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JOHNSTON, IOWA  
NORTHWEST PLANNING AREA  
UTILITY SERVICE MASTER PLAN

This letter is to present the master plan for utility service in the Northwest Planning Area. The Northwest Planning Area is generally bounded on the east by Beaver Creek and bounded on the west by the current and proposed corporate limits of the City of Johnston. The westerly boundary is located 1/2 mile west of NW 100<sup>th</sup> Street in the area south of NW 70<sup>th</sup> Avenue and along NW 107<sup>th</sup> Street from NW 70<sup>th</sup> Avenue to NW 78<sup>th</sup> Avenue. Northerly of NW 78<sup>th</sup> Avenue the planning boundary extends westerly to Highway 141.

The southern boundary of the Northwest Planning Area is located between 1/4 mile and 1/2 mile southerly of NW 70<sup>th</sup> Avenue. The Northwest Planning Area includes those areas south of NW 70<sup>th</sup> Avenue that do not have available sanitary sewer service. Areas with sanitary sewer service are generally not included within the Northwest Planning Area.

The northern boundary of the Northwest Planning Area generally follows Little Beaver Creek from Beaver Creek northwesterly. The northwesterly boundary of the planning area has not been specifically defined. The northwest boundary of the planning area will be determined as development and annexation extend northwesterly toward NW 78<sup>th</sup> Avenue and NW 107<sup>th</sup> Street.

The master plan addresses utility service for sanitary sewer, water main and storm drainage. The primary focus of the master plan is to address the availability of sanitary sewer service.

The master plan provides recommendations for additional water mains in the Northwest Planning Area. Portions of the Northwest Planning Area are provided water service. The master plan sets forth recommendations for completion of the water mains within the planning area.

The master plan sets forth areas of concern and general recommendations regarding stormwater drainage. Stormwater drainage facilities will be designed as individual developments are completed within the Northwest Planning Area. The purpose of the storm sewer master planning is to identify potential areas of concern along existing drainage courses where development may affect downstream property owners and downstream drainage facilities.

### **SANITARY SEWER**

Sanitary sewer service to the Northwest Planning Area will be provided by an extension of the City of Johnston's Beaver Creek Trunk Sewer. The trunk sewer currently terminates at NW 86<sup>th</sup> Street near the entrance to Green Meadows North, approximately 2,000 feet south of NW 70<sup>th</sup> Avenue.

The Beaver Creek Trunk Sewer is primarily located along the westerly side of Beaver Creek from north of Interstate 35/80 to a point approximately 2,000 feet south of NW 70<sup>th</sup> Avenue. The trunk sewer is a 24-inch pipe at a slope of 0.08%. The capacity of the trunk sewer is approximately 4.1 mgd.

The existing trunk sewer along Beaver Creek maintains the 24-inch pipe size even as the service area decreases. The reason for maintaining the pipe size is two-fold.

First, the slope of the sewer is 0.08% to follow the approximate slope of Beaver Creek. A 24-inch pipe is considered the minimum pipe size suitable for a sewer slope as flat as 0.08%.

Second, by maintaining the pipe capacity along the entire trunk sewer flexibility is available to modify and extend the planning area. The 24-inch trunk sewer provides the City the opportunity to continue expanding its planning area northwesterly. If the City reaches the capacity of the trunk sewer selected downstream reaches of the trunk sewer can be paralleled to provide additional sewer capacity.

In the late 1990s the City of Johnston extended the Beaver Creek Trunk Sewer northerly to serve the Green Meadows North development. At the time the trunk sewer was extended, the City of Johnston evaluated several options for future extension of the trunk sewer to NW 70<sup>th</sup> Avenue. At the time the trunk sewer extension was constructed, the City could not determine whether the future trunk sewer extension northerly to NW 70<sup>th</sup> Avenue would follow the westerly side of Beaver Creek through the Simpson property or would follow NW 86<sup>th</sup> Street northerly to NW 70<sup>th</sup> Avenue.

The City constructed the trunk sewer extension westerly from Beaver Creek to NW 86<sup>th</sup> Street with sufficient capacity to extend the sewer northerly. Due to ground elevations the City raised the invert elevation of the sewer at NW 86<sup>th</sup> Street by several feet. The invert elevation of the trunk sewer at Beaver Creek is Elevation 810. The invert elevation of the sewer at NW 86<sup>th</sup> Street is Elevation 816.

This feasibility study evaluated the extension of the Beaver Creek Trunk Sewer northerly to NW 70<sup>th</sup> Avenue. Extension of the trunk sewer to NW 70<sup>th</sup> Avenue is a key element to provide sewer service to the Northwest Planning Area, including the areas located northerly of NW 70<sup>th</sup> Avenue and westerly along NW 70<sup>th</sup> Avenue from NW 86<sup>th</sup> Street. Four alternatives were evaluated for extending the trunk sewer to NW 70<sup>th</sup> Avenue. The four alternatives are briefly described as follows:

- Alternative 1 - Extend the trunk sewer northerly along the westerly side of Beaver Creek to NW 70<sup>th</sup> Avenue.
- Alternative 2 - Extend the trunk sewer northerly along Beaver Creek to a point south of the Simpson house. The sewer would then extend westerly to the west side of NW 86<sup>th</sup> Street and northerly to NW 70<sup>th</sup> Avenue.
- Alternative 3 - Extend the trunk sewer along NW 86<sup>th</sup> Street from the current terminus near Green Meadows North northerly to NW 70<sup>th</sup> Avenue.
- Alternative 4 - Construct a parallel trunk sewer from the Beaver Creek Trunk Sewer westerly to NW 86<sup>th</sup> Street along the alignment of the existing sewer. The new sewer would be located at a deeper elevation. The sewer would then extend northerly along NW 86<sup>th</sup> Street to NW 70<sup>th</sup> Avenue.

The evaluation of the alternatives identified two alternatives with significant constraints. Alternative 1 would follow Beaver Creek northerly to NW 70<sup>th</sup> Avenue. This alternative is not considered constructable with the current location of the Simpson residence on the east side of NW 86<sup>th</sup> Street. This alternative was eliminated from consideration due to the conflict with the Simpson residence.

Alternative 3 would extend the sewer northerly along NW 70<sup>th</sup> Avenue with a downstream invert elevation of 816. This sewer would result in a sewer with a depth of Elevation 818 at NW 70<sup>th</sup> Avenue and NW 86<sup>th</sup> Street. The invert elevation of this sewer near NW 70<sup>th</sup> Avenue would be too shallow to provide complete sewer service. This alternative was eliminated from consideration due to the invert elevation limitations.

The two viable alternatives were considered Alternative 2 and Alternative 4. Both alternatives result in invert elevations at NW 70<sup>th</sup> Avenue in the range of Elevation 812. Both alternatives eliminate the conflict with the Simpson residence by locating the sewer on the west side of NW 86<sup>th</sup> Street.

Alternative 4 is more costly than Alternative 2 because of the construction of the greater length of sewer at depths greater than 20 feet. Alternative 2 is considered the preferable alternative primarily because of cost considerations.

Alternative 2 involves approximately 2,600 feet of sewer following Beaver Creek northerly to a point south of the Simpson residence. The sewer then continues westerly to the west side of NW 86<sup>th</sup> Street and northerly along the west side of NW 86<sup>th</sup> Street to NW 70<sup>th</sup> Avenue.

The estimated cost for this extension of the Beaver Creek Trunk Sewer is:

Description	Unit	Quantity	Unit Price	Extended Price
24" Sanitary Sewer	LF	2,500	\$ 175	\$437,500
24" Sanitary Sewer Augered	LF	125	350	43,750
Manholes	Ea.	8	4,000	32,000
Seeding	Acre	6	1,200	7,200
Surface Restoration	LF	2,600	5	13,000
Miscellaneous	LS	1	10,000	<u>10,000</u>
			Estimated Construction Cost	\$543,450
			Contingency @ 10%	54,350
			Engineering, Legal & Administrative @ 18%	<u>98,200</u>
			Total Project Cost	\$696,000

The extension of the trunk sewer northerly to NW 70<sup>th</sup> Avenue provides the City the outlet to extend sewer service to areas westerly along NW 70<sup>th</sup> Avenue and northerly along Beaver Creek from NW 70<sup>th</sup> Avenue.

The City of Johnston has experienced interest in development along the NW 70<sup>th</sup> Avenue corridor from NW 86<sup>th</sup> Street to NW 107<sup>th</sup> Street. Based on the development interest, the City of Johnston has identified this area as the priority area for sewer service.

The feasibility study evaluated alternatives for providing sewer service to the primary development areas located along the NW 70<sup>th</sup> Avenue corridor. The ground slopes along the NW 70<sup>th</sup> Avenue corridor generally slope easterly from the western boundary of the planning area boundary toward Beaver Creek.

The feasibility study identified three alternatives for extending sewer service westerly along the NW 70<sup>th</sup> Avenue corridor. The first alternative is construction of a trunk sewer along the NW 70<sup>th</sup> Avenue corridor.

The second alternative is the construction of a trunk sewer along the drainage course located approximately 1,000 feet south of NW 70<sup>th</sup> Avenue. The third alternative is the construction of a trunk sewer along the drainage course located approximately 1/4 mile north of NW 70<sup>th</sup> Avenue.

Alternative 2 following the drainage course southerly of NW 70<sup>th</sup> Avenue was determined not to be feasible. Although this sewer would serve the Simpson property located at the southwest corner of NW 86<sup>th</sup> Street and NW 70<sup>th</sup> Avenue, this drainage course extends toward the far southwest corner of the planning area. Complete sewer service to the northwest development area would be considered very costly with a trunk sewer along this southerly alignment.

The sewer alignment northerly of NW 70<sup>th</sup> Avenue follows a drainage course that extends from Beaver Creek southwesterly to a point near the intersection of NW 70<sup>th</sup> Avenue and NW 100<sup>th</sup> Street. The westerly terminus of the trunk sewer under the third alternative is similar to the terminus under the first alternative. The length of sewer necessary to follow the third alignment is significantly longer.

Based on a comparison of the alternatives, it was determined the alternative of locating the trunk sewer along NW 70<sup>th</sup> Avenue from NW 86<sup>th</sup> Street to NW 100<sup>th</sup> Street is the preferred alternative.

Enclosed is a copy of an aerial photograph showing the Northwest Planning Area. The aerial photograph shows the location of the recommended trunk sewer along NW 70<sup>th</sup> Avenue from NW 86<sup>th</sup> Street to NW 100<sup>th</sup> Street.

The trunk sewer along NW 70<sup>th</sup> Avenue would be constructed at a depth averaging approximately 15 feet. This depth of trunk sewer is considered economically feasible and provides sufficient depth to allow areas adjoining the NW 70<sup>th</sup> Avenue corridor to be sewered to the NW 70<sup>th</sup> Avenue Trunk Sewer.

The estimated cost for the trunk sewer along the NW 70<sup>th</sup> Avenue corridor is:

Description	Unit	Quantity	Unit Price	Extended Price
15" Sanitary Sewer	LF	5,200	\$ 80	\$ 416,000
15" Sanitary Sewer Augered	LF	100	275	27,500
Manholes	Ea.	16	3,200	51,200
PCC Pavement	SY	300	40	12,000
Seeding	Acre	12	1,200	14,400
Surface Restoration	LF	2,600	15	39,000
Miscellaneous	LS	1	20,000	<u>20,000</u>
			Estimated Construction Cost	\$580,100
			Contingency @ 10%	58,000
			Engineering, Legal & Administrative \$ 18%	<u>105,900</u>
			Total Project Cost	\$744,000

The enclosed aerial photograph shows proposed service area for the trunk sewer along NW 70<sup>th</sup> Avenue. The trunk sewer would serve the undeveloped Simpson property along the south side of NW 70<sup>th</sup> Avenue and the existing residential area located along the south side of NW 70<sup>th</sup> Avenue from NW 93<sup>rd</sup> Court to NW 100<sup>th</sup> Street.

The service area would include the area at the northwest corner of NW 70<sup>th</sup> Avenue and NW 86<sup>th</sup> Street. This area can be sewered to the proposed trunk sewer without an extension of the trunk sewer northerly of NW 70<sup>th</sup> Avenue.

The service area includes the area extending from NW 100<sup>th</sup> Street to the west corporate limits from NW 70<sup>th</sup> Avenue south 1/2 mile. The photograph illustrates a potential service area in the eastern part of the Bright Foundation property. This portion of the Bright Foundation property can either be sewered to the NW 70<sup>th</sup> Avenue Trunk Sewer or southerly to the trunk sewer being proposed in the Adam Ridge development.

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The service area includes the area from NW 70<sup>th</sup> Avenue northerly approximately 1/4 mile between NW 100<sup>th</sup> Street and NW 107<sup>th</sup> Street.

It is proposed the City of Johnston's trunk sewer would terminate at NW 100<sup>th</sup> Street and NW 70<sup>th</sup> Avenue. Individual developers would be responsible for extending sewers to serve the development area west of NW 100<sup>th</sup> Street. The enclosed drawing shows a proposed sewer extending south along NW 100<sup>th</sup> Street and a sewer extending westerly to NW 107<sup>th</sup> Street.

The City of Johnston has received inquiry concerning the development of a parcel located on the east side of NW 107<sup>th</sup> Street south of NW 78<sup>th</sup> Avenue. This area is naturally tributary to a drainage swale that extends easterly toward Beaver Creek. This area cannot be sewered by gravity to the proposed NW 70<sup>th</sup> Avenue Trunk Sewer, including the extension westerly to NW 107<sup>th</sup> Street.

It is not anticipated sewer service would be available by gravity to this area south of NW 78<sup>th</sup> Avenue on a time frame compatible with the proposed development. The developer of the property has indicated an interest in providing sewer service to this area by pumping the flow southerly to the sewer that would be extended westerly to NW 107<sup>th</sup> Street.

The enclosed aerial photograph identifies the proposed development area. To facilitate development of this area, it is suggested the developer be allowed to pump the flow southerly to the NW 70<sup>th</sup> Avenue area.

Although initial sewer service to this area near NW 78<sup>th</sup> Avenue and NW 100<sup>th</sup> Street would be provided by a pump station, it is possible a trunk sewer would be extended westerly to this area at some future date. The sewers within the development should be designed in a manner that would allow the option of gravity sewer, if it becomes available at a future date.

To provide sewer service in a timely manner it would be necessary for the City to construct the NW 70<sup>th</sup> Avenue Trunk Sewer to NW 100<sup>th</sup> Street and the developer of the property to extend the trunk sewer from NW 100<sup>th</sup> Street to NW 107<sup>th</sup> Street.

The NW 70<sup>th</sup> Avenue Trunk Sewer would provide an outlet for sewer service to the existing development located along the south side of NW 70<sup>th</sup> Avenue, including NW 93<sup>rd</sup> Court, NW 95<sup>th</sup> Court and the Candleridge area. The enclosed drawing shows a conceptual alignment for gravity lateral sewers to serve the existing residential development.

Development of sewer service in the existing residential areas can be considered after the construction of the trunk sewer. Lateral sewers in the residential areas would be developed in accordance with the City of Johnston's policy for extension of sanitary sewer to undeveloped residential areas.

To provide sewer service to the NW 70<sup>th</sup> Avenue corridor, two separate reaches of sewer would be required. A summary of the sewers and estimated cost is:

Trunk Sewer Extension to NW 70 <sup>th</sup> Avenue	\$ 696,000
NW 70 <sup>th</sup> Avenue Trunk to NW 100 <sup>th</sup> Street	<u>744,000</u>
Total	\$1,440,000

The service area for the NW 70<sup>th</sup> Avenue Trunk would be included in a new connection fee district. The City of Johnston would construct the sewer and recover the cost through the connection fee district charges.

The City of Johnston would establish the connection fee district with an acreage connection fee of approximately \$2,200 per acre and a frontage sewer fee of \$60 per linear foot. The frontage fee would be applicable only in those locations where the trunk sewer would replace a lateral sewer within this development. The connection fee district would not establish a frontage fee in those locations where the frontage provides no sewer frontage benefit to the adjoining property.

If the City elects not to establish a single westerly area connection fee district, the alternative available would be to establish a separate connection fee district for the Northwest Planning Area. The connection fee district would be structured to recover the cost for construction of the Beaver Creek Trunk Sewer Extension and NW 70<sup>th</sup> Avenue trunk sewer.

The Northwest Planning Area includes the area located northerly of NW 70<sup>th</sup> Avenue. The balance of the Northwest Planning Area generally slopes easterly and northeasterly toward Beaver Creek and Little Beaver Creek.

Sewer service to the Northwest Planning Area northerly of NW 70<sup>th</sup> Avenue would be provided by an extension of the trunk sewer along Beaver Creek to the outlet of Little Beaver Creek. It is recommended this sewer follow the NW 86<sup>th</sup> Street corridor northerly from NW 70<sup>th</sup> Avenue to Beaver Creek.

The trunk sewer would then extend northwesterly along Little Beaver Creek to NW 100<sup>th</sup> Street. The trunk sewer would continue westerly of NW 100<sup>th</sup> Street to serve the future development areas located on the north side of NW 78<sup>th</sup> Avenue.

The trunk sewer along Little Beaver Creek could continue westerly to Highway 141. The extension of the trunk sewer westerly to Highway 141 would provide an outlet if the City of Johnston were to consider extension of the corporate limits to the north annexation area located along the northeasterly side of Highway 141 in the vicinity of Saylorville Drive.

It is recommended the trunk sewer along NW 86<sup>th</sup> Street to Little Beaver Creek be a 24-inch pipe at a slope of 0.08%. This design maintains the maximum depth available along this reach of sewer.

The slope of Little Beaver Creek increases as it extends westerly from Beaver Creek toward Highway 141. The increased slope and the decreased service area would allow the City of Johnston to decrease the size of the trunk sewer along Little Beaver Creek. The size of this trunk sewer will be directly determined by the future service area.

If the City elects not to pursue annexation in the north area, the trunk sewer along Little Beaver Creek is anticipated to be a 12-inch or 15-inch pipe. If the City elects to pursue annexation in the north annexation area, the size of the sewer pipe is anticipated to be approximately 18-inch diameter.

Construction of the sewers northerly of NW 70<sup>th</sup> Avenue is not considered an immediate need. The feasibility for these trunk sewers should be updated after the City determines its long range annexation plan in the northwest and north area.

Sewer service to the area from NW 86<sup>th</sup> Street westerly to NW 107<sup>th</sup> Street in the area tributary to the trunk sewer extension will require the construction of subtrunk sewers extending westerly from the trunk toward NW 100<sup>th</sup> Street.

The enclosed aerial photograph shows two possible subtrunk sewer extensions. One extension is located approximately 1/4 mile north of NW 70<sup>th</sup> Avenue. The second extension is located approximately 3/4 mile north of NW 70<sup>th</sup> Avenue. This northerly subtrunk sewer follows the pronounced drainage course that extends as far west as the proposed west corporate limits at NW 107<sup>th</sup> Street.

Construction of one of the subtrunk sewers will be determined by the extent of development in the area north of NW 70<sup>th</sup> Avenue. It is anticipated portions of the trunk sewer would be constructed as development is undertaken. Other portions of the trunk sewer may require the City to facilitate extension of the trunk sewer. Master planning for smaller subtrunk sewers should be updated prior to the actual design and construction of the sewers.

To assist the City in long range planning conceptual cost estimates for the trunk sewer extensions northerly of NW 70<sup>th</sup> Avenue have been developed. The approximate cost for these trunk sewer extensions are as follows:

**Beaver Creek Trunk Sewer -  
 NW 70<sup>th</sup> Avenue to North Subtrunk**

Description	Unit	Quantity	Unit Price	Extended Price
24" Sanitary Sewer	LF	2,600	\$ 130	\$ 338,000
18" Sanitary Sewer	LF	5,000	95	475,000
Manholes	Ea.	22	3,500	77,000
Seeding	Acre	18	1,200	21,600
Pavement Replacement	SY	400	35	14,000
Surface Restoration	LF	7,600	5	38,000
Miscellaneous	LS	1	25,000	<u>25,000</u>
			Estimated Construction Cost	\$ 988,600
			Contingency @ 10%	99,400
			Engineering, Legal & Administrative @ 18%	<u>178,000</u>
			Total Project Cost	\$1,266,000

**Little Beaver Creek Trunk Sewer -  
 North Subtrunk to 1/2 Mile West of NW 100<sup>th</sup> Street**

Description	Unit	Quantity	Unit Price	Extended Price
18" Sanitary Sewer	LF	5,600	\$ 95	\$532,000
18" Sanitary Sewer Augered	LF	100	250	25,000
Manholes	Ea.	18	3,000	54,000
Seeding	Acre	13	1,200	15,600
Pavement Replacement	SY	200	35	7,000
Surface Replacement	LF	5,600	5	28,000
Miscellaneous	LS	1	15,000	<u>15,000</u>
			Estimated Construction Cost	\$676,600
			Contingency @ 10%	67,700
			Engineering, Legal & Administrative @ 18%	<u>121,700</u>
			Total Project Cost	\$866,000

**Little Beaver Creek Trunk Sewer -  
 1/2 West of NW 100<sup>th</sup> Street to Highway 141**

Description	Unit	Quantity	Unit Price	Extended Price
18" Sanitary Sewer	LF	3,000	\$ 95	\$ 28,500
Manholes	Ea.	10	3,000	30,000
Seeding	Acre	6	1,200	7,200
Surface Restoration	LF	3,000	5	15,000
Miscellaneous	LS	1	15,000	<u>15,000</u>
			Estimated Construction Cost	\$352,200
			Contingency @ 10%	35,200
			Engineering, Legal & Administrative @ 18%	<u>63,600</u>
			Total Project Cost	\$451,000

**South Subtrunk**

Description	Unit	Quantity	Unit Price	Extended Price
12" Sanitary Sewer	LF	4,400	\$ 3,000	\$308,000
Manholes	Ea.	12	3,000	36,000
Seeding	Acre	9	1,200	10,800
Surface Restoration	LF	4,400	5	22,000
Miscellaneous	LS	1	10,000	<u>10,000</u>
			Estimated Construction Cost	\$386,800
			Contingency @ 10%	38,600
			Engineering, Legal & Administrative @ 18%	<u>69,600</u>
			Total Project Cost	\$495,000

**North Subtrunk**

Description	Unit	Quantity	Unit Price	Extended Price
12" Sanitary Sewer	LF	5,400	\$ 80	\$432,000
12" Sanitary Sewer Augered	LF	100	225	22,500
Manholes	Ea.	17	3,000	51,000
Seeding	Acre	14	1,200	16,800
Pavement Replacement	SY	200	35	7,000
Surface Restoration	LF	5,400	5	27,000
Miscellaneous	LS	1	25,000	<u>25,000</u>
			Estimated Construction Cost	\$581,300
			Contingency @ 10%	58,100
			Engineering, Legal & Administrative @ 18%	<u>104,600</u>
			Total Project Cost	\$744,000

A summary of the estimated cost of the future trunk sewers north of NW 70<sup>th</sup> Avenue is:

Beaver Creek Trunk Sewer - NW 70 <sup>th</sup> Avenue to North Subtrunk	\$1,266,000
Little Beaver Creek Trunk Sewer - North Subtrunk to 1/2 Mile West of NW 100 <sup>th</sup> Street	866,000
Little Beaver Creek Trunk Sewer - 1/2 Mile west of NW 100 <sup>th</sup> Street to Highway 141	451,000
South Subtrunk	495,000
North Subtrunk	<u>744,000</u>
Total	\$3,822,000

To provide sanitary sewer service in the Northwest Planning Area required in the near future, the master plan study recommends the following:

- The City of Johnston establish a single northwest area connection fee district.
- Design and construct the Beaver Creek Trunk Sewer Extension to NW 70<sup>th</sup> Avenue and the NW 70<sup>th</sup> Avenue Trunk Sewer to NW 100<sup>th</sup> Street at an estimated cost of approximately \$1,440,000.
- Coordinate with the developer for timely extension of the trunk sewer from NW 100<sup>th</sup> Street to NW 107<sup>th</sup> Street.
- Monitor and update the long range plan for sewer service north of NW 70<sup>th</sup> Avenue as appropriate based on development.

## **WATER MAINS**

In the mid-1990s the City of Johnston developed a long range plan to provide water service to its western area, located from NW 86<sup>th</sup> Street to the west corporate limits. The primary element of the long range water plan is 12-inch water mains along major roadways from NW 100<sup>th</sup> Street southerly, and 8-inch water mains located along major streets northerly of NW 70<sup>th</sup> Avenue.

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Since development of the long range plan, the City of Johnston has constructed the 12-inch water mains along NW 100<sup>th</sup> Street and NW 86<sup>th</sup> Street. The 12-inch water main has been constructed along both NW 70<sup>th</sup> Avenue and NW 62<sup>nd</sup> Avenue from NW 86<sup>th</sup> Street to NW 100<sup>th</sup> Street.

The City extended an 8-inch water main northerly on NW 100<sup>th</sup> Street to a point slightly more than 1/2 mile north of NW 70<sup>th</sup> Avenue. The 8-inch water main has since been extended north to NW 78<sup>th</sup> Avenue and west on NW 78<sup>th</sup> Avenue approximately 1/4 mile.

In addition to the water mains located along major streets, the water main plan called for the construction of a 12-inch water main loop along the west boundary of the City. This boundary is located 1/2 mile west of NW 100<sup>th</sup> Street. As development is being proposed south of NW 62<sup>nd</sup> Avenue, the 12-inch water main is being required along the corridor of NW 106<sup>th</sup> Street.

As development continues westerly of NW 100<sup>th</sup> Street between NW 62<sup>nd</sup> Avenue and NW 70<sup>th</sup> Avenue, the City should continue its requirement for a 12-inch water main generally following the most westerly street within the corporate limits. This reach of water main will extend through individual developments and will be constructed as development is completed in the corridor west of NW 100<sup>th</sup> Street.

The City of Johnston's water plan developed in the mid-1990s provided for a loop of 8-inch water mains in the area northerly of NW 70<sup>th</sup> Avenue. The smaller water mains proposed for the area north of NW 70<sup>th</sup> Avenue was based on the concept of large lot development. At that time the City of Johnston anticipated future development north of NW 70<sup>th</sup> Avenue would be based on large lot development

Subsequent to the development of the long range water plan, the City of Johnston has reviewed the development densities in the area north of NW 70<sup>th</sup> Avenue. Current planning would anticipate development densities greater than those assumed at the time the water main plan was developed. Based on the potential increased development density it is recommended the City increase the size of future loop water mains north of NW 70<sup>th</sup> Avenue to 12-inch diameter. The existing 8-inch water main on NW 100<sup>th</sup> Street from NW 70<sup>th</sup> Avenue to NW 78<sup>th</sup> Avenue and the reach of 8-inch water main in NW 78<sup>th</sup> Avenue west of NW 100<sup>th</sup> Street would be integrated into the loop system of 12-inch water mains.

Enclosed is a copy of an aerial photograph showing the current and proposed water mains in the Northwest Planning Area. The master plan recommends extension of the 12-inch water main westerly on NW 70<sup>th</sup> Avenue from 100<sup>th</sup> Street to 107<sup>th</sup> Street and the

construction of a 12-inch water main on NW 107<sup>th</sup> Street from NW 70<sup>th</sup> Avenue to NW 78<sup>th</sup> Avenue. The master plan calls for a 12-inch water main on NW 78<sup>th</sup> Avenue from the existing water main westerly to NW 107<sup>th</sup> Street.

The master plan calls for extension of a 12-inch water main northerly on NW 86<sup>th</sup> Street to the alignment of approximately NW 78<sup>th</sup> Avenue and westerly to NW 100<sup>th</sup> Street. The location of the east-west connection can be coordinated with future development. The water main is intended to represent the general need for an interconnecting main between NW 86<sup>th</sup> Street and NW 100<sup>th</sup> Street.

The recommended water mains have been divided into two phases. The first phase water mains would involve the extension of water main westerly along NW 100<sup>th</sup> Street to 107<sup>th</sup> Street, northerly along NW 107<sup>th</sup> Street to NW 78<sup>th</sup> Avenue and easterly on NW 78<sup>th</sup> Avenue to the existing water main. These reaches of water main would be necessary to support the proposed development along 107<sup>th</sup> Street.

The estimated cost for the Phase 1 water main on NW 70<sup>th</sup> Avenue, NW 78<sup>th</sup> Avenue and NW 107<sup>th</sup> Street is:

Description	Unit	Quantity	Unit Price	Extended Price
12" Water Main	LF	8,800	\$ 38	\$334,400
12" Water Main Augered	LF	100	125	12,500
Hydrant	Ea.	28	2,700	75,600
12" Gate Valve	Ea.	14	1,500	21,000
Seeding	Acre	6	1,200	7,200
Surface Restoration	LF	8,800	7	61,600
Miscellaneous	LS	1	15,000	<u>15,000</u>
Estimated Construction Cost				\$527,300
Contingency @ 10%				52,700
Engineering, Legal & Administrative @ 18%				<u>95,000</u>
Total Project Cost				\$675,000

The second phase of water main involves projects that are not considered as likely to be constructed in the near future. These two projects include the NW 86<sup>th</sup> Street water main and the interconnection to NW 100<sup>th</sup> Street. The exact alignment and location of these water mains will be determined based on future development plans. The estimated cost for the second phase of the water main is:

**NW 86<sup>th</sup> Street and Connection to NW 100<sup>th</sup> Street**

Description	Unit	Quantity	Unit Price	Extended Price
12" Water Main	LF	11,000	\$ 38	\$418,000
12" Water Main Augered	LF	100	125	12,500
Hydrant	Ea.	35	2,700	94,500
12" Gate Valve	Ea.	16	1,500	24,000
Seeding	Acre	7	1,200	8,400
Surface Restoration	LF	11,000	7	77,000
Miscellaneous	LS	1	15,000	<u>15,000</u>
			Estimated Construction Cost	\$649,400
			Contingency @ 10%	65,000
			Engineering, Legal & Administrative @ 18%	<u>110,600</u>
			Total Project Cost	\$825,000

A summary of the estimated cost of the two water main projects is:

Phase 1 - NW 70 <sup>th</sup> Avenue, NW 107 <sup>th</sup> Street and NW 78 <sup>th</sup> Avenue	\$675,000
Phase 3 - NW 86 <sup>th</sup> Street and Connection to NW 100 <sup>th</sup> Street	825,000

Some of the water mains in the Northwest Planning Area could be constructed by development as it occurs. It is unlikely development will occur in an orderly manner that would allow all of the water mains to be constructed by development. For example, it is unlikely the water main on NW 107<sup>th</sup> Street would be constructed in a timely manner due to the nature of the development and existing residential properties.

Another issue the City of Johnston will face is the construction of the 12-inch water main along NW 107<sup>th</sup> Street. NW 107<sup>th</sup> Street will be the corporate boundary and only one side of the street will benefit from the water main.

The NW 107<sup>th</sup> Street water main is part of the essential looping for the Northwest Planning Area. It is anticipated a portion of the NW 107<sup>th</sup> Street water main cost will be borne by the City, rather than by adjoining property owners or developers.

The City of Johnston has constructed most of the major water mains along the street corridors in the western area of the City. It is anticipated this pattern will continue in the Northwest Planning Area. The major water mains constructed by the City of Johnston would be supplemented by smaller and interconnecting water mains located within individual developments.

To finance the construction of the water mains the City of Johnston should establish an appropriate connection fee district. The connection fee district would involve a combination of area fee and frontage fee.

The total cost for the three phases of the water main project is estimated to be approximately \$1,500,000. The loop of 12-inch water mains provides direct benefit to the adjoining property owners. The loop of 12-inch main also provides the basic foundation for the overall fire protection level and circulation patterns within the west water system.

The City of Johnston has generally established a policy of recovering the cost of the 12-inch water main loop system. In practice, the City has targeted approximately a 90% recovery factor from the directly benefited properties. The remaining 10% of the project cost has been allocated to the general benefit of the water system. Based on the 90% recovery factor, the estimated connection fee should recover a cost for the water main project of approximately \$1,350,000.

The three phases of the water main improvements would have a theoretical frontage of approximately 19,800 linear feet. The service area that would benefit from the water mains north of NW 70<sup>th</sup> Avenue, excluding the areas that already are considered to have water service, would be approximately 850 acres.

It should be recognized the City may not recover all of the frontage fee along NW 107<sup>th</sup> Street where the water main adjoins the west corporate limits. This cost will generally be borne by the overall water utility, rather than being reallocated to specific properties.

The anticipated connection fee for the north water main improvements would be approximately \$25 per linear foot applicable to both sides of the water main. The area assessment would be approximately \$400 per acre.

The exact connection fee can be determined by the exact scope of the projects to be implemented and the area benefited by the projects. The City would have the choice to establish separate connection fee districts for each project, or a single connection fee for all three projects.

Under each methodology the frontage assessment would remain at approximately \$25 per linear foot. The area assessment in the western area would be higher under the separate connection fee district approach than the single unified connection fee district approach. To provide uniformity, it is generally recommended the City establish a uniform connection fee districts.

## **STORM DRAINAGE**

The master plan evaluation for the Northwest Planning Area was undertaken to identify areas of concern relating to stormwater drainage. The purpose of the feasibility analysis is to identify areas of concern in the Northwest Planning Area. Unlike sanitary sewer and water main, most of the major issues with respect to storm drainage must be addressed during the development of individual parcels.

The undeveloped areas in the Northwest Planning Area can be categorized into two distinct characteristics. The undeveloped areas in the eastern part of the Northwest Planning Area are generally located between Beaver Creek and existing development. The drainage from the future development in these areas will generally extend through undeveloped areas directly to Beaver Creek.

As development occurs in the eastern part of the Northwest Planning Area, on-site detention facilities can be developed to reduce detention to a 5 year undeveloped condition and release to undeveloped channels. The primary area of concern for development in the eastern part of the Northwest Planning Area would be the adequacy of existing downstream culverts, especially culverts crossing NW 86<sup>th</sup> Street both southerly and northerly of NW 70<sup>th</sup> Avenue.

The western part of the Northwest Planning Area generally westerly of NW 100<sup>th</sup> Street is frequently located upstream of existing residential development. The undeveloped areas westerly of NW 100<sup>th</sup> Street are marked by the lack of defined drainage channels. These areas generally slope easterly toward small drainage channels that extend through residential areas. Many of the downstream channels are marked by small ponds, detention basins and undersized culverts.

Many of the existing road and drive culverts may not be adequate to accommodate a 5 year recurrence interval storm, even with stormwater detention. Many of the small ponds are not designed to accommodate the release from a typical urban stormwater detention basin. Many farm ponds and rural residential ponds are designed with very limited release capacity and cannot accommodate the release from a 5 year recurrence interval storm without overflowing.

The undeveloped areas in the northwest part of the planning area in the vicinity of NW 78<sup>th</sup> Avenue are tributary to more defined drainage courses. The major concern with these areas is the adequacy of downstream culverts.

Attached is an aerial photograph showing the Northwest Planning Area. The aerial photograph highlights the natural drainage course located in the Northwest Planning Area.

The aerial photograph identifies the downstream channels by two categories. Category 1 drainage channels are those where the primary area of concern is major roadway culvert capacity. These channels are generally well defined or located in undeveloped areas.

The Category 2 channels are drainage courses with a more significant area of concern. These drainage channels extend through areas that are partially or fully developed. Many of these smaller channels include ponds and culverts of limited capacity.

The Category 2 channels are primarily located along the NW 70<sup>th</sup> Avenue corridor. Development west of NW 100<sup>th</sup> Street has the potential to significantly impact downstream residential areas.

For the Category 1 drainage channels it is recommended the City adopt a requirement that developers must evaluate all downstream culverts between the development and Beaver Creek. The developer's engineer would be responsible to submit drainage culvert design evaluations that would be reviewed by the City of Johnston.

The evaluation of culverts on Category 1 channels would be used to identify areas of concern. Most of these downstream culverts serve a much larger area than a particular development. If areas of culvert capacity are identified, it is quite likely the City would need to program appropriate improvements to culvert capacity.

For many of the channels that are identified as Category 2 channels, the preliminary evaluation indicates existing drainage facilities are inadequate to accommodate the runoff from a 5 year event. The obstructions and constrictions in the channels were generally placed by downstream property owners. For many of these channels there is no practical method for the developer to install additional detention that would offset the inadequacy of the downstream ponds and culverts.

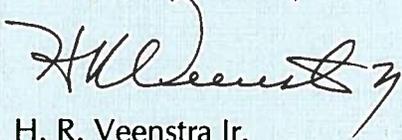
James P. Sanders  
October 12, 2004  
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For the Category 2 channel it is recommended the City take the initiative to complete a comprehensive evaluation of the channels and develop a long range improvement plan that provides adequate channel and culvert capacity for existing and future conditions. The evaluation would identify improvements to culverts, channels and pond capacity to accommodate future development, with adequacy on-site stormwater management within the development areas.

Development is anticipated to occur in the areas upstream of these channels following the completion of the NW 70<sup>th</sup> Avenue trunk sewer. Development could occur as early as 2005. It is recommended the City of Johnston complete the evaluation of the downstream channels prior to development by developing a plan in advance of development. One of the major areas of concern for this area is ensuring that drainage within individual developments is appropriately routed to channels with adequate capacity.

If you have any questions or comments concerning the project, please contact us at 225-8000.

VEENSTRA & KIMM, INC.



H. R. Veenstra Jr.

168249  
Enclosures

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.



Signed:

Date:

\_\_\_\_\_  
H. Robert Veenstra, P.E.

Iowa License No. 9037

My license renewal date is December 31, 2004

Parts covered by this seal:

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