PLEASANT HILL
FLOOD CONTROL EFFORTS
2001 - 2012

Village of Palatine

February 16, 2012

TYPES OF FLOODING

- Overbank Flooding
- Street Flooding
- Overland Flooding
- Sanitary Sewer Backups
- Groundwater Conditions

TYPES OF FLOOD PROTECTION

- **Storm Collection Improvements**
  - Public Improvements
    - Creek Adjustments (Reservoirs or Widening)
    - Larger Storm Sewers
    - Additional inlets
  - Private Improvement
    - Area Drains
- **Sanitary Sewer Improvements**
  - Public Improvements
    - Removing rain water from sanitary sewers
  - Private Improvements
    - Backwater valves
    - Overhead plumbing

HOW THE REIMER RESERVOIR WORKS

- Operational in the fall of 1984.
- It can hold 186 million gallons of water.
- Designed primarily for one type of storm, the 100-year event.
- Designed that 90 to 95% of the time the reservoir would not be required to store stormwater runoff.
- Controls runoff from an upstream drainage area of 5.31 sq-mi that is west of Quentin Road.
- Reduces flood levels in the creek downstream of the reservoir.

MARGRETH REIMER RESERVOIR

DIVERSION STRUCTURE

UPSTREAM SIDE

DOWNSTREAM SIDE

UPPER SALT CREEK WATERSHED

The Reimer Reservoir is just one part of a system of 6 flood control reservoirs in the Upper Salt Creek basin protecting not only 11 communities and the unincorporated areas within the watershed but also other communities downstream.

RESERVOIR	STORAGE CAPACITY	% OF TOTAL
Busse Woods	4,210 Acre-Feet	65%
Plum Grove	262 Acre-Feet	4%
St. Michaels	405 Acre-Feet	6%
Twin Lakes	465 Acre-Feet	7%
Hamilton	550 Acre-Feet	9%
Reimer	575 Acre-Feet	9%
TOTAL	6,467 Acre-Feet*	

* 2.1 billion gallons of water

LOCATION OF THE RESERVOIRS

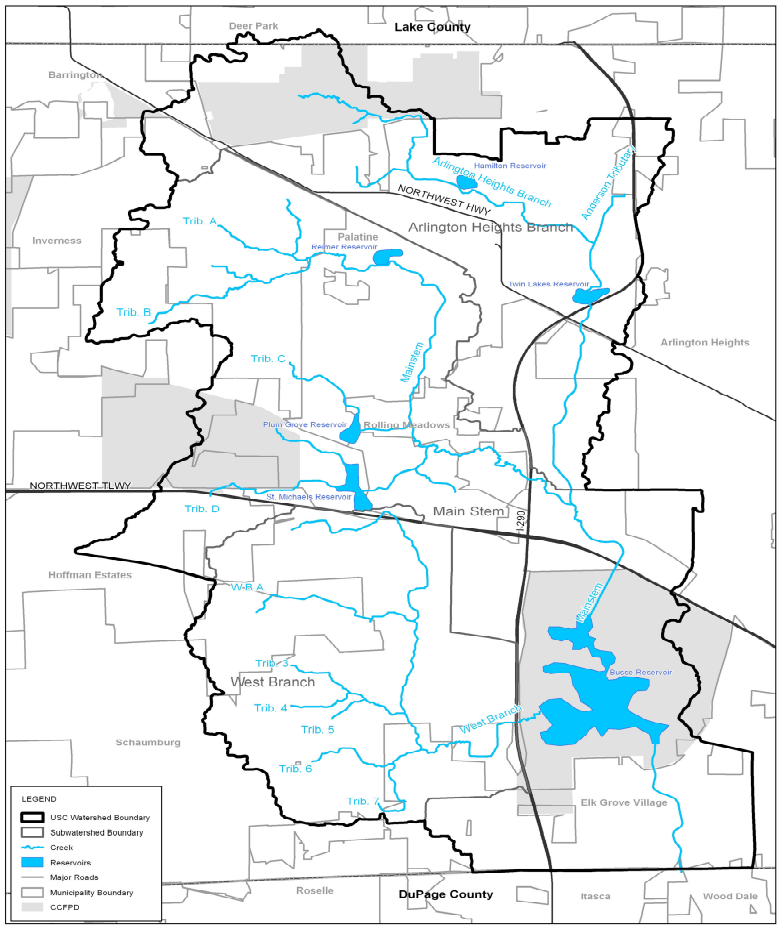


Figure ES. 1
Upper Salt Creek Watershed Overview

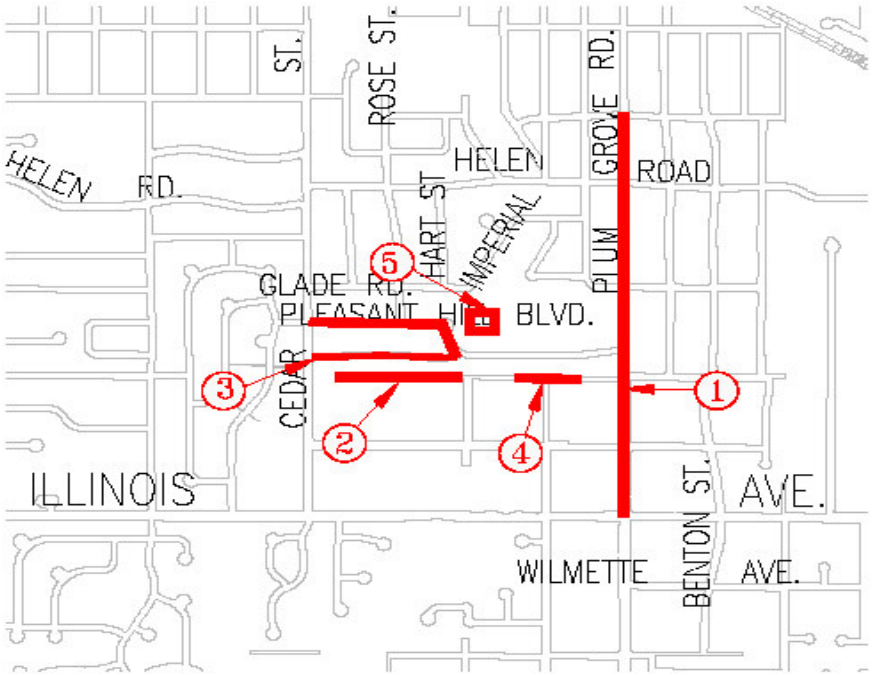
MWH

AREAS SUBJECT TO OVERBANK FLOODING (100-YR FLOODPLAIN)

POTENTIAL MODIFICATIONS TO THE RESERVOIR AND/OR THE CREEK

- The Village has recently selected a consultant to study possible modifications to the operation of the reservoir in order to be able to function for a variety of storm events.
- MWRD identified a possible project that would involve widening the creek channel and enlarging the bridge openings between Illinois Ave and Helen Road.

COMPLETED LARGER STORM SEWERS & MORE COLLECTION



① PLUM GROVE ROAD RECONSTRUCTION & STORM SEWER
② GILBERT R.O.W. STORM WATER OVERFLOW ROUTE
③ PLEASANT HILL BLVD./ CHERYL LANE STORM SEWER (WEST OF CREEK)
④ PLEASANT HILL BLVD. STORM SEWER (EAST OF CREEK)
⑤ IMPERIAL /GLADE DETENTION BASIN

Residential Storm Water Drainage Program

Public Storm Sewer Extension Program

- Intended to extend village storm sewers to areas not served and are experiencing excessive water accumulation and to bring older storms up to current standards.
- Two or more properties need to be affected.
- Total Avg. cost ~ $15,000.
- Homeowner's share $1,200 per affected property. Village pays for the remainder.

Private Storm Sewer Reimbursement Program

- Intended to extend a private storm sewer to areas not served and are experiencing isolated water accumulation.
- One or more properties need to be affected.
- Total Avg. cost ~ $5,000
- Village will pay 50% up to a maximum of $2,500.

Rain Gardens/Bio-Swales

- Intended for areas experiencing limited & isolated water accumulation.
- Total Avg. cost ~ $4,000.
- Village will pay up to 75% up to a maximum of $3,000.

Connection of Sump Pump to Storm Sewer

- Intended for those homeowners who would like to connect their sump pump discharge to a nearby storm sewer.
- Total Avg. cost ~$3,000.
- Homeowner to cover the entire cost. Low interest loan available.

DESIGN OF SANITARY SEWER SYSTEMS

- Designed only for wastewater.
- The regulations do allow for a nominal amount of Infiltration & Inflow (I&I) into the system.
- Infiltration is clear water that enters the pipes through leaky joints, cracked pipes etc.
- Inflow is clear water entering the system through direct connections of inlets, downspouts, footing drains, sump pumps etc.
- Excess clear water in the sanitary sewers can overload the system causing basement back-ups.
- Studies have shown that as much as 75% of the I&I comes from the privately owned portion of the sanitary sewer system.
- Palatine and all communities are mandated to reduce the amount of I&I into their sanitary sewer system.

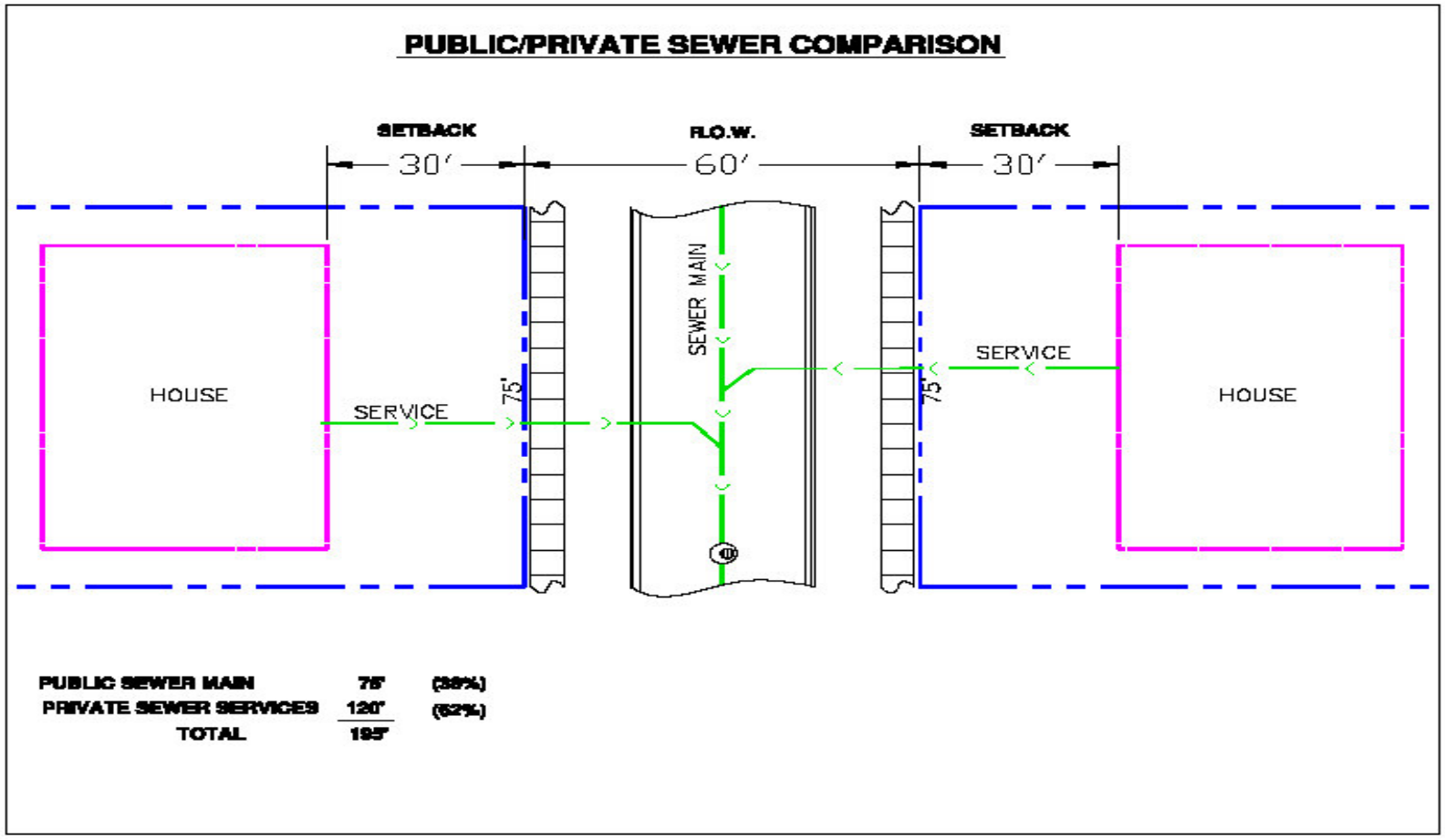
PUBLIC IMPROVEMENTS TO SANITARY SEWER SYSTEM

Goal of 2002 Flood Improvement Program was to make the public portion of the sanitary sewer system as water tight as possible. However it was recognized that this effort might not totally eliminate basement backups or reduce them to an acceptable level and that corrections to the private portion may be necessary.

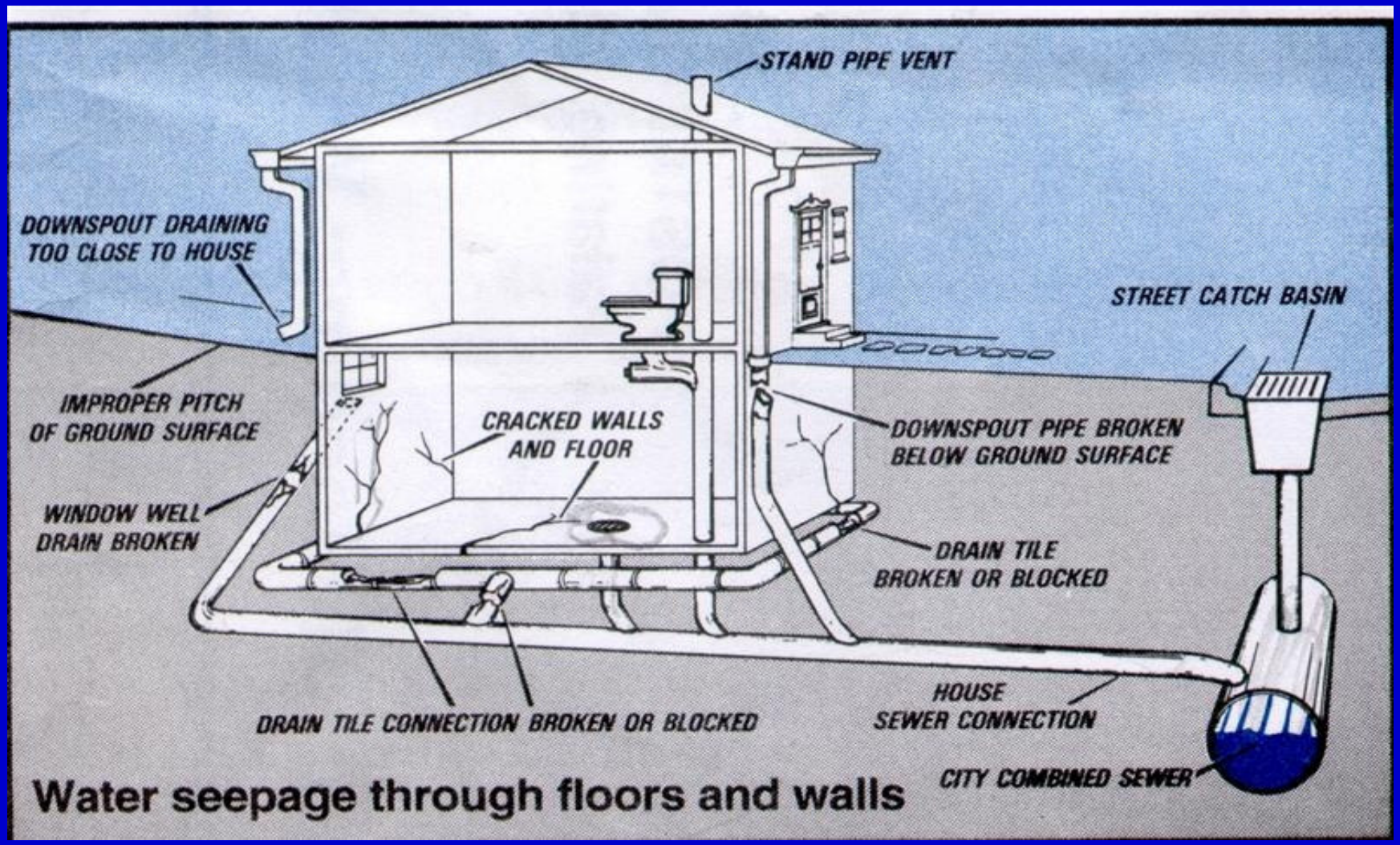
By 2004;

- Slip lined public sewer in Pleasant Hills and the adjacent subdivisions.
- Inspected all manholes
- Replaced all lids
- Flow monitored areas
- Fog tested all the sewer mains looking for cross connections between the storm and sanitary sewer systems.
- Dye tested many lines looking for possible cross connections.
- Televised many sewer mains looking for defects that could contribute I&I.
- Re-inspected all homes that were part of the original sump pump disconnection program back in the late 1980's.

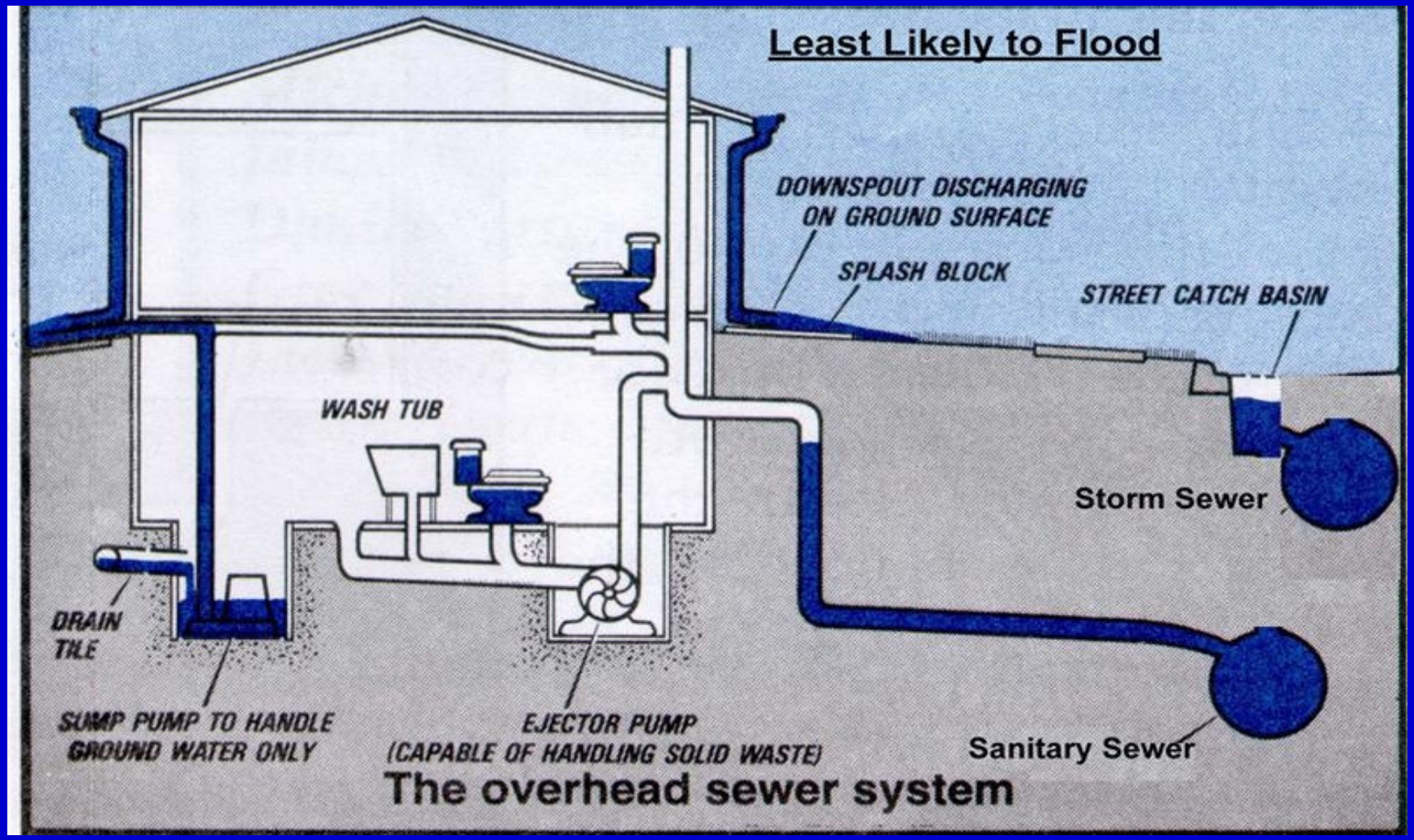
% of PUBLIC/PRIVATE in R-2 SINGLE FAMILY DISTRICTS



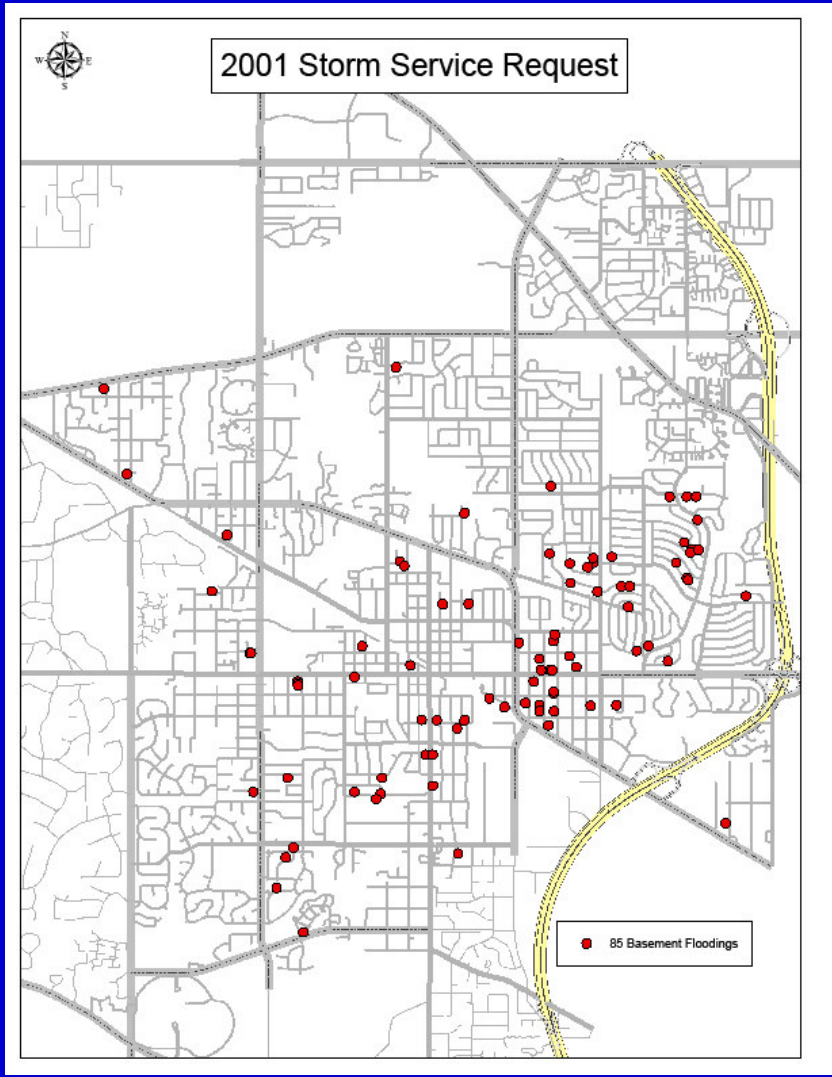
PRE 1970 PLUMBING SYSTEM

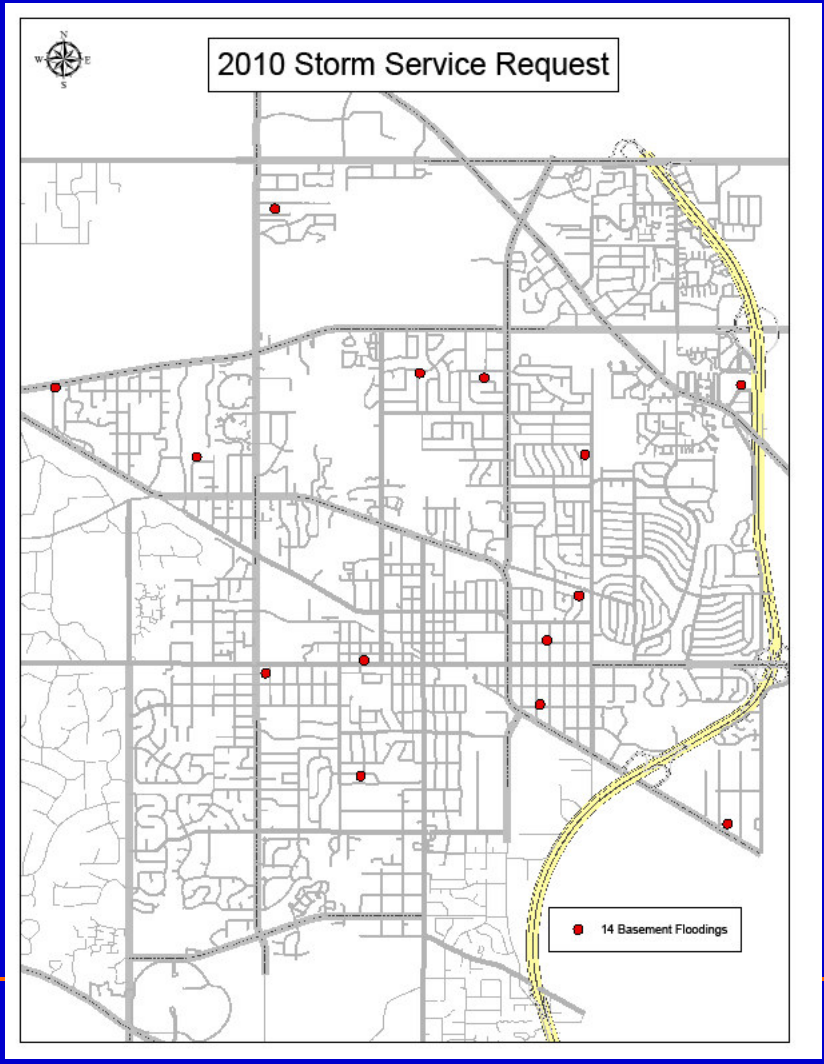


MODERN PLUMBING SYSTEM



VILLAGE WIDE REPORTED BASEMENT FLOODING





VILLAGE'S BASEMENT PROTECTION PROGRAM

The Village will reimburse homeowners;

- 50% of the cost up to a maximum of $6,000 to convert to overhead plumbing.
- 50% of the cost up to a maximum of $2,500 for the disconnection of footing drains.
- 50% of the cost up to a maximum of $750 for an automatic sewer backup check valve.

Additionally the Village can provide a low interest loan for;

- The balance of the non-reimbursable expense.
- Replacement or slip-lining of the sewer service line from the house to the main.
- Replacement or repairs to footing drains.
- Replacement or the installation of basement window well drains.

QUESTIONS & OTHER ISSUES

Watermain Replacement

Plum Grove Rd to the creek.

Electric Aggregation

Municipalities working together to obtain competitive prices for electric.
Spring ballot question.

TYPES OF FLOODING

- **Overbank Flooding -** Overbank flooding occurs when the creeks overtops its banks. These areas are known as the floodplain.

- **Street Flooding -** Street flooding can occur when inlets become clogged or when the storm exceeds the capacity of the sewer pipes to carry the water away. Some street flooding is expected and acceptable except where it can flood homes or damage property.

- **Overland Flooding –** Similar to street flooding overland flow or pocketing of water in low-lying areas can result in flood damage to homes. The causes can be a lack of proper grading where storm water is carried towards a building and may enter through window wells or other entrance points. Also the lack of adequate storm sewer outlets in low-lying areas may cause water to accumulate to the point where it may enter a home. This type of flooding is common in areas where there may be no formal or adequate storm sewer system or the grading has been altered due to settlement or filling activity that may redirect the flow of water.

- **Sanitary Sewer Backups -** Though technically the sanitary sewer should only carry sanitary wastes, storm water from many sources can enter the system. These can be obvious sources such as storm inlets, downspouts or sump pumps but there can be many sources that are not visible. These may be cracked pipes and/or leaky joints in both the public sewer mains and the private house services. Another major source of storm water entering the system can be from footing drains around the foundation that connect directly to the house service line. Basement back-ups usually only occur in homes that do not have overhead plumbing or are not protected by a back-flow device.

EVOLUTION IN THE DESIGN OF STORM DRAINAGE SYSTEMS

- Some areas of the Village do not have a formal storm sewer system relying on ditches, culverts and drain-tiles that may be inadequate and can easily deteriorate over time. This was common in areas developed before the 1930's and areas developed in unincorporated Cook County.
- Prior to 1958 storm sewers were commonly designed to handle only a 1-year storm event.
- Between 1958 & 1972 storm sewers were designed for a 5-year storm event.
- After 1972 storm sewers were designed to handle a 10-year event which is the current standard. Storm water detention basins became mandatory after 1972.
- Additionally the importance of adequate overland flow routing became more recognized overtime. This is extremely crucial in some areas such as where homes have depressed driveways or are lower than the street.
- Floodplain development regulations also became effective in the early 1970's.
- As a result, neighborhoods built after 1972 generally do not experience overland and overbank storm water flooding that older neighborhoods do.

DESIGN OF SANITARY SEWER SYSTEMS

- The design capacity of sanitary sewers are limited by outside agency regulations to carry only 100 GPCPD with a peaking factor added to adjust for variations in flows rates during the day.
- The regulations do allow for a nominal amount of Infiltration & Inflow (I&I) into the system.
- Infiltration is water that enters the pipes through leaky joints, cracked pipes etc.
- Inflow is water entering the system through direct connections of inlets, downspouts, footing drains, sump pumps etc.
- Excess water in the sanitary sewers can overload the system causing basement back-ups. The excess water can also overtax the sewerage treatment plants necessitating the discharge of raw sewerage into waterways.
- Palatine and all communities are mandated to reduce the amount of I&I into their sanitary sewer system.
- Palanois Park was originally built with “combined sewers” which carried both sanitary waste and storm water.
- All areas of the Village now have separate storm and sanitary sewers.

OWNERSHIP OF THE SANITARY SEWER SYSTEM

- The sanitary sewer system is comprised of portions that are publicly owned & maintained and portions that are owned and maintained by the property owner.
- The public portion are the sewer mains and manholes located within street right-of-ways or utility easements.
- The private portion are the sewer service line from the house to the main plus the footing drain-tile if directly connected to the sewer service line.
- Roughly 38% of the entire system is public, 62% is private. The portion that is privately owned is greater in areas where the footing drain-tiles are connected to the sewer service.
- Both portions require similar maintenance i.e. cleaning, repairs, lining and/or replacement.

EVOLUTION IN THE DESIGN OF HOUSE PLUMBING SYSTEMS

- Homes with basements built prior to 1958 typically had the footing drain-tile tied directly into the sanitary sewer service line.
- Homes built between 1958 and 1970 may or may not have a footing drain-tile sump pump.
- Separate footing drain sump pumps became mandatory after 1970.
- Older homes with basements generally have the floor drains, laundry tubs etc drain to the sewer by gravity. These homes are more susceptible to basement backups.
- Overhead plumbing systems intended to prevent sewer back-ups into basements also became mandatory after 1970.
- As a result homes built after 1970 are protected from sanitary sewer back-up into their basements.
- In 1989 the Village initiated a low interest loan program to assist homeowner in repairing their own sewer service lines and/or upgrading their plumbing system to prevent sewer back-ups. The program has been modified and expanded several times since.
- In 2007 the Village provided reimbursement to homeowners for certain types of improvements.

MAJOR RAINFALL TOTALS

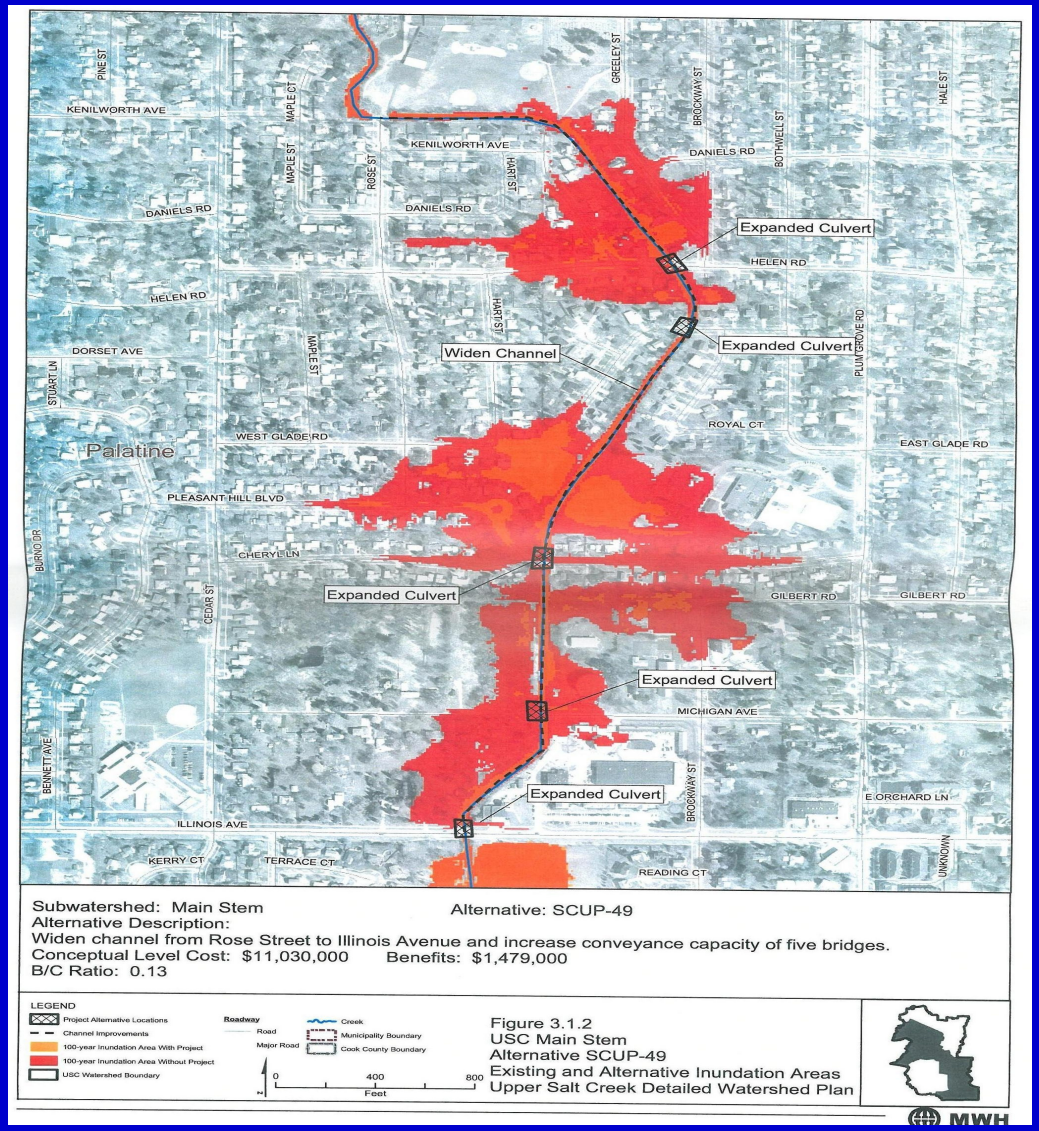
Rainfall in Inches for Given Recurrence Interval

Storm Duration	Recurrence Interval							Actual Storm Totals	
	1 year	5 year	10 ye	25 year	50 year	100 year			
1 hour	1.18	1.79	2.10	2.59 Aug 22 '01	3.04	3.56		August 22, 2001 September 19, 2001	2.8 inches in 1 hour 5.1 inches in 6 hours
3 hour	1.60	2.43	2.86 May 13 '10	3.53 Aug 23 '07	4.14	4.85	Over 5" July 23, 2011	October 11, 2001 October 12, 2001	0.9 inches in 8 hours 4.7 inches in 8 hours
6 hour	1.88	2.85	3.35 Aug 7 '07	4.13	4.85 Sept 19 '01 Oct 12 '01	5.68		August 7, 2007 August 19, 2007 August 23, 2007	3.7 inches in 6 hours 4.56 inches in 24 hours 3.50 inches in 3 hours
12 hour	2.18	3.31	3.89	4.79	5.62	6.59		August 13- August 23, 2007	> 11 inches in 10 days
24 hour	2.51	3.80	4.47 Aug 19 '07	5.51	6.46	Sept 13 '08 7.58 Aug 14 '87	Over 6.6" Sept 13 '08	September 13, 2008 May 13, 2010 July 23, 2011	> 6.59 inches in 12 hours > 3 inches in 5 hours >5 inches in 3 hours
48 hour	2.70	4.09	4.81	5.88	6.84	8.16			
5 day	3.25	4.91	5.70	6.93	8.04	9.96			
10 day	4.12	6.04	6.89	8.18	9.38	11.14 Aug '07			

Source: "Frequency Distribution and Hydroclimatic Characteristics of Heavy Rainfall in Illinois"

Bulletin 70 Illinois State Water Survey 1989

MWRD PROJECT



MWRD PROJECT COST ESTIMATE

Metropolitan Water Reclamation District of Greater Chicago
Upper Salt Creek Watershed Detailed Watershed Plan
Total Conceptual Cost Report

Alternative Name	SCUP-40
Problem Description	Project 1 addresses flooding issues, which include several homes, on the midstream of the
Strategy	The channel improvements include approximately 2,800 L.F. of clean river channel and requires 1 detention
District Minimum Criteria for Funding	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pipe under pavement (city): 30 to 36 inches / box culvert (39 to 50 ft2)	LF	216	$605	$131,475	$123,474	$0	Helen Road
Pipe under pavement (city): Box culvert (51 to 60 ft2)	lf	538	$661	$223,184	$207,539	$0	Linscott Court
Pipe under pavement (city): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	356	$609	$216,841	$201,752	$0	Pleasant Hill Boulevard
Pipe under pavement (city): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	348	$609	$211,828	$196,996	$0	Michigan Avenue
Pipe under pavement (city): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	347	$609	$211,462	$196,655	$0	Illinois Avenue
Channel treatment: Excavation	yd3	50300	$11	$521,468	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	50300	$12	$653,675	$0	$0	
Channel treatment: Riverbank stabilization	yd2	41000	$61	$2,626,370	$2,442,649	$626,011	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		$4,296,887	$3,368,166	$639,011
Utility Relocation	4%	$171,875		
Mobilization / General Conditions	5%	$214,840		
Subtotal with Percent Allowances		$4,683,606		
Contingency	30%	$1,405,082		
Profit	5%	$304,434		
Probable Construction Cost Estimate		**$6,393,123**		
Design Engineering, Geotechnical, and Construction Management	10%	$639,312		
Property Acquisition Cost		$0		
Total Conceptual Cost Estimate		$11,029,612		

Additional Comments