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EFFECT OF SUPPLEMENTAL DAMPING ON LRB AND FPS SEISMIC ISOLATORS UNDER NEAR-FAULT GROUND MOTIONS

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ABSTRACT -Numerical simulations are performed to assess the effects of near-fault ground motions on base-isolated buildings that consist of either lead-rubber (LRB) or friction-pendulum system (FPS) bearings in addition to supplemented viscous dampers. While LRB and FPS isolation systems have been applied for a number of years, the addition of supplemental damping devices is being currently considered for strong ground motions to reduce the isolator displacements. However, the main problem in this case is that the addition of damping may increase both internal deformation and absolute accelerations of the superstructure and thus may defeat many of the gains for which base isolation is intended.

In the present paper, a detailed and systematic investigation on the performance of LRB and FPS isolation systems, provided with supplemental viscous damping under the effect of near-fault ground motions, will be carried out by using commercial finite element software.

In the present analysis, a residential building with 20 floors is to be analyzed with columns, columns with LRB and FPS isolation systems. The building comes under zone 2 & zone 5. Moments, Storey Shear, Drift and Torsion will be compared for all the cases.

Earthquake load is becoming a great concern in our country as because not a single zone can be designated as earthquake resistant zone. One of the most important aspects is to construct a building structure, which can resist the seismic force efficiently. Study is made on the structural arrangement to find out the most optimized solution to produce an efficient safe earthquake resistant building.

A commercial package ETABS has been utilized for analyzing high-rise building of 20 stories in different zones with respect to three types of soils. The result has been compared using tables & graph to find out the most optimized solution. Concluding remark will be made on the basis of this analysis & comparison tables.

INTRODUCTION

The purpose of earthquake prevention of buildings is to provide the structural safety and comfort by controlling the internal forces and displacement within the particular limits. The common method for protecting the structures against the destructive effects of earthquakes is to damp the seismic energy for limiting the seismic energy by the structural elements, thus providing the resistance against the earthquake. In spite of using this method for a certain level of protection, the structure could be damaged for real sometimes. Another method for protection of the structures against the earthquake is to isolate the building from the ground and/or to install seismic energy dissipating elements at the appropriate places of the building. With this method, better protection could be provided, by designing correctly against the earthquake and therefore significant structural damage level could be minimized.
The earthquakes have been carried on to be an important factor that threatens the social and economic future of the countries, as we can observe the results of them. Thus, it is insisted on the resolutions that minimize the seismic effects of the buildings should demonstrate a high performance level in the expected earthquakes. The seismic isolators and energy dissipating devices are seen to be effective solutions within this context, which are placed in the building appropriately to damp the seismic energy or placed between the foundation and vertical structural systems damping the seismic energy under the ground of the building, thus decreasing the effects of lateral loads on top floors. Application of earthquake protection systems in buildings whether will be constructed and were constructed -especially the historical ones-, increases the importance of these technologies.

Seismic isolation

Seismic isolation is a technique used to reduce the effects of earthquake ground shaking on structure, their components and protect them from damaging. In this technique we use some hardwires that I will describe later to reduce structures lateral movement (Drift).

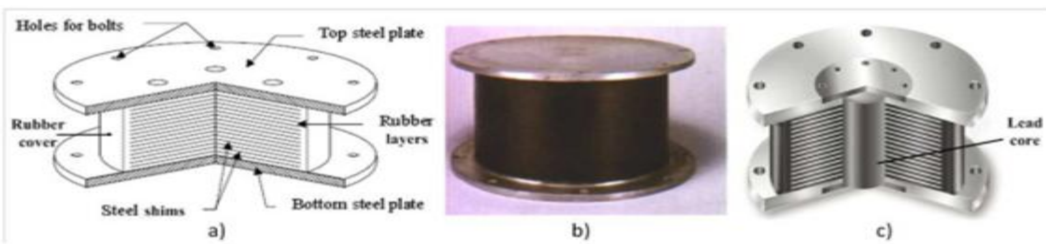
Seismic isolation is one of the most important concepts for earthquake engineering which can be defined as separating or decoupling the structure from its foundation.

BASE ISOLATION SYSTEMS

The most extensively used methods today are the methods which are based on the separation of the building and the ground, allowing a horizontal movement on the foundations of the building/on the bearings of vertical structural members. These systems will be called base isolation systems in general. Since seismic isolators are placed between the superstructure and the ground or to separate certain parts of the building, this type of seismic isolation is also defined as external isolation.

Rubber Bearings

These systems also have steel laminated rubber types and steel laminated rubber types with lead nucleus, along with the ones made of rubber and neoprene. The natural and artificial rubber bearings, which were used in bridge bearings, have later been developed and have been named elastomeric bearings. These bearings, which are used as seismic isolators, are widely used.



a) Natural Rubber Bearing (NRB), b) elastomeric bearing device, c) Lead Rubber Bearing (LRB)

Friction pendulum bearings:

Friction pendulum systems are the most extensively used kinematic systems especially in base isolation. Pendulum system consists of a steel globe placed in two steel concave curved surface or a cylindrical member with global contact surfaces. In these parts special metals are used.

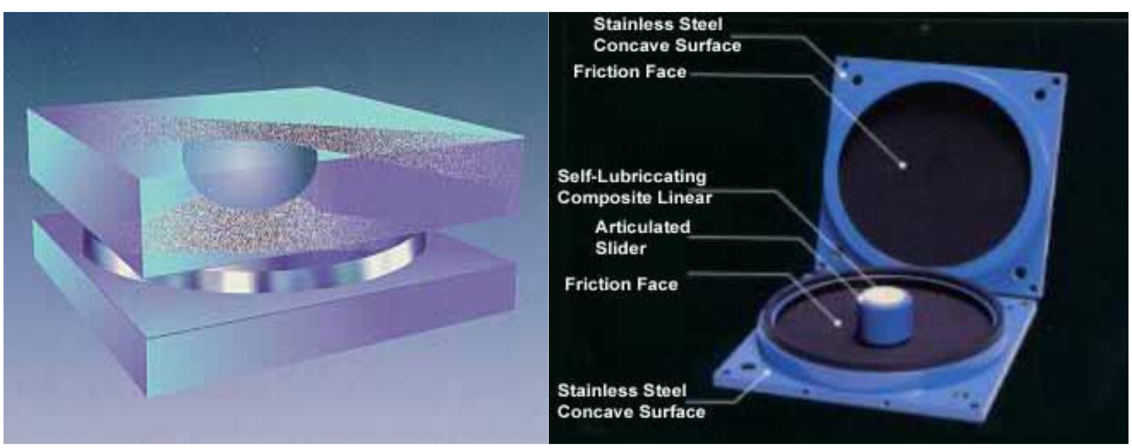


FIG.7.Cross section of a friction pendulum bearing   Detail of a friction pendulum bearing

LITERATURE REVIEW

1. Anoop Mokha, M. C. Constantinou, Associate Member, ASCE, A. M. Reinhorn and Victor A. Zayas Members, ASCE A shake-table study of the friction-pendulum isolation system, installed in a six-story, quarter-scale, 52-kip model structure, is presented. Two bearing materials are studied, one with a peak friction coefficient of 0.075 and another of 0.095. In both cases, the isolation system has a rigid-body mode period of 1 sec. The isolated structure is found to be capable of withstanding strong earthquake forces of different frequency content.

2. Arathy S. and Manju P.M reported that Friction pendulum bearings (FPBs) are a type of base isolation technique which essentially detaches structures from the ground to help stabilize the building from the unstable ground motion. FPBs allow

superstructures to rest atop two concave surfaces with a ball bearing as a buffer between the two surfaces. During an earthquake the bearings shift against the direction of earthquake, hence by keeping the building stable.

ISOLATION SYSTEMS

EVALUATION OF SEISMIC ISOLATION SYSTEMS

Seismic isolation is a technology that was developed in order to minimize the earthquake damage. It is a design method that is based on the principle of decreasing the earthquake energy affecting the structure by extending the structure period instead of increasing the resistance capacity of the building against the earthquake. In the buildings that are constructed by using this technology, the elastic behaviour of the building is ensured even during major earthquakes. Initially, the purpose was to prevent the collapsing of the buildings during an earthquake, but today, the designs that aim to maintain comfort in addition to earthquake security are on the foreground.

MODELLING

GEOMETRICAL PROPERTIES

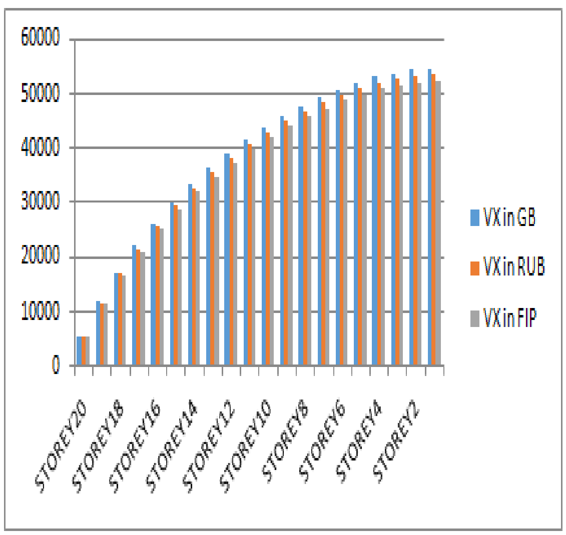
1. Height of typical Storey = 3 m
2. Height of ground Storey = 3 m
3. Length of the building = 30 m
4. Width of the building = 24 m
5. Span in both the direction = 30 m X 24 m
6. Height of the building = 60 m
7. Number of stores = 20
8. Wall thickness = 230 mm
9. Slab Thickness = 125 mm
10. Grade of the concrete = M 30
11. Grade of the steel = Fe 500
12. Thickness of shear wall = 230 mm
13. Support = Fixed, Lead Rubber, Friction Pendulum
14. Column sizes = 0.4m X 0.4m up to 40 Storey
15. Beam size = 0.25 m X 0.25 m

TABLES AND GRAPHS

STOREY SHEAR

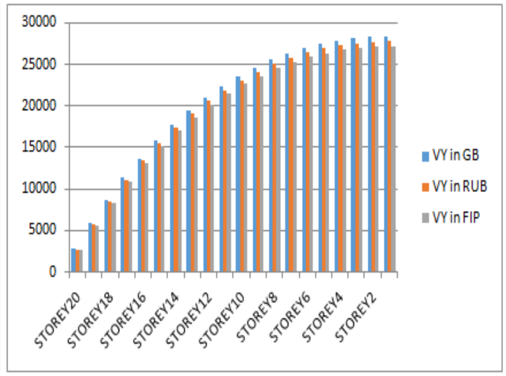
Story shear for loose soil in X-Direction

STOREY	VX in GB	VX in RUB	VX in FIP
STOREY20	5619.324	5502.464	5387.83
STOREY19	11856.21	11610.01	11368.13
STOREY18	17311.18	16952.13	16598.96
STOREY17	22073.75	21616.12	21165.78
STOREY16	26265.13	25720.4	25184.56
STOREY15	29997.47	29374.85	28762.87
STOREY14	33349.73	32657.07	31976.72
STOREY13	36370.57	35615.01	34873.03
STOREY12	39096.57	38284.5	37486.9
STOREY11	41564.81	40701.73	39853.78
STOREY10	43809.83	42900.46	42006.7
STOREY9	45852.25	44901.08	43965.64
STOREY8	47694.48	46706.2	45733.15
STOREY7	49329.28	48308.79	47302.35
STOREY6	50752.21	49704.4	48668.9
STOREY5	51964.4	50894.08	49833.78
STOREY4	52962.47	51874.75	50794.03
STOREY3	53728.2	52629.2	51532.76
STOREY2	54234.98	53131.41	52024.51
STOREY1	54477.55	53377.69	52265.65



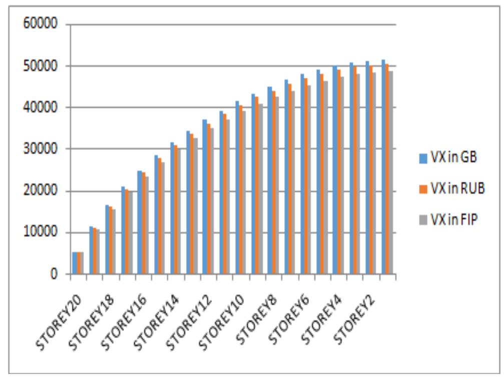
Story shear for loose soil in Y-Direction

STOREY	VY in GB	VY in RUB	VY in FIP
STOREY20	2680.99	2623.818	2569.155
STOREY19	5786.214	5662.999	5545.02
STOREY18	8635.009	8451.401	8275.33
STOREY17	11233.74	10995.25	10766.18
STOREY16	13593.68	13305.55	13028.35
STOREY15	15728.88	15396.02	15075.27
STOREY14	17654.13	17281.09	16921.07
STOREY13	19383.72	18974.69	18579.38
STOREY12	20930.66	20489.52	20062.66
STOREY11	22306.39	21836.76	21381.83
STOREY10	23520.69	23025.99	22546.29
STOREY9	24581.89	24065.38	23564.02
STOREY8	25497.07	24961.88	24441.84
STOREY7	26272.19	25721.38	25185.52
STOREY6	26912.36	26348.96	25800.02
STOREY5	27422.18	26849.19	26289.83
STOREY4	27806.47	27226.82	26659.6
STOREY3	28071.5	27488.07	26915.4
STOREY2	28227.53	27642.8	27066.91
STOREY1	28293.25	27709.69	27132.41



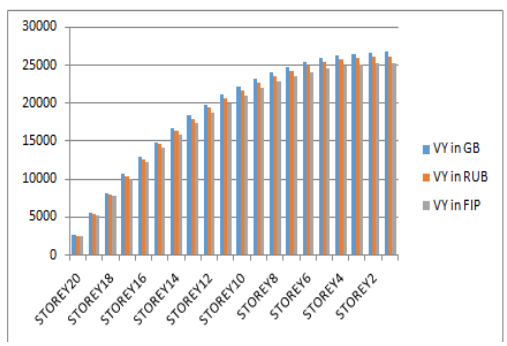
Story shear in medium soil

STOREY	VX in GB	VX in RUB	VX in FIP
STOREY20	5308.166	5194.239	5021.097
STOREY19	11192.03	10952.17	10587.1
STOREY18	16338.79	15989.02	15456.05
STOREY17	20832.81	20387.02	19707.45
STOREY16	24788.32	24257.7	23449.11
STOREY15	28310.96	27704.48	26781
STOREY14	31475.11	30800.42	29773.74
STOREY13	34326.57	33590.6	32470.92
STOREY12	36899.76	36108.73	34905.11
STOREY11	39229.61	38388.89	37109.26
STOREY10	41348.66	40462.84	39114.08
STOREY9	43276.34	42349.79	40938.13
STOREY8	45014.92	44052.18	42583.77
STOREY7	46557.59	45563.43	44044.65
STOREY6	47900.21	46879.38	45316.74
STOREY5	49043.86	48001.03	46400.99
STOREY4	49985.41	48925.53	47294.68
STOREY3	50707.69	49636.7	47982.14
STOREY2	51185.69	50110.07	48439.73
STOREY1	51414.44	50342.17	48664.09



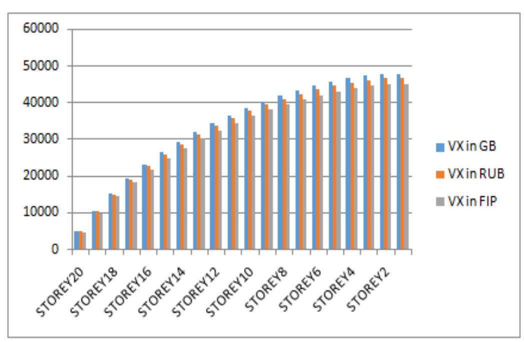
Story shear in Y-Direction

STOREY	VY in GB	VY in RUB	VY in FIP
STOREY20	2528.963	2473.342	2390.897
STOREY19	5454.182	5334.391	5156.578
STOREY18	8137.965	7959.486	7694.17
STOREY17	10586.3	10354.48	10009.33
STOREY16	12809.8	12529.72	12112.06
STOREY15	14821.67	14498.1	14014.83
STOREY14	16635.85	16273.21	15730.77
STOREY13	18265.77	17868.13	17272.52
STOREY12	19723.68	19294.8	18651.64
STOREY11	21020.32	20563.73	19878.27
STOREY10	22164.9	21683.91	20961.12
STOREY9	23165.24	22663.02	21907.59
STOREY8	24027.99	23507.59	22724
STOREY7	24758.75	24223.15	23415.71
STOREY6	25362.34	24814.46	23987.31
STOREY5	25843.07	25285.82	24442.96
STOREY4	26205.46	25641.7	24786.97
STOREY3	26455.42	25887.92	25024.99
STOREY2	26602.6	26033.77	25165.98
STOREY1	26664.59	26096.83	25226.94



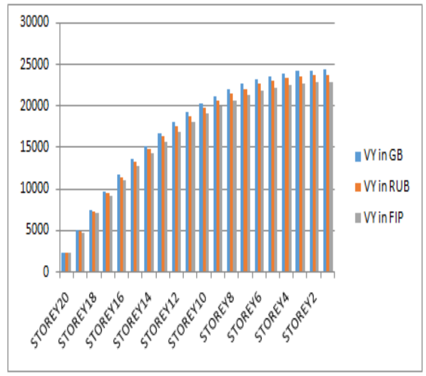
Story shear in Hard soil in X-Direction

STOREY	VX in GB	VX in RUB	VX in FIP
STOREY20	4914.358	4800.103	4626.605
STOREY19	10367.78	10127.07	9761.032
STOREY18	15145.11	14793.87	14259.16
STOREY17	19323.12	18875.18	18192.94
STOREY16	23005.82	22472.35	21660.1
STOREY15	26289.31	25679.3	24751.14
STOREY14	29241.03	28562.17	27529.8
STOREY13	31902.38	31161.61	30035.29
STOREY12	34304.44	33508.01	32296.88
STOREY11	36478.87	35632.21	34344.3
STOREY10	38455.26	37563.04	36205.34
STOREY9	40251.35	39318.01	37896.87
STOREY8	41869.33	40899.45	39421.15
STOREY7	43303.2	42301.58	40772.61
STOREY6	44549.54	43520.97	41947.92
STOREY5	45609.78	44558.94	42948.38
STOREY4	46481.5	45413.37	43771.92
STOREY3	47149.45	46069.87	44404.69
STOREY2	47591.07	46506.49	44825.53
STOREY1	47802.33	46720.52	45031.82



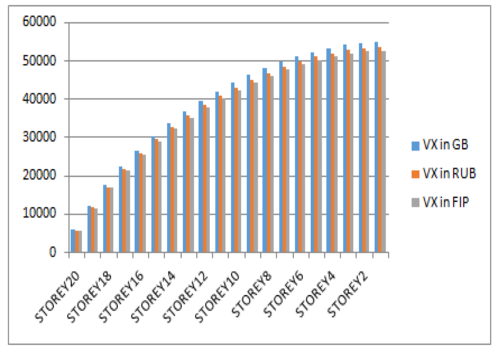
Story shear in Hard soil in Y-Direction

STOREY	VY in GB	VY in RUB	VY in FIP
STOREY20	2293.584	2238.957	2158.031
STOREY19	4948.314	4830.618	4656.017
STOREY18	7385.633	7210.208	6949.598
STOREY17	9610.771	9382.829	9043.691
STOREY16	11633.17	11357.68	10947.17
STOREY15	13464.66	13146.27	12671.11
STOREY14	15117.68	14760.71	14227.19
STOREY13	16604.2	16212.64	15626.64
STOREY12	17935.11	17512.65	16879.66
STOREY11	19119.93	18670.02	17995.2
STOREY10	20166.79	19692.69	18980.9
STOREY9	21082.57	20587.39	19843.27
STOREY8	21873.12	21359.88	20587.83
STOREY7	22543.39	22015	21219.28
STOREY6	23097.58	22556.93	21741.62
STOREY5	23539.47	22989.44	22158.49
STOREY4	23873.01	23316.41	22473.65
STOREY3	24103.42	23543	22692.05
STOREY2	24239.36	23677.5	22821.68
STOREY1	24296.78	23735.83	22877.91



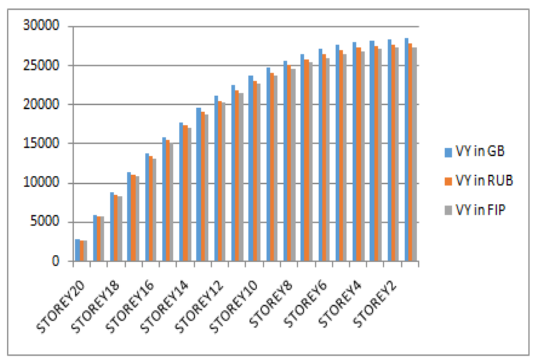
Storey Shear values in Low Soil of Zone – V in X – Direction

STOREY	VX in GB	VX in RUB	VX in FIP
STOREY20	5658.187	5511.6644	5425.094
STOREY19	11930.04	11621.4679	11438.93
STOREY18	17416.18	16966.1267	16699.64
STOREY17	22206.53	21632.8921	21293.11
STOREY16	26422.86	25740.1127	25335.82
STOREY15	30177.8	29397.5351	28935.79
STOREY14	33550.59	32682.671	32169.33
STOREY13	36590.07	35643.3613	35083.52
STOREY12	39332.93	38315.3794	37713.57
STOREY11	41816.42	40734.8783	40095.06
STOREY10	44075.2	42935.5738	42261.19
STOREY9	46129.99	44937.8303	44232
STOREY8	47983.22	46744.2583	46010.06
STOREY7	49627.61	48347.8637	47588.47
STOREY6	51058.76	49744.2324	48962.91
STOREY5	52277.83	50934.425	50134.41
STOREY4	53281.45	51915.4262	51100
STOREY3	54051.37	52670.0541	51842.78
STOREY2	54560.88	53172.3509	52337.18
STOREY1	54804.72	53418.6323	52579.6



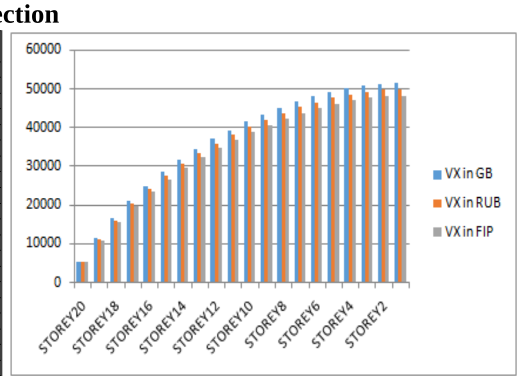
Storey Shear values in Low Soil of Zone – V in Y – Direction

STOREY	VY in GB	VY in RUB	VY in FIP
STOREY20	2695.723	2624.491	2583.268
STOREY19	5813.832	5660.381	5571.475
STOREY18	8674.584	8445.899	8313.241
STOREY17	11284.36	10987.25	10814.68
STOREY16	13654.48	13295.42	13086.6
STOREY15	15799.01	15384.1	15142.46
STOREY14	17732.82	17267.68	16996.46
STOREY13	19470.22	18960.07	18662.27
STOREY12	21024.26	20473.93	20152.35
STOREY11	22406.4	21820.4	21477.67
STOREY10	23626.46	23009.04	22647.64
STOREY9	24692.76	24047.99	23670.27
STOREY8	25612.4	24944.16	24552.37
STOREY7	26391.35	25703.45	25299.73
STOREY6	27034.74	26330.9	25917.32
STOREY5	27547.17	26831.06	26409.63
STOREY4	27933.45	27208.69	26781.33
STOREY3	28199.9	27469.96	27038.49
STOREY2	28356.78	27624.73	27190.83
STOREY1	28422.86	27691.64	27256.69



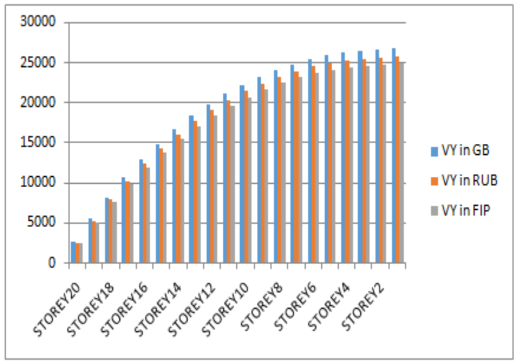
Storey Shear values in Medium Soil of Zone – V in X – Direction

STOREY	VX in GB	VX in RUB	VX in FIP
STOREY20	5308.166	5155.7	4981.912
STOREY19	11192.03	10854.49	10488.61
STOREY18	16338.79	15836.66	15302.84
STOREY17	20832.81	20188.22	19507.72
STOREY16	24788.32	24018.15	23208.55
STOREY15	28310.96	27426.1	26501.63
STOREY14	31475.11	30484.16	29456.61
STOREY13	34326.57	33239.51	32119.07
STOREY12	36899.76	35728.43	34524.1
STOREY11	39229.61	37985.49	36705.08
STOREY10	41348.66	40040.56	38690.87
STOREY9	43276.34	41910.53	40497.81
STOREY8	45014.92	43597.34	42127.77
STOREY7	46557.59	45095.89	43575.8
STOREY6	47900.21	46403.59	44839.42
STOREY5	49043.86	47520.9	45919.07
STOREY4	49985.41	48442.01	46809.14
STOREY3	50707.69	49147.44	47490.78
STOREY2	51185.69	49612.18	47939.85
STOREY1	51414.44	49838	48158.06



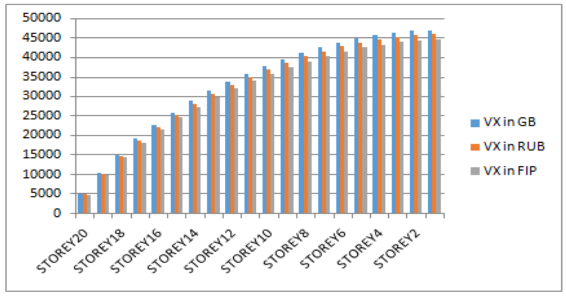
Storey Shear values in Medium Soil of Zone – V in Y – Direction

STOREY	VY in GB	VY in RUB	VY in FIP
STOREY20	2528.963	2417.467	2335.979
STOREY19	5454.182	5220.49	5044.519
STOREY18	8137.965	7801.059	7538.102
STOREY17	10586.3	10164.32	9821.706
STOREY16	12809.8	12317.25	11902.06
STOREY15	14821.67	14268.4	13787.44
STOREY14	16635.85	16027.88	15487.61
STOREY13	18265.77	17607.01	17013.52
STOREY12	19723.68	19017.42	18376.39
STOREY11	21020.32	20269.91	19586.65
STOREY10	22164.9	21373.74	20653.28
STOREY9	23165.24	22336.62	21583.7
STOREY8	24027.99	23164.9	22384.06
STOREY7	24758.75	23863.77	23059.37
STOREY6	25362.34	24437.51	23613.77
STOREY5	25843.07	24890.13	24051.13
STOREY4	26205.46	25226.47	24376.14
STOREY3	26455.42	25453.92	24595.93
STOREY2	26602.6	25584.5	24722.1
STOREY1	26664.59	25639.15	24774.91



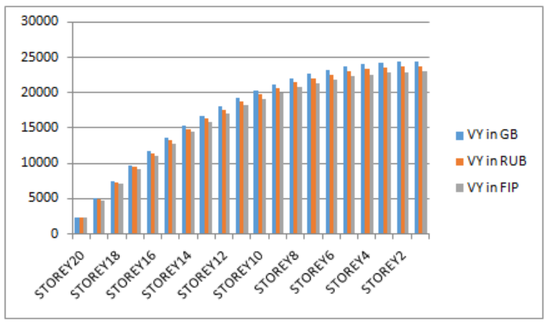
Storey Shear values in High Soil of Zone –V in X – Direction

STOREY	VX in GB	VX in RUB	VX in FIP
STOREY20	4846.586	4750.195	4605.372
STOREY19	10218.81	10000.77	9695.864
STOREY18	14918.03	14591.08	14146.23
STOREY17	19021.26	18600.38	18033.3
STOREY16	22632.81	22129.08	21454.41
STOREY15	25849.14	25268.99	24498.6
STOREY14	28738.15	28086.53	27230.24
STOREY13	31341.65	30625.16	29691.47
STOREY12	33691.08	32918.33	31914.72
STOREY11	35818.34	34997.87	33930.86
STOREY10	37753.12	36891.3	35766.56
STOREY9	39513.18	38614.19	37436.93
STOREY8	41100.58	40168.34	38943.69
STOREY7	42509.1	41549.02	40282.28
STOREY6	43734.97	42753.87	41450.39
STOREY5	44779.18	43783.3	42448.44
STOREY4	45638.85	44631.97	43271.24
STOREY3	46298.33	45281.91	43901.36
STOREY2	46734.76	45710.09	44316.49
STOREY1	46943.62	45918.15	44518.21



Storey Shear values in High Soil of Zone – V in Y – Direction

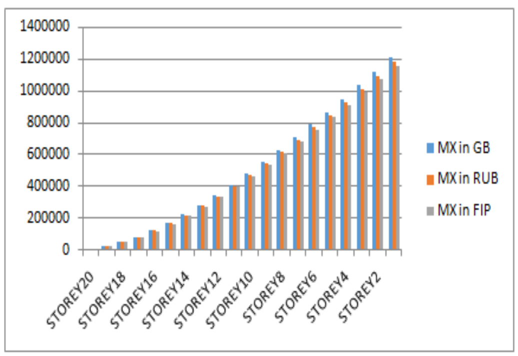
STOREY	VY in GB	VY in RUB	VY in FIP
STOREY20	2309.053	2227.329	2159.422
STOREY19	4979.905	4809.89	4663.247
STOREY18	7430.316	7187.493	6968.362
STOREY17	9665.752	9364.882	9079.367
STOREY16	11695.9	11348.48	11002.49
STOREY15	13532.83	13146.16	12745.37
STOREY14	15189.25	14767.26	14317.04
STOREY13	16677.44	16222.19	15727.61
STOREY12	18008.58	17521.67	16987.47
STOREY11	19192.46	18675.64	18106.26
STOREY10	20237.51	19692.66	19092.27
STOREY9	21150.87	20579.81	19952.38
STOREY8	21938.6	21342.94	20692.24
STOREY7	22605.82	21986.84	21316.51
STOREY6	23156.92	22515.46	21829.01
STOREY5	23595.85	22932.48	22233.32
STOREY4	23926.72	23242.36	22533.76
STOREY3	24154.95	23451.93	22736.93
STOREY2	24289.33	23572.24	22853.57
STOREY1	24345.93	23622.58	22902.38



STOREY MOMENT

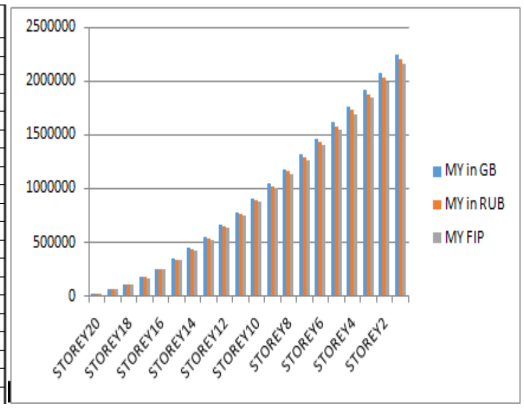
Storey Moment values in Low Soil of Zone – II in X – Direction

STOREY	MX in GB	MX in RUB	MX in FIP
STOREY20	8042.971	7871.4545	7707.466
STOREY19	25399.08	24857.9711	24340.1
STOREY18	51292.62	50200.9451	49155.09
STOREY17	84961.13	83154.7174	81422.33
STOREY16	125670.2	123001.0734	120438.6
STOREY15	172723.5	169058.8577	165536.8
STOREY14	225467.2	220688.4196	216090.7
STOREY13	283290.3	277292.2183	271515.3
STOREY12	345623.8	338313.1233	331264.9
STOREY11	411936.7	403231.5283	394830.9
STOREY10	481733.3	471562.0546	461737.8
STOREY9	554549.3	542850.4313	531541
STOREY8	629950	616670.9059	603823.6
STOREY7	707527.4	692624.3138	678194.6
STOREY6	786899.5	770336.8596	754288.2
STOREY5	867709.7	849459.7872	831762.7
STOREY4	949627.8	929670.3031	910302.2
STOREY3	1032353	1010674	989618.8
STOREY2	1115620	1092213	1069459
STOREY1	1207583	1182273	1157642



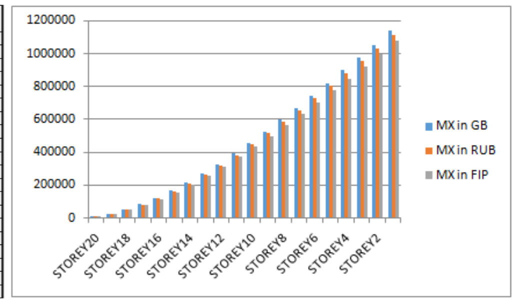
Storey Moment values in Low Soil of Zone – II in Y – Direction

STOREY	MY in GB	MY in RUB	MY FIP
STOREY20	16857.97	16507.3931	16163.49
STOREY19	52407.69	51318.972	50249.83
STOREY18	104248.2	102084.6058	99957.84
STOREY17	170195.4	166665.4302	163193.2
STOREY16	248392.8	243242.5209	238175
STOREY15	337324.2	330329.973	323448.1
STOREY14	435751.3	426714.2305	417824.4
STOREY13	542628.1	531370.9675	520300.7
STOREY12	657039.5	643404.8287	630000.6
STOREY11	778177.3	762024.8526	746149.3
STOREY10	905333	886537.9843	868068.4
STOREY9	1037886	1016336	995162.8
STOREY8	1175273	1150871	1126894
STOREY7	1316962	1289620	1262753
STOREY6	1462429	1432073	1402238
STOREY5	1611163	1577731	1544861
STOREY4	1762665	1726105	1690145
STOREY3	1916447	1876720	1837622
STOREY2	2072023	2029103	1986830
STOREY1	2244662	2198214	2152418



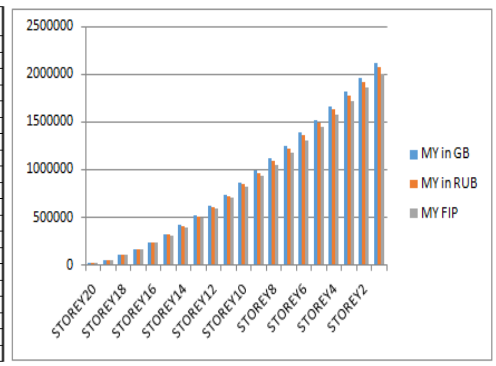
Moment values in Medium Soil of Zone – II in X – Direction

STOREY	MX in GB	MX in RUB	MX in FIP
STOREY20	7586.889	7420.0254	7172.691
STOREY19	23947.04	23420.861	22640.17
STOREY18	48350.11	47288.7344	45712.44
STOREY17	80078.16	78322.0267	75711.29
STOREY16	118439.7	115844.921	111983.4
STOREY15	162779	159216.4538	153909.2
STOREY14	212480.2	207834.6939	200906.9
STOREY13	266968.3	261137.3059	252432.7
STOREY12	325707	318599.9445	307979.9
STOREY11	388196.5	379733.5343	367075.7
STOREY10	453969.5	444081.166	429278.5
STOREY9	522588.9	511215.1617	494174.7
STOREY8	593645	580734.6418	561376.8
STOREY7	666753.3	652263.7126	630521.6
STOREY6	741553.8	725450.3252	701268.6
STOREY5	817710.4	799965.97	773300.4
STOREY4	894911.8	875506.5509	846323
STOREY3	972874.3	951795.122	920068.6
STOREY2	1051348	1028588	994301.3
STOREY1	1138017	1113405	1076291



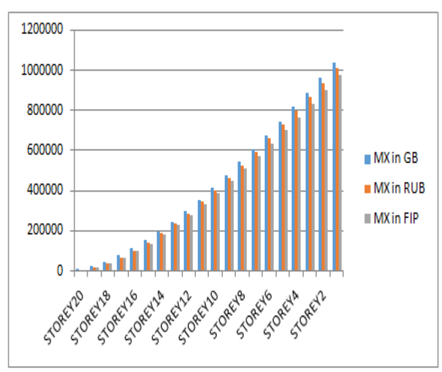
Storey Moment values in Medium Soil of Zone – II in Y – Direction

STOREY	MY in GB	MY in RUB	MY FIP
STOREY20	15924.5	15582.7161	15063.29
STOREY19	49482.77	48421.8317	46807.77
STOREY18	98411.41	96303.3201	93093.21
STOREY17	160651.3	157212.1833	151971.8
STOREY16	234452.2	229434.7424	221786.9
STOREY15	318384.6	311570.8901	301185.2
STOREY14	411280.5	402476.8933	389061
STOREY13	512153.2	501187.0938	484480.9
STOREY12	620139.3	606857.1727	586628.6
STOREY11	734475.7	718741.0364	694783
STOREY10	854493.5	836184.739	808311.9
STOREY9	979606.2	958614.6176	926660.8
STOREY8	1109283	1085512	1049328
STOREY7	1243019	1216385	1175838
STOREY6	1380322	1350751	1305726
STOREY5	1520707	1488138	1438533
STOREY4	1663702	1628087	1573817
STOREY3	1808849	1770148	1711143
STOREY2	1955687	1913874	1850078
STOREY1	2118628	2073377	2004265



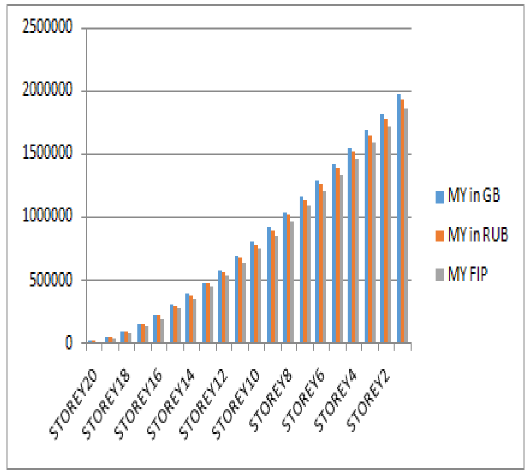
Storey Moment values in High Soil of Zone – II in X – Direction

STOREY	MX in GB	MX in RUB	MX in FIP
STOREY20	6880.751	6716.8707	6474.092
STOREY19	21723.5	21206.585	20440.08
STOREY18	43870.47	42827.528	41279.55
STOREY17	72674.52	70948.4551	68384.05
STOREY16	107511.9	104960.9231	101167.2
STOREY15	147790.7	144287.5462	139072.3
STOREY14	192955	188385.7609	181576.6
STOREY13	242484.8	236748.2858	228191.1
STOREY12	295895.2	288901.6226	278459.4
STOREY11	352733.2	344403.5665	331955.2
STOREY10	412575.1	402840.3965	388279.9
STOREY9	475023.6	463824.2427	447059.5
STOREY8	539705.7	526990.932	507943.1
STOREY7	606271.2	591998.4097	570600.9
STOREY6	674391.1	658525.7736	634723.6
STOREY5	743758	726273.0592	700022.2
STOREY4	814086.6	794962.0859	766228.5
STOREY3	885116.3	864338.9955	833097.8
STOREY2	956617.1	934179.4662	900413.9
STOREY1	1035588	1011322	974768



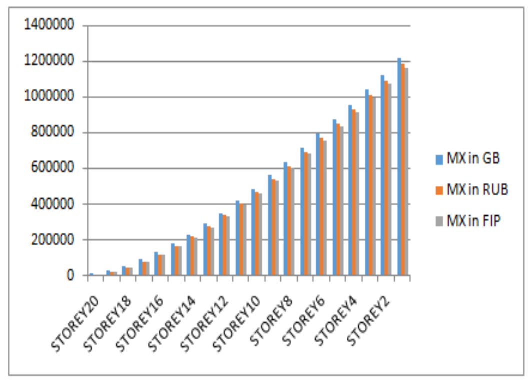
Storey Moment values in High Soil of Zone – II in Y – Direction

STOREY	MY in GB	MY in RUB	MY FIP
STOREY20	14743.07	14400.308	13879.81
STOREY19	45829.91	44765.4565	43147.43
STOREY18	91184.47	89068.4387	85849.1
STOREY17	148916.3	145462.7566	140205.1
STOREY16	217416.5	212375.8488	204699.6
STOREY15	295367.9	288520.2059	278091.8
STOREY14	381691.5	372841.0029	359364.8
STOREY13	475472.4	464444.5867	447657.4
STOREY12	575907.3	562546.8266	542213.8
STOREY11	682283.6	666452.2769	642363.6
STOREY10	793974.3	775548.9326	747517
STOREY9	910427.1	889297.709	857154.4
STOREY8	1031140	1007210	970804.4
STOREY7	1155638	1128820	1088020
STOREY6	1283454	1253676	1208362
STOREY5	1414131	1381331	1331403
STOREY4	1547227	1511354	1456727
STOREY3	1682309	1643325	1583928
STOREY2	1818950	1776828	1712605
STOREY1	1970556	1924967	1855390



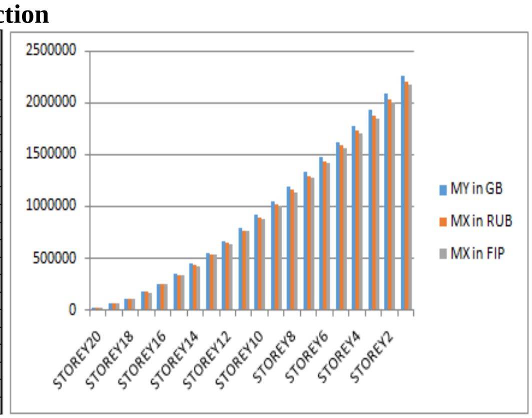
Storey Moment values in Low Soil of Zone – V in X – Direction

STOREY	MX in GB	MX in RUB	MX in FIP
STOREY20	8087.17	7873.471	7749.804
STOREY19	25526.12	24852.14	24461.79
STOREY18	51538.32	50178.6	49390.46
STOREY17	85358.53	83108.37	81803.01
STOREY16	126249.6	122924.3	120993.6
STOREY15	173512.6	168946.3	166292.7
STOREY14	226491.2	220535.7	217071.8
STOREY13	284572.2	277095.7	272743.4
STOREY12	347184.2	338069.9	332759.9
STOREY11	413794.2	402939.5	396610.6
STOREY10	483904.3	471219.5	463818.1
STOREY9	557048.6	542456.1	533935.8
STOREY8	632790.1	616224	606545.1
STOREY7	710719.2	692124.3	681253.2
STOREY6	790452.1	769783.4	757692.6
STOREY5	871630.4	848852.8	835520
STOREY4	953922.5	929009.7	914418
STOREY3	1037026	1009960	994097.1
STOREY2	1120674	1091446	1074303
STOREY1	1213058	1181446	1162890



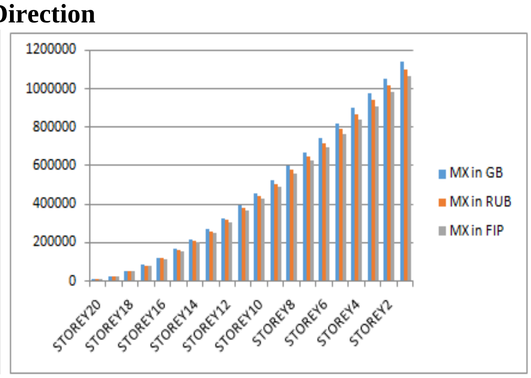
Storey Moment values in Low Soil of Zone – V in Y – Direction

STOREY	MY in GB	MX in RUB	MX in FIP
STOREY20	16974.56	16534.99	16275.28
STOREY19	52745.68	51380.94	50573.91
STOREY18	104900.7	102188.5	100583.5
STOREY17	171244.7	166819.6	164199.4
STOREY16	249912	243455.8	239631.8
STOREY15	339379	330611.3	325418.5
STOREY14	438400.5	427072.7	420364.8
STOREY13	545924.7	531815.2	523462.1
STOREY12	661031.4	643942.9	633828.6
STOREY11	782907.1	762664.1	750685.1
STOREY10	910839	887284.9	873348.5
STOREY9	1044202	1017197	1001220
STOREY8	1182429	1151849	1133757
STOREY7	1324984	1290719	1270446
STOREY6	1471341	1433297	1410784
STOREY5	1620982	1579080	1554277
STOREY4	1773407	1727581	1700446
STOREY3	1928125	1878323	1848821
STOREY2	2084646	2030833	1998935
STOREY1	2258331	2200084	2165527



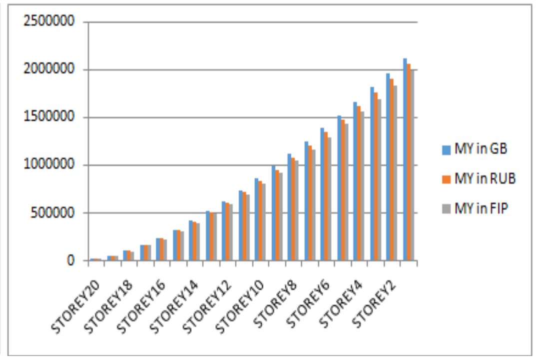
Storey Moment values in Medium Soil of Zone – V in X – Direction

STOREY	MX in GB	MX in RUB	MX in FIP
STOREY20	7586.889	7252.4	7007.937
STOREY19	23947.04	22912.05	22139.74
STOREY18	48350.11	46307.34	44746.42
STOREY17	80078.16	76778.64	74190.6
STOREY16	118439.7	113684	109851.9
STOREY15	162779	156403.9	151131.9
STOREY14	212480.2	204346.2	197458.1
STOREY13	266968.3	256949.7	248288.5
STOREY12	325707	313687.6	303113.8
STOREY11	388196.5	374067.3	361458.3
STOREY10	453969.5	437629.3	422877.8
STOREY9	522588.9	503944.2	486957.4
STOREY8	593645	572610	553308.5
STOREY7	666753.3	643249.5	621566.9
STOREY6	741553.8	715509.3	691391
STOREY5	817710.4	789058.4	762460.9
STOREY4	894911.8	863589.9	834480.1
STOREY3	972874.3	938824.5	907178.7
STOREY2	1051348	1014518	980320.8
STOREY1	1138017	1098082	1061068



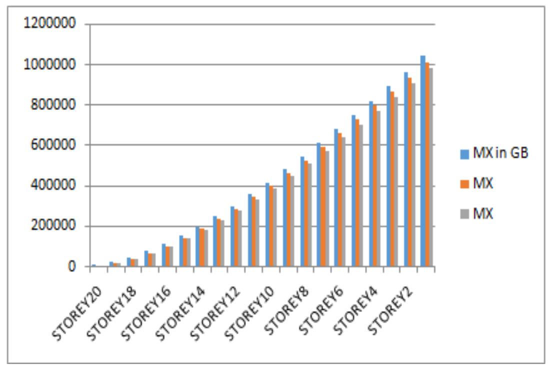
Storey Moment values in Medium Soil of Zone – V in Y – Direction

STOREY	MY in GB	MY in RUB	MY in FIP
STOREY20	15924.5	15467.1	14945.74
STOREY19	49482.77	48011.66	46393.29
STOREY18	98411.41	95432.96	92216.12
STOREY17	160651.3	155743.5	150493.7
STOREY16	234452.2	227252.4	219592.2
STOREY15	318384.6	308570.2	298169
STOREY14	411280.5	398555.4	385120.9
STOREY13	512153.2	496244.5	479517.1
STOREY12	620139.3	600801.1	580549.4
STOREY11	734475.7	711493.1	687510.2
STOREY10	854493.5	827681.5	799782.1
STOREY9	979606.2	948805	916822.8
STOREY8	1109283	1074354	1038140
STOREY7	1243019	1203843	1163264
STOREY6	1380322	1336799	1291738
STOREY5	1520707	1472759	1423116
STOREY4	1663702	1611273	1556961
STOREY3	1808849	1751895	1692843
STOREY2	1955687	1894177	1830329
STOREY1	2118628	2052085	1982913



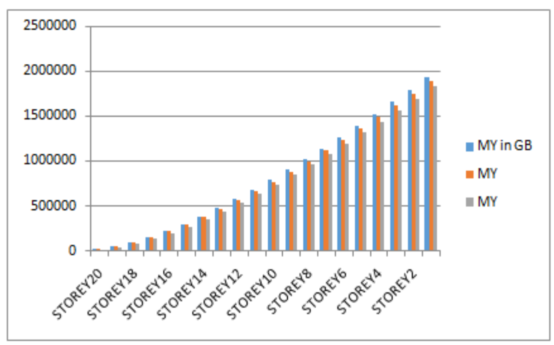
Storey Moment values in High Soil of Zone –V in X – Direction

STOREY	MX in GB	MX in RUB	MX in FIP
STOREY20	6927.159	6681.986	6478.267
STOREY19	21864.69	21109.98	20466.38
STOREY18	44145.75	42665.19	41364.42
STOREY17	73114.84	70739.87	68583.17
STOREY16	108140.6	104742.6	101549.2
STOREY15	148624.3	144102.5	139709.1
STOREY14	194003.6	188274	182534
STOREY13	243753.6	236740.2	229522.5
STOREY12	297384.7	289015.5	280204.1
STOREY11	354440.2	344646.3	334138.8
STOREY10	414493.9	403209	390916.1
STOREY9	477146.4	464308.2	450152.4
STOREY8	542023.7	527573.2	511488.7
STOREY7	608774.8	592656.9	574588
STOREY6	677070.9	659233.3	639134.7
STOREY5	746605.2	726997.6	704833.1
STOREY4	817093.4	795667.1	771409
STOREY3	888276.6	864984.4	838612.9
STOREY2	959926.4	934724.4	906226.7
STOREY1	1039059	1011716	980870.6



Storey Moment values in High Soil of Zone –V in Y – Direction

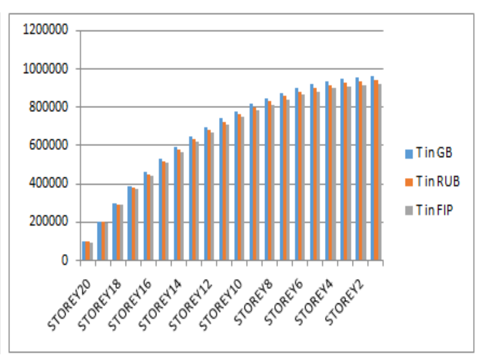
STOREY	MY in GB	MY in RUB	MY in FIP
STOREY20	14539.76	14250.59	13816.12
STOREY19	45179.92	44235.47	42886.82
STOREY18	89853.9	87927	85246.3
STOREY17	146681.6	143494	139119.2
STOREY16	214065.1	209378.6	202995.1
STOREY15	290699	284300.7	275633
STOREY14	375517	367208.3	356013
STOREY13	467618.2	457214	443274.5
STOREY12	566214.1	553547.1	536670.7
STOREY11	670608.2	655533	635547.2
STOREY10	780189.8	762582.9	739333.5
STOREY9	894423.1	874179.9	847528.1
STOREY8	1012823	989854	959675.5
STOREY7	1134931	1109158	1075343
STOREY6	1260294	1231657	1194107
STOREY5	1388471	1356924	1315555
STOREY4	1519033	1484544	1439284
STOREY3	1651558	1614106	1564895
STOREY2	1785627	1745197	1691990
STOREY1	1934399	1890685	1833042



Torsion

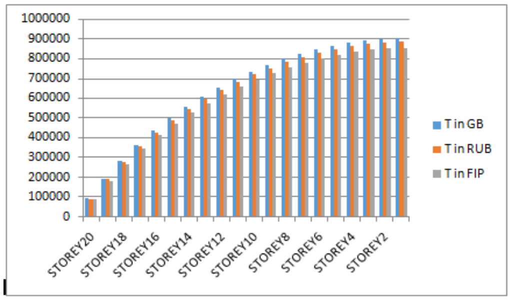
Torsion values in Low Soil of Zone II

STOREY	T in GB	T in RUB	T in FIP
STOREY20	94579.52	92594.11	90665.06
STOREY19	201674.7	197447.6	193334.1
STOREY18	297424.2	291199.1	285132.4
STOREY17	382678.1	374677.2	366871.4
STOREY16	458712.2	449127.9	439771.1
STOREY15	526821.2	515818.2	505072
STOREY14	588044.1	575766.8	563771.7
STOREY13	643137.4	629716.2	616597.1
STOREY12	692707.6	678260.2	664129.8
STOREY11	737316.3	721947.7	706907.1
STOREY10	777457.4	761262.1	745402.5
STOREY9	813463	796530.5	779936.2
STOREY8	845467.8	827887.9	810640.2
STOREY7	873486.2	855349.8	837530.1
STOREY6	897524	878922.6	860611.7
STOREY5	917606.5	898631.8	879910.3
STOREY4	933700.9	914449	895398
STOREY3	945652.6	926229.2	906932.7
STOREY2	953299.1	933810.6	914356.2
STOREY1	956838.7	937407.7	917878.4



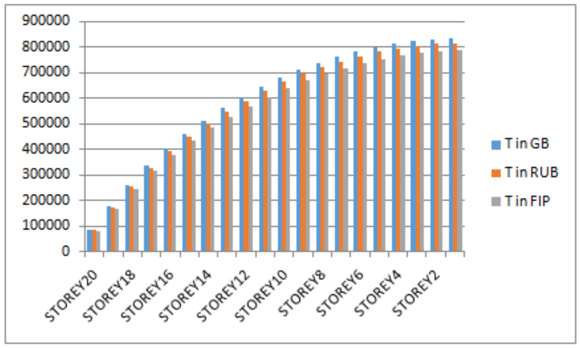
Torsion values in Medium Soil of Zone –II

STOREY	T in GB	T in RUB	T in FIP
STOREY20	89305.57	87371.31	84458.93
STOREY19	190293.4	186178	179972.1
STOREY18	280587.6	274527.7	265376.7
STOREY17	360989.2	353201	341427.6
STOREY16	432700.9	423371.6	409259.2
STOREY15	496942.6	486232.3	470024.6
STOREY14	554693	542742.2	524650.8
STOREY13	606664.2	593599.7	573813
STOREY12	653427.2	639363.4	618051.3
STOREY11	695510.9	680550.1	657865.1
STOREY10	733380.4	717614.5	693694
STOREY9	767348.4	750864.4	725835.5
STOREY8	797541.6	780426.6	754412.4
STOREY7	823973.5	806316.1	779438.9
STOREY6	846649.7	828538.5	800920.6
STOREY5	865594.4	847118.3	818881.1
STOREY4	880776.6	862029	833294.7
STOREY3	892050.8	873133.9	844029.4
STOREY2	899263.8	880280.7	850938
STOREY1	902602.5	883671.5	854215.8



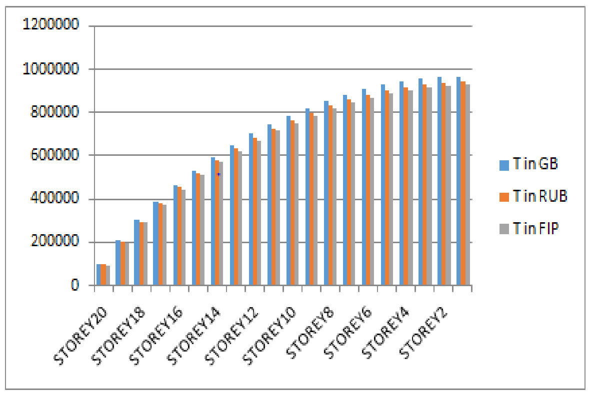
Torsion values in High Soil of Zone –II

STOREY	T in GB	T in RUB	T in FIP
STOREY20	82175.78	80248.41	77347.87
STOREY19	175157.8	171055.6	164872.8
STOREY18	258359.1	252316.2	243196.4
STOREY17	332508	324738.6	313001.1
STOREY16	398700.7	389390.6	375316.2
STOREY15	458048.7	447356.9	431187.4
STOREY14	511440.5	499506.8	481452.3
STOREY13	559520.2	546470.5	526718.6
STOREY12	602803.2	588751.6	567471.4
STOREY11	641767.7	626816.3	604160.3
STOREY10	676835.2	661076	637181.7
STOREY9	708288.5	691808.7	666803.6
STOREY8	736241.8	719128.4	693135.8
STOREY7	760706.8	743048.1	716190.9
STOREY6	781690.2	763574.5	735975.4
STOREY5	799216.4	780732.6	752513.3
STOREY4	813259.7	794500.2	765783.3
STOREY3	823687.6	804753.7	775666.2
STOREY2	830360.3	811354.3	782028.3
STOREY1	833450.9	814488.6	785049.2



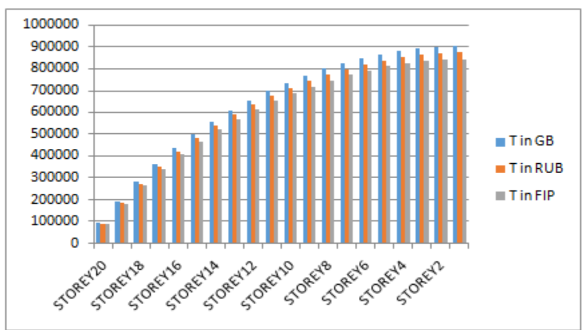
Torsion values in Low Soil of Zone –V

STOREY	T in GB	T in RUB	T in FIP
STOREY20	95194.4	92710.66	91254.48
STOREY19	202841.4	197555.5	194452.6
STOREY18	299089.6	291304.3	286728.9
STOREY17	384792.9	374785.5	368898.8
STOREY16	461233.3	449244.3	442188.1
STOREY15	529711.1	515946.5	507842.7
STOREY14	591269.5	575909.8	566864.1
STOREY13	646667.7	629875.2	619981.9
STOREY12	696514.3	678435.7	667779.6
STOREY11	741373	722139.2	710796.7
STOREY10	781739.7	761468.7	749508.4
STOREY9	817947.5	796750.5	784236.1
STOREY8	850131.7	828119.4	815112.3
STOREY7	878306.5	855591	842152.4
STOREY6	902478	879171.4	865362.4
STOREY5	922671.8	898886.7	884768
STOREY4	938855.2	914708.6	900341.4
STOREY3	950872.8	926492	911939.8
STOREY2	958561.5	934075.7	919404.3
STOREY1	962120.3	937673.6	922945.8



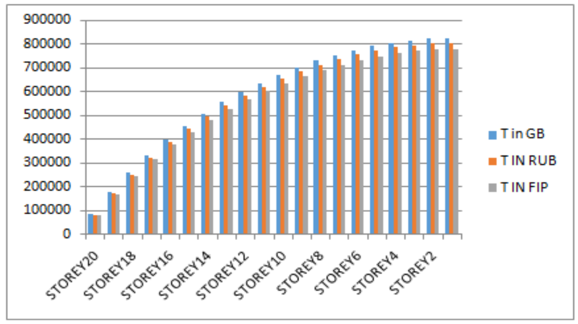
Torsion values in Medium Soil of Zone –V

STOREY	T in GB	T in RUB	T in FIP
STOREY20	89305.57	86045.51	83145.1
STOREY19	190293.4	183357.5	177176.9
STOREY18	280587.6	270589.4	261468.4
STOREY17	360989.2	348476.1	336729.7
STOREY16	432700.9	418024.5	403933.8
STOREY15	496942.6	480291.3	464101.7
STOREY14	554693	536201.1	518126.9
STOREY13	606664.2	586487.7	566718.5
STOREY12	653427.2	631743.8	610449.1
STOREY11	695510.9	672481.9	649814
STOREY10	733380.4	709132.2	685228.9
STOREY9	767348.4	741990	716979.1
STOREY8	797541.6	771190.1	745194.9
STOREY7	823973.5	796755.2	769898.2
STOREY6	846649.7	818677.5	791081.6
STOREY5	865594.4	836946	808734.3
STOREY4	880776.6	851499	822796.7
STOREY3	892050.8	862197.8	833135
STOREY2	899263.8	868945.9	839655.6
STOREY1	902602.5	872078.5	842682.6



Torsion values in High Soil of Zone –V

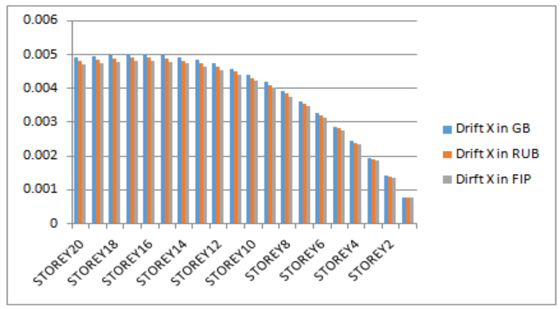
STOREY	T in GB	T IN RUB	T IN FIP
STOREY20	81539.87	79277.89	76860.88
STOREY19	173746.2	168936.1	163785.6
STOREY18	256188.6	249307.1	241706.3
STOREY17	329598.8	321067.9	311279.2
STOREY16	395074.7	385146.1	373403.9
STOREY15	453730.2	442515.6	429024.3
STOREY14	506458.8	494028	478966.2
STOREY13	553910.7	540359.5	523885.1
STOREY12	596607.4	582056.1	564310.5
STOREY11	635031.7	619590.1	600700.2
STOREY10	669608.2	653357.8	633438.3
STOREY9	700622.4	683631.3	662788.8
STOREY8	728190.1	710534.7	688872
STOREY7	752323.6	734089	711708.3
STOREY6	773028	754287.1	731290.6
STOREY5	790325.3	771118.8	747609
STOREY4	804187.3	784527.1	760608.6
STOREY3	814481.1	794384.5	770165.5
STOREY2	821067	800601.8	776193.2
STOREY1	824115.3	803488.1	778991.5



Story Drift

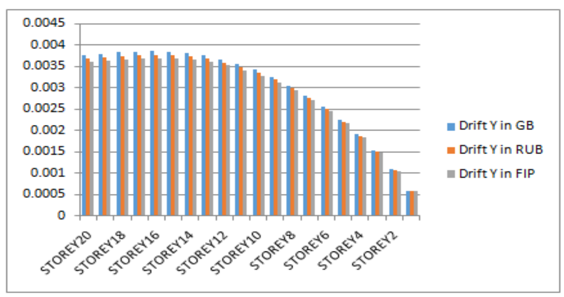
Storey Drift values in Low Soil of Zone–II in X – Direction

STOREY	Drift X in GB	Drift X in RUB	Dirft X in FIP
STOREY20	0.00489	0.00479	0.00469
STOREY19	0.004936	0.004834	0.004734
STOREY18	0.004971	0.004869	0.004768
STOREY17	0.004992	0.004889	0.004787
STOREY16	0.004992	0.00489	0.004788
STOREY15	0.004969	0.004867	0.004765
STOREY14	0.004918	0.004817	0.004717
STOREY13	0.004838	0.004738	0.004639
STOREY12	0.004724	0.004627	0.004531
STOREY11	0.004576	0.004482	0.004388
STOREY10	0.004391	0.004301	0.004211
STOREY9	0.004167	0.004082	0.003997
STOREY8	0.003904	0.003824	0.003744
STOREY7	0.003599	0.003526	0.003452
STOREY6	0.003252	0.003186	0.003119
STOREY5	0.00286	0.002802	0.002744
STOREY4	0.002423	0.002373	0.002324
STOREY3	0.001936	0.001898	0.001858
STOREY2	0.001399	0.001367	0.001338
STOREY1	0.00075	0.00076	0.000744



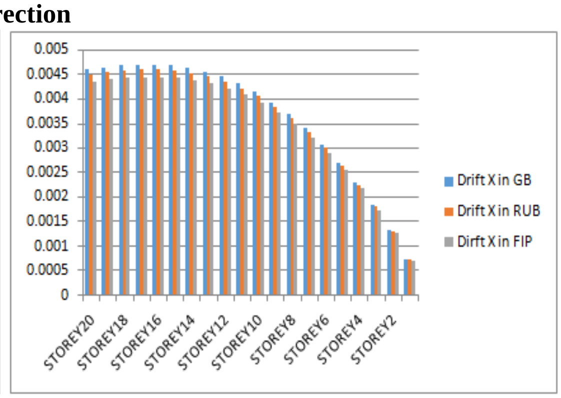
Storey Drift values in Low Soil of Zone – II in Y – Direction

STOREY	Drift Y in GB	Drift Y in RUB	Drift Y in FIP
STOREY20	0.003758	0.003679	0.003603
STOREY19	0.003792	0.003713	0.003635
STOREY18	0.00382	0.003741	0.003663
STOREY17	0.00384	0.003759	0.003681
STOREY16	0.003845	0.003764	0.003686
STOREY15	0.003832	0.003752	0.003674
STOREY14	0.003799	0.00372	0.003643
STOREY13	0.003743	0.003665	0.003589
STOREY12	0.003662	0.003585	0.003511
STOREY11	0.003553	0.003479	0.003406
STOREY10	0.003415	0.003344	0.003274
STOREY9	0.003247	0.003179	0.003113
STOREY8	0.003046	0.002983	0.002921
STOREY7	0.002813	0.002754	0.002697
STOREY6	0.002544	0.002492	0.00244
STOREY5	0.00224	0.002194	0.002148
STOREY4	0.001898	0.001859	0.00182
STOREY3	0.001514	0.001484	0.001453
STOREY2	0.001086	0.001062	0.001039
STOREY1	0.000561	0.00057	0.000558



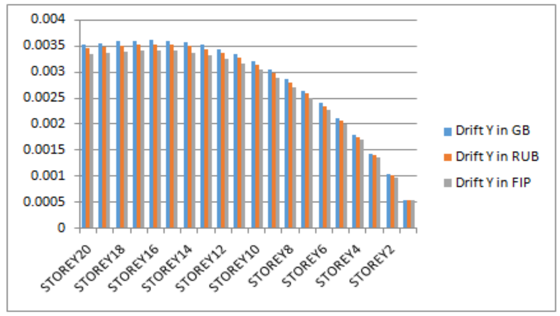
Storey Drift values in Medium Soil of Zone – II in X – Direction

STOREY	Drift X in GB	Drift X in RUB	Dirft X in FIP
STOREY20	0.004597	0.004499	0.004349
STOREY19	0.00464	0.004542	0.00439
STOREY18	0.004674	0.004575	0.004422
STOREY17	0.004693	0.004594	0.004441
STOREY16	0.004694	0.004595	0.004442
STOREY15	0.004673	0.004574	0.004421
STOREY14	0.004626	0.004528	0.004377
STOREY13	0.00455	0.004454	0.004305
STOREY12	0.004444	0.00435	0.004205
STOREY11	0.004305	0.004214	0.004073
STOREY10	0.004131	0.004044	0.003909
STOREY9	0.003922	0.003839	0.003711
STOREY8	0.003674	0.003596	0.003477
STOREY7	0.003388	0.003316	0.003206
STOREY6	0.003061	0.002997	0.002897
STOREY5	0.002693	0.002636	0.002548
STOREY4	0.002281	0.002233	0.002159
STOREY3	0.001823	0.001786	0.001726
STOREY2	0.001318	0.001287	0.001244
STOREY1	0.000707	0.000716	0.000692



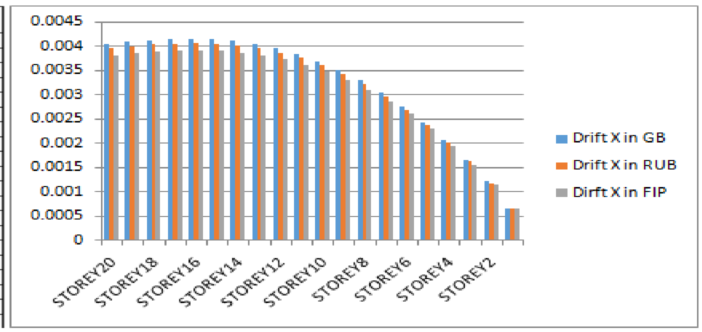
Storey Drift values in Medium Soil of Zone – II in Y – Direction

STOREY	Drift Y in GB	Drift Y in RUB	Drift Y in FIP
STOREY20	0.003521	0.003445	0.00333
STOREY19	0.003554	0.003477	0.003361
STOREY18	0.003581	0.003504	0.003387
STOREY17	0.003599	0.003521	0.003404
STOREY16	0.003604	0.003527	0.003409
STOREY15	0.003593	0.003516	0.003399
STOREY14	0.003563	0.003486	0.00337
STOREY13	0.003511	0.003435	0.003321
STOREY12	0.003435	0.003361	0.003249
STOREY11	0.003333	0.003262	0.003153
STOREY10	0.003204	0.003136	0.003031
STOREY9	0.003047	0.002981	0.002882
STOREY8	0.002859	0.002798	0.002705
STOREY7	0.00264	0.002584	0.002498
STOREY6	0.002389	0.002338	0.00226
STOREY5	0.002104	0.002059	0.00199
STOREY4	0.001783	0.001745	0.001687
STOREY3	0.001423	0.001394	0.001347
STOREY2	0.001021	0.000997	0.000964
STOREY1	0.000527	0.000536	0.000518



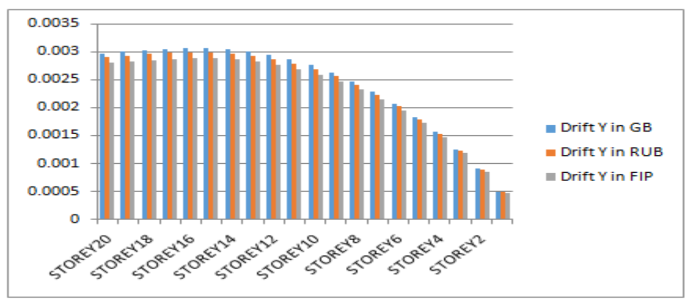
Storey Drift values in High Soil of Zone – II in X – Direction

STOREY	Drift X in GB	Drift X in RUB	Dirft X in FIP
STOREY20	0.004046	0.003953	0.00381
STOREY19	0.004089	0.003995	0.003851
STOREY18	0.004123	0.004028	0.003883
STOREY17	0.004146	0.00405	0.003904
STOREY16	0.004152	0.004056	0.00391
STOREY15	0.004138	0.004043	0.003897
STOREY14	0.004102	0.004008	0.003863
STOREY13	0.004041	0.003948	0.003805
STOREY12	0.003952	0.003861	0.003722
STOREY11	0.003834	0.003746	0.003611
STOREY10	0.003685	0.0036	0.00347
STOREY9	0.003503	0.003423	0.003299
STOREY8	0.003288	0.003212	0.003096
STOREY7	0.003036	0.002967	0.00286
STOREY6	0.002749	0.002686	0.002589
STOREY5	0.002423	0.002368	0.002282
STOREY4	0.002057	0.00201	0.001937
STOREY3	0.001648	0.001612	0.001554
STOREY2	0.001197	0.001166	0.001124
STOREY1	0.000648	0.000655	0.000631



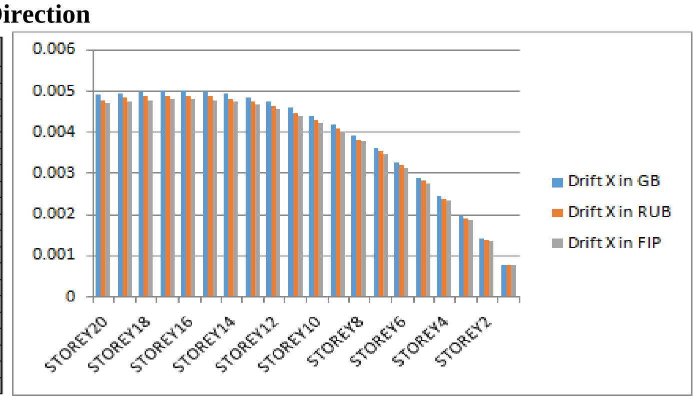
Storey Drift values in High Soil of Zone – II in Y – Direction

STOREY	Drift Y in GB	Drift Y in RUB	Drift Y in FIP
STOREY20	0.002967	0.002898	0.002793
STOREY19	0.003	0.002929	0.002824
STOREY18	0.003027	0.002956	0.002849
STOREY17	0.003048	0.002976	0.002869
STOREY16	0.003058	0.002986	0.002878
STOREY15	0.003054	0.002983	0.002875
STOREY14	0.003034	0.002963	0.002856
STOREY13	0.002996	0.002926	0.00282
STOREY12	0.002937	0.002868	0.002764
STOREY11	0.002855	0.002789	0.002688
STOREY10	0.002751	0.002686	0.002589
STOREY9	0.002621	0.00256	0.002467
STOREY8	0.002465	0.002407	0.00232
STOREY7	0.002281	0.002228	0.002148
STOREY6	0.002069	0.002021	0.001948
STOREY5	0.001827	0.001785	0.001721
STOREY4	0.001553	0.001518	0.001463
STOREY3	0.001245	0.001217	0.001173
STOREY2	0.000898	0.000876	0.000844
STOREY1	0.00047	0.000477	0.000459



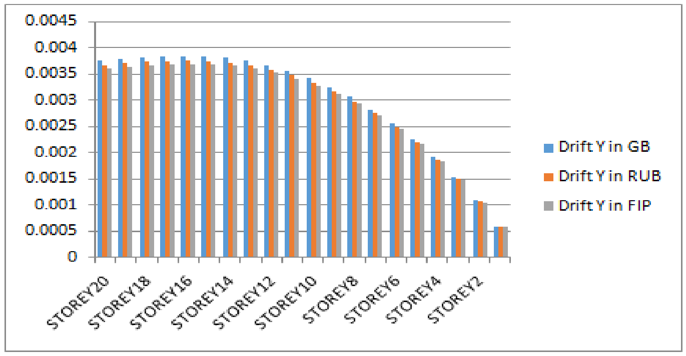
Storey Drift values in Low Soil of Zone – V in X – Direction

STOREY	Drift X in GB	Drift X in RUB	Drift X in FIP
STOREY20	0.0049	0.004774	0.004699
STOREY19	0.004946	0.004819	0.004744
STOREY18	0.004982	0.004854	0.004778
STOREY17	0.005003	0.004875	0.004798
STOREY16	0.005004	0.004876	0.004799
STOREY15	0.004981	0.004853	0.004777
STOREY14	0.004931	0.004804	0.004729
STOREY13	0.00485	0.004726	0.004652
STOREY12	0.004737	0.004616	0.004543
STOREY11	0.004589	0.004471	0.004401
STOREY10	0.004404	0.004291	0.004223
STOREY9	0.00418	0.004073	0.004009
STOREY8	0.003916	0.003816	0.003756
STOREY7	0.003611	0.003519	0.003464
STOREY6	0.003263	0.00318	0.00313
STOREY5	0.00287	0.002797	0.002754
STOREY4	0.002432	0.00237	0.002333
STOREY3	0.001943	0.001895	0.001865
STOREY2	0.001405	0.001366	0.001344
STOREY1	0.000754	0.00076	0.000748



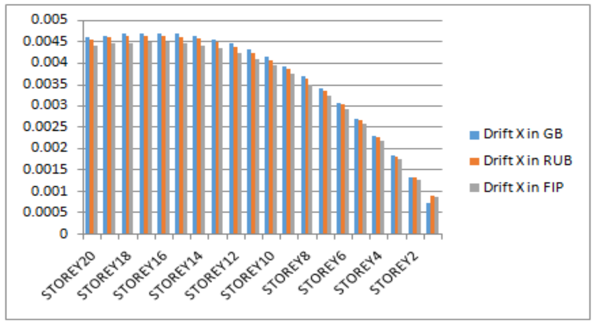
Storey Moment values in Low Soil of Zone – V in Y – Direction

STOREY	Drift Y in GB	Drift Y in RUB	Drift Y in FIP
STOREY20	0.003753	0.003656	0.003598
STOREY19	0.003788	0.00369	0.003632
STOREY18	0.003817	0.003718	0.003659
STOREY17	0.003836	0.003737	0.003678
STOREY16	0.003842	0.003742	0.003683
STOREY15	0.00383	0.003731	0.003672
STOREY14	0.003798	0.003699	0.003641
STOREY13	0.003742	0.003645	0.003588
STOREY12	0.003661	0.003566	0.00351
STOREY11	0.003553	0.003461	0.003407
STOREY10	0.003416	0.003327	0.003275
STOREY9	0.003248	0.003164	0.003114
STOREY8	0.003048	0.002969	0.002922
STOREY7	0.002814	0.002742	0.002699
STOREY6	0.002546	0.002481	0.002442
STOREY5	0.002242	0.002185	0.002151
STOREY4	0.0019	0.001852	0.001823
STOREY3	0.001517	0.001479	0.001456
STOREY2	0.001089	0.001058	0.001041
STOREY1	0.000562	0.000569	0.00056



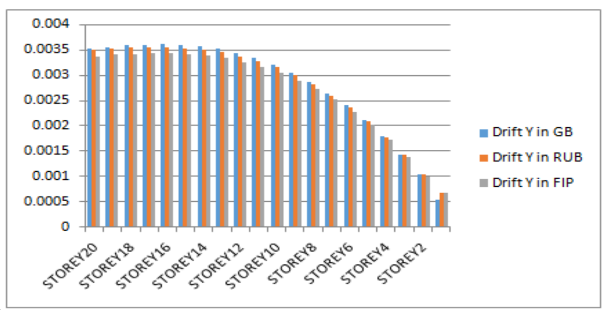
Storey Drift values in Medium Soil of Zone – V in X – Direction

STOREY	Drift X in GB	Drift X in RUB	Drift X in FIP
STOREY20	0.004597	0.004556	0.004402
STOREY19	0.00464	0.004605	0.004449
STOREY18	0.004674	0.004622	0.004467
STOREY17	0.004693	0.004637	0.004481
STOREY16	0.004694	0.004634	0.004478
STOREY15	0.004673	0.004611	0.004455
STOREY14	0.004626	0.004562	0.004408
STOREY13	0.00455	0.004485	0.004334
STOREY12	0.004444	0.00438	0.004232
STOREY11	0.004305	0.004242	0.004099
STOREY10	0.004131	0.00407	0.003933
STOREY9	0.003922	0.003863	0.003733
STOREY8	0.003674	0.00362	0.003498
STOREY7	0.003388	0.003339	0.003226
STOREY6	0.003061	0.003018	0.002917
STOREY5	0.002693	0.002659	0.002569
STOREY4	0.002281	0.002258	0.002182
STOREY3	0.001823	0.001814	0.001753
STOREY2	0.001318	0.001313	0.001269
STOREY1	0.000707	0.000889	0.000859



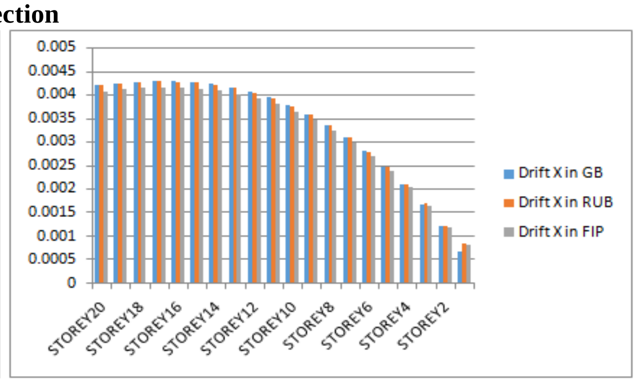
Storey Drift values in Medium Soil of Zone – V in Y – Direction

STOREY	Drift Y in GB	Drift Y in RUB	Drift Y in FIP
STOREY20	0.003521	0.003489	0.003371
STOREY19	0.003554	0.003524	0.003405
STOREY18	0.003581	0.003532	0.003413
STOREY17	0.003599	0.003543	0.003424
STOREY16	0.003604	0.003544	0.003424
STOREY15	0.003593	0.00353	0.003411
STOREY14	0.003563	0.003498	0.00338
STOREY13	0.003511	0.003445	0.003329
STOREY12	0.003435	0.00337	0.003256
STOREY11	0.003333	0.003269	0.003159
STOREY10	0.003204	0.003143	0.003037
STOREY9	0.003047	0.002989	0.002888
STOREY8	0.002859	0.002807	0.002712
STOREY7	0.00264	0.002594	0.002507
STOREY6	0.002389	0.002351	0.002272
STOREY5	0.002104	0.002076	0.002006
STOREY4	0.001783	0.001767	0.001707
STOREY3	0.001423	0.001422	0.001375
STOREY2	0.001021	0.001023	0.000988
STOREY1	0.000527	0.000674	0.000652



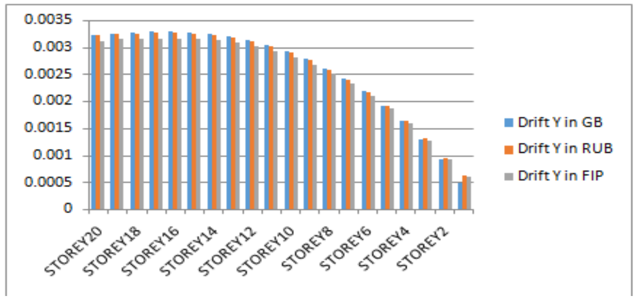
Storey Drift values in High Soil of Zone –V in X – Direction

STOREY	Drift X in GB	Drift X in RUB	Drift X in FIP
STOREY20	0.004197	0.004198	0.00407
STOREY19	0.004237	0.004242	0.004113
STOREY18	0.004267	0.004259	0.004129
STOREY17	0.004285	0.004272	0.004142
STOREY16	0.004286	0.00427	0.00414
STOREY15	0.004267	0.004248	0.004119
STOREY14	0.004224	0.004203	0.004075
STOREY13	0.004155	0.004133	0.004007
STOREY12	0.004058	0.004035	0.003912
STOREY11	0.003931	0.003908	0.003789
STOREY10	0.003772	0.00375	0.003636
STOREY9	0.003581	0.003559	0.003451
STOREY8	0.003355	0.003335	0.003233
STOREY7	0.003093	0.003076	0.002982
STOREY6	0.002795	0.002781	0.002696
STOREY5	0.002459	0.002449	0.002375
STOREY4	0.002083	0.002081	0.002017
STOREY3	0.001664	0.001672	0.001621
STOREY2	0.001203	0.00121	0.001173
STOREY1	0.000645	0.000819	0.000794



Storey Drift values in High Soil of Zone –V in Y – Direction

STOREY	Drift Y in GB	Drift Y in RUB	Drift Y in FIP
STOREY20	0.003215	0.003214	0.003116
STOREY19	0.003245	0.003246	0.003147
STOREY18	0.003269	0.003254	0.003155
STOREY17	0.003286	0.003264	0.003165
STOREY16	0.003291	0.003265	0.003165
STOREY15	0.003281	0.003252	0.003153
STOREY14	0.003253	0.003223	0.003124
STOREY13	0.003206	0.003174	0.003077
STOREY12	0.003136	0.003105	0.00301
STOREY11	0.003043	0.003012	0.00292
STOREY10	0.002926	0.002896	0.002807
STOREY9	0.002782	0.002754	0.00267
STOREY8	0.002611	0.002586	0.002507
STOREY7	0.002411	0.00239	0.002318
STOREY6	0.002181	0.002166	0.0021
STOREY5	0.001921	0.001912	0.001854
STOREY4	0.001628	0.001628	0.001578
STOREY3	0.001299	0.001311	0.001271
STOREY2	0.000932	0.000942	0.000914
STOREY1	0.000482	0.000621	0.000602



CONCLUSIONS

1. Storey shear decreased in both the directions when the building is damped with Friction Pendulum System followed by Lead Rubber Dampers in both the Zones (II&V) on all the soils (LS, MS, HS).
2. Storey Moment decreased in both the directions when the building is damped with Friction Pendulum System followed by Lead Rubber Dampers in both the Zones (II&V) on all the soils (LS, MS, HS).
3. Torsion decreased when the building is damped with Friction Pendulum System followed by Lead Rubber Dampers in both the Zones (II&V) on all the soils (LS, MS, HS).
4. Storey Drift decreased in both the directions when the building is damped with Friction Pendulum System followed by Lead Rubber Dampers in both the Zones (II&V) on all the soils (LS, MS, HS).
5. Optimum control of the parameters considered was observed when the building is damped with Friction Pendulum System followed by Lead Rubber Dampers. So from the work carried out it can be stated that Friction Pendulum System is the best supplemental damping system.

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