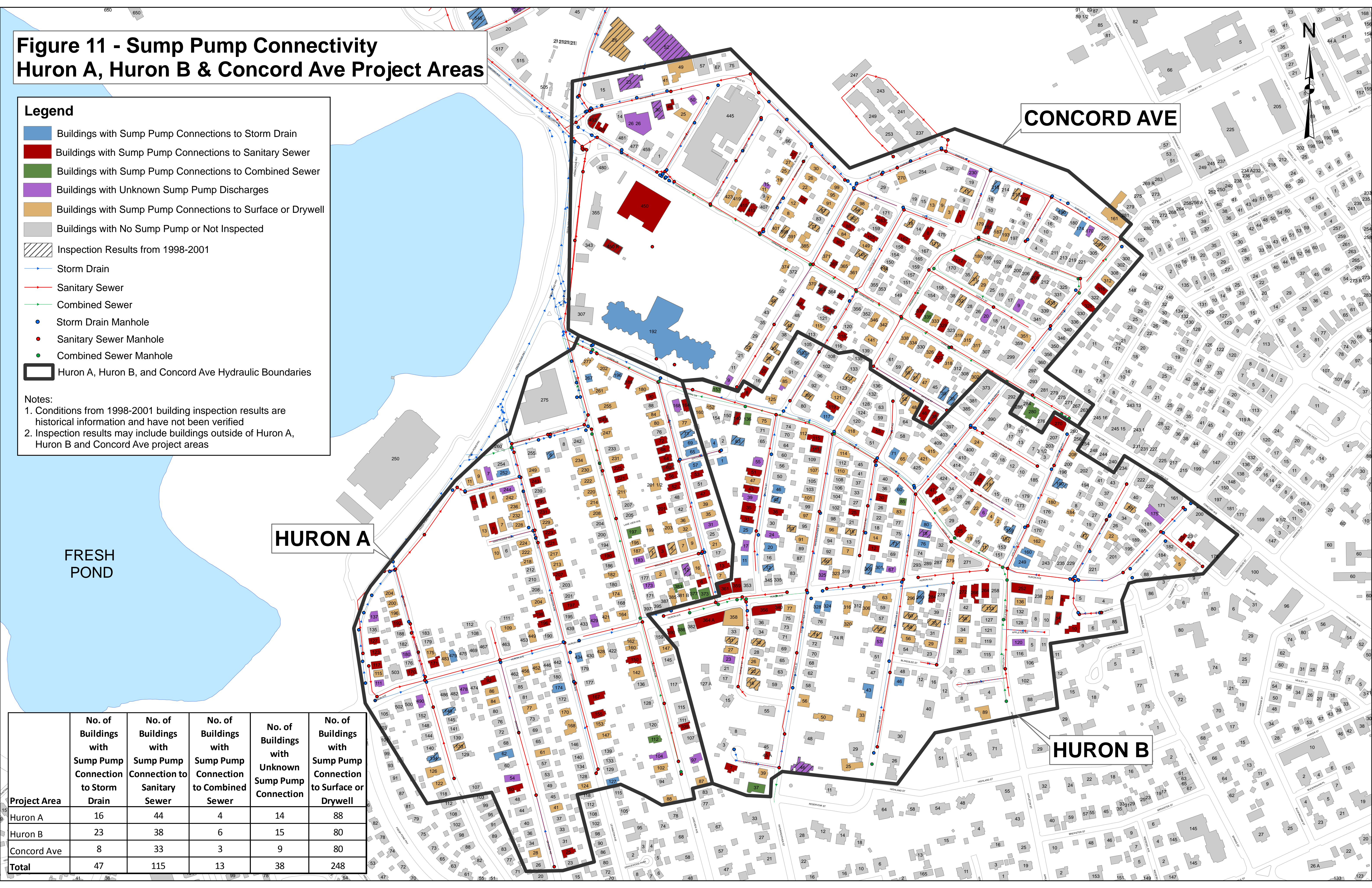
**Figure 11 - Sump Pump Connectivity  
Huron A, Huron B & Concord Ave Project Areas**

**Legend**

- Buildings with Sump Pump Connections to Storm Drain
- Buildings with Sump Pump Connections to Sanitary Sewer
- Buildings with Sump Pump Connections to Combined Sewer
- Buildings with Unknown Sump Pump Discharges
- Buildings with Sump Pump Connections to Surface or Drywell
- Buildings with No Sump Pump or Not Inspected
- Inspection Results from 1998-2001
- Storm Drain
- Sanitary Sewer
- Combined Sewer
- Storm Drain Manhole
- Sanitary Sewer Manhole
- Combined Sewer Manhole
- Huron A, Huron B, and Concord Ave Hydraulic Boundaries

**Notes:**

1. Conditions from 1998-2001 building inspection results are historical information and have not been verified
2. Inspection results may include buildings outside of Huron A, Huron B and Concord Ave project areas



Project Area	No. of Buildings with Sump Pump Connection to Storm Drain	No. of Buildings with Sump Pump Connection to Sanitary Sewer	No. of Buildings with Sump Pump Connection to Combined Sewer	No. of Buildings with Unknown Sump Pump Connection	No. of Buildings with Sump Pump Connection to Surface or Drywell
Huron A	16	44	4	14	88
Huron B	23	38	6	15	80
Concord Ave	8	33	3	9	80
<b>Total</b>	<b>47</b>	<b>115</b>	<b>13</b>	<b>38</b>	<b>248</b>



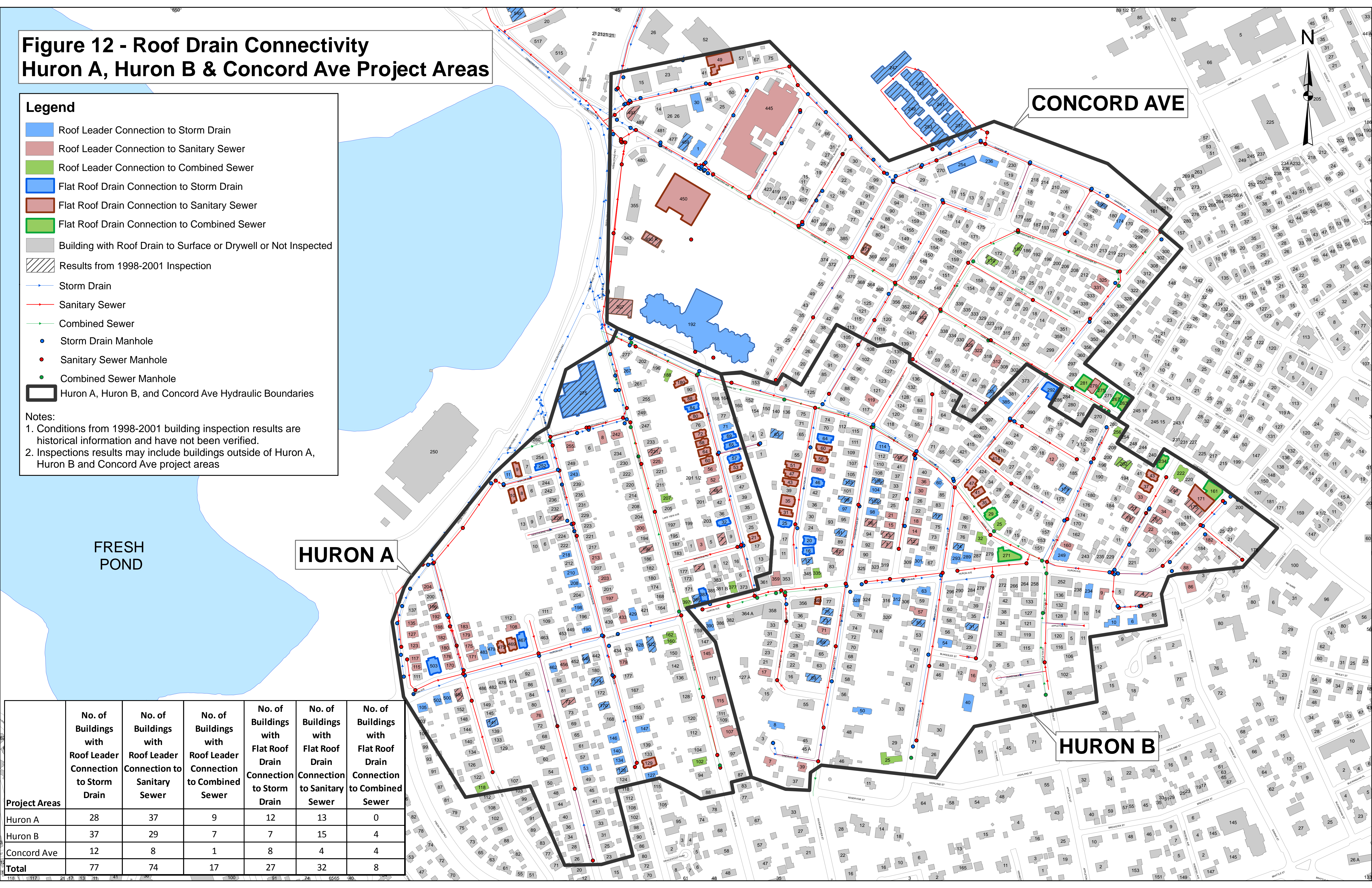
**Figure 12 - Roof Drain Connectivity**  
**Huron A, Huron B & Concord Ave Project Areas**

**Legend**

- Roof Leader Connection to Storm Drain
- Roof Leader Connection to Sanitary Sewer
- Roof Leader Connection to Combined Sewer
- Flat Roof Drain Connection to Storm Drain
- Flat Roof Drain Connection to Sanitary Sewer
- Flat Roof Drain Connection to Combined Sewer
- Building with Roof Drain to Surface or Drywell or Not Inspected
- Results from 1998-2001 Inspection
- Storm Drain
- Sanitary Sewer
- Combined Sewer
- Storm Drain Manhole
- Sanitary Sewer Manhole
- Combined Sewer Manhole
- Huron A, Huron B, and Concord Ave Hydraulic Boundaries

**Notes:**

- Conditions from 1998-2001 building inspection results are historical information and have not been verified.
- Inspections results may include buildings outside of Huron A, Huron B and Concord Ave project areas



Project Areas	No. of Buildings with Roof Leader Connection to Storm Drain	No. of Buildings with Roof Leader Connection to Sanitary Sewer	No. of Buildings with Roof Leader Connection to Combined Sewer	No. of Buildings with Flat Roof Drain Connection to Storm Drain	No. of Buildings with Flat Roof Drain Connection to Sanitary Sewer	No. of Buildings with Flat Roof Drain Connection to Combined Sewer
Huron A	28	37	9	12	13	0
Huron B	37	29	7	7	15	4
Concord Ave	12	8	1	8	4	4
<b>Total</b>	<b>77</b>	<b>74</b>	<b>17</b>	<b>27</b>	<b>32</b>	<b>8</b>