SURGE (Subsidence - Utilisation of Resources by Good Engineering)

What is SURGE

Surge is a business process that maximises the number of subsidence claims that a single engineer can handle effectively. It is particularly relevant to tree-related claims in event years. However, it can be used in non-event years and can be applied to all types of subsidence claims. In addition to optimising engineering resources, it has the potential to substantially reduce settlement costs and reduce claim duration. There is no negative impact on customer service or investigation costs. Finally, it provides insurers with a technical audit of all claims accepted as being valid.

SURGE is based on the guidance contained in the various Digests issued by the Building Research Establishment and, in particular, makes full use of the precise level monitoring described in BRE Digest 386. Precise levelling is the only technique that can be used to quantify the extent and scale of the foundation movements to a subsidence-damaged property and it would seem intuitively obvious that this information would be of critical importance to the solution of the problem. Yet measurements of this kind are made in less than 1 in 20 subsidence claims.

Why is SURGE needed?

It is generally agreed that climate change is resulting in hotter summers and wetter winters. Although this has little effect on the long term growth of trees, it has the potential to increase seasonal movements in shrinkable clays. Because of the number of trees in the urban environment, there is little that can be done in practical terms to reduce the threat of trees. The answer must lie therefore in handling tree-related claims more efficiently.

Key points of SURGE

- In an event year, the majority of claims are for relatively minor damage.
- Soil testing and root identification are often inconclusive and are rarely critical in the decision making process (especially at the start of the claim)
- The critical role for the engineer / lead investigator is to assess the damage and offer reassurance to the policyholder. Claims can be categorised according to the severity of the damage and other agreed criteria.
- Level monitoring over a six month period will confirm the accuracy of the Engineer's assessment and, in the majority of cases, will allow technicians to run the claim. Claims can be prioritised according to the amount of movement recorded. Misdiagnosis and more serious cases will be flagged for special attention.
- For claims reported in late summer / autumn, the initial monitoring takes place during the following winter while the trees are essentially dormant. In most cases, repairs can be undertaken at the end of the six month monitoring period. If necessary, further monitoring can be carried out post-repair to confirm the effectiveness of tree management.
- The principal cost benefit of SURGE is that it eliminates unnecessary underpinning. This is likely to be in the region of £ 2M per thousand claims.
- The cost of operating SURGE is likely to be in the region of £ 875 per claim, which includes the cost of the monitoring and synthesis of the data. In most cases there will be no other investigation costs. SURGE is therefore no more expensive than the cost of a conventional soil investigation plus crack monitoring.

How it works

1. When the claim is notified, a claims technician makes contact with the policyholder and records relevant factual information (e.g. date of purchase, when the cracks appeared, etc.). The technician also records the surface geology according to the BGS maps and notes any other claims in the same area.

2. The initial inspection is carried out by the Engineer who assesses the cause and the severity of the damage and advises the policyholder accordingly. No soil investigation or drainage survey is carried out at this stage. If the available evidence indicates the cause of the damage to be subsidence, the Engineer places the claim into one of the following categories according to fixed criteria:

    - **UPO** (underpinning an option)
    - **MAR** (monitor & repair)
    - **MSM** (minor seasonal movement)

    A fourth category (**PNS** – probable non subsidence) can be selected if there is no other identifiable cause for the damage.

3. The Engineer records key information (e.g. location and nature of cracks, position of trees, etc) on a pre-printed proforma which already contains the policy details and information obtained by the technician. A soil investigation is recommended only if there is a potential claim against a third party tree owner. A drainage survey is recommended only if there is evidence that leakage is a contributory cause of the damage. Time on site is no more than one hour and, under normal circumstances, an experienced Engineer should be able to visit five or six new claims in one day.

4. The information recorded on the proforma is processed by a claims technician to produce a draft report for the Engineer's approval. The technician also organises any soil testing and drain testing that is needed (these do not form part of the decision-making process). If the claim meets the agreed criteria, a copy of the proforma is sent to Geo-Serv with an instruction to set up level monitoring.

5. Geo-Serv make an appointment with the policyholder, install monitoring points and carry out the initial survey. This is currently within 10 days of instruction. Dependant on the information on the proforma, the monitoring may be to the whole perimeter or only part of the property.

6. Further surveys are scheduled initially at two-monthly intervals. The readings are processed into a draft monitoring report (see Appendix I), normally within 5 working days, and forwarded electronically to the engineer or service provider for assessment and comment. Once approved a hard copy is sent to the policyholder.

7. The maximum movement is extracted from the monitoring results and recorded by Geo-Serv in the SURGE database. This provides an immediate check of the coding assigned by the Engineer (as defined in the following paragraphs). Any claims that have to be re-classified are brought to the Engineer's attention, otherwise claims technicians execute any appropriate actions that are needed.

A **Minor Seasonal Movement** claim is defined as one where the recorded movement is 5 mm or less. Although this is a somewhat arbitrary limit, it is based on the fact that thermal expansion can cause movements of 5 mm in a typical house. Foundation movements of 5 mm are therefore unlikely to be of any more significance than thermal expansion and contraction.

For claims falling within the MSM category, there is a strong suspicion that foundation movement was not the sole cause of the damage. Common contributory factors include existing defects and exceptional thermal expansion (in hot summer weather). If the damage is properly repaired, it is unlikely to recur. Nevertheless, where practical, measures should be taken to reduce the influence of nearby vegetation. Claims technicians can execute these actions with minimal supervision by the Engineer.

A **Monitor And Repair** claim is defined as one where the maximum movement is between 6 and 15 mm. In these cases there is "genuine subsidence" although the damage is likely to be relatively minor. Research has shown that movements of about 15 mm are needed to cause

cracking to a masonry wall, although experience tends to suggest that smaller movements can also cause damage, especially to a house with existing defects. Nevertheless, in most cases the expectation is that there will not be a recurrence of the damage until there is another exceptional summer. Repairs can be scheduled immediately, but appropriate tree management will be required to prevent a recurrence. Again claims technicians can execute appropriate actions to achieve these objectives.

Where the recorded movement is 16 mm or more, the claim is classified as **Underpinning an Option** on the basis that some form of foundation deepening is likely to be needed unless the implicated trees can be dealt with effectively. It is in this category of claim that SURGE offers the greatest benefit.

i) The UPO claims are identified at an early stage. Although some may have been correctly identified in the initial visual inspection because of the severity of the damage, this will not always be the case. Where the movement is well distributed over a large part of the house, the cracks may be relatively small.
ii) By "*sorting the wheat from the chaff*", Engineering Resources can be focussed on the UPO claims.
iii) The level monitoring results are powerful evidence, which make it difficult for tree owners to deny a request to deal with their trees.
iv) Where the tree is cut back, rather than removed, the level monitoring can be continued through the following summer to determine the potential for further movement.
v) Where underpinning is appropriate, the level monitoring results will take the guess work out of deciding the extent of the scheme required, minimising cost and reducing the risk of future damage
vi) For each service provider, a portfolio report can be collated at agreed intervals showing the division of claims between the various headings: MSM, MAR, UPO. The portfolio report will identify the claims that are ready to repair and those in need of further remedial work and/or monitoring. Any claims not fitting the general pattern will be flagged for special attention. The claims can be prioritised according to the duration of the claim or the amount of movement recorded.

The system could be easily adapted to allow internet access to both service providers and to insurers.

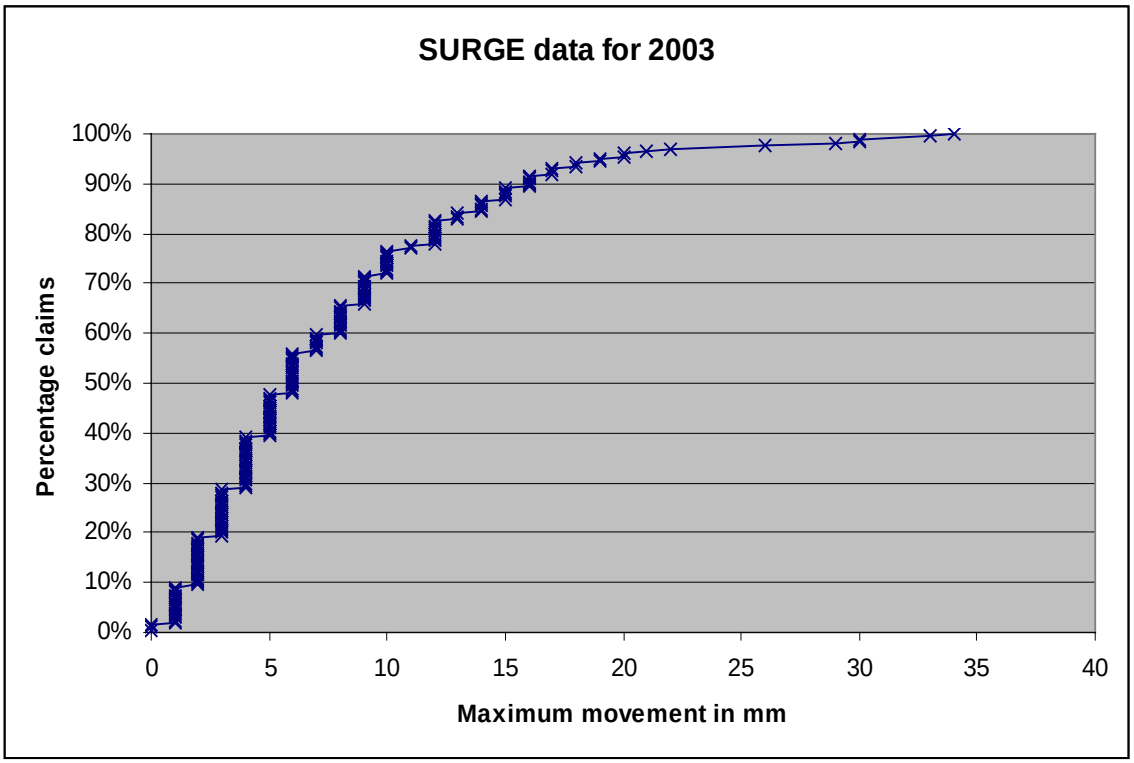
Lessons learned in 2003

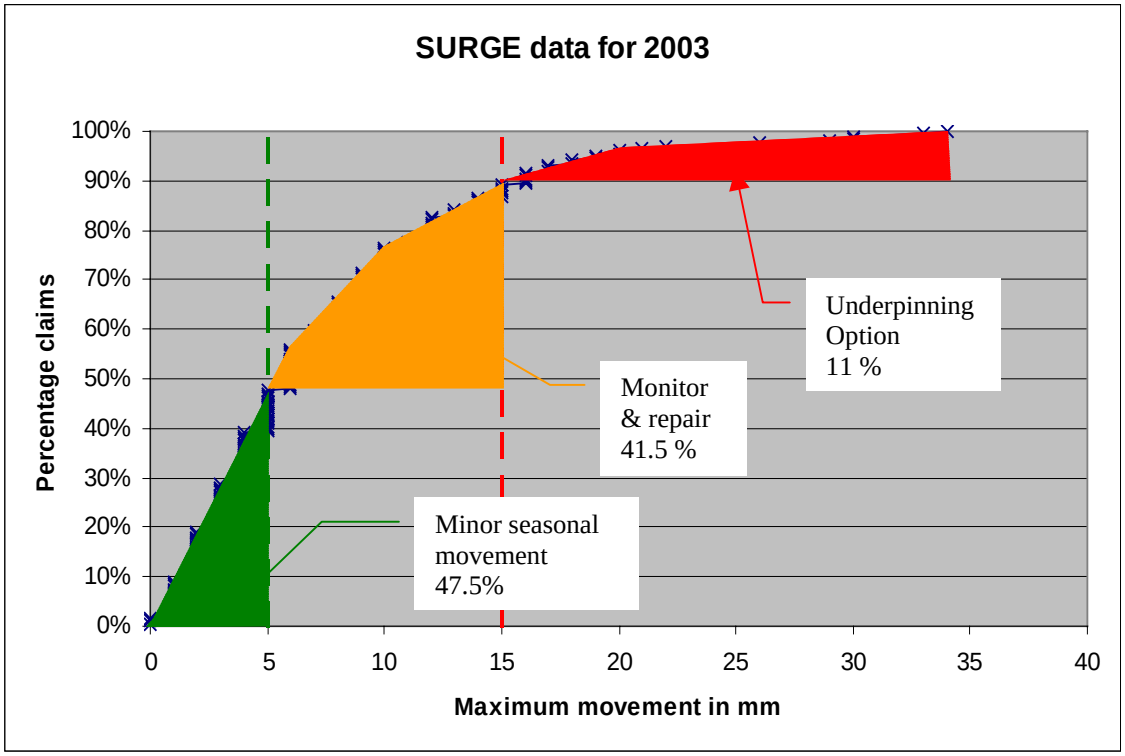
Geo-Serv Ltd level monitored 200 claims in 2003 that were identified as being tree-related subsidence. In each case, the policyholder had reported cracks appearing in the dry weather, the geological maps indicated a soil with significant clay content, and the initial inspection confirmed the presence of trees or large shrubs within influencing distance of the property.

The level monitoring results collected during the first six months' of monitoring for these 200 claims are summarised overleaf. The top graph shows the raw data in terms of percentage claims against movement recorded. The lower graph shows the data divided up into the MSM, MAR and UPO categories.

Immediately it can be seen that nearly half the claims fall into the category of minor seasonal movement. 41.5 % of the claims fall into the Monitor & Repair category and only 11% fall into the Underpinning Option category.

Of the 22 claims identified by Geo-Serv as falling in the UPO category, six were ultimately underpinned. In every case, the implicated tree was either a well established high water demand tree (e.g. Oak) that could not be removed because of the risk of heave or belonged to a third party who refused to remove the tree. Recovery actions are being pursued in 3 of these cases with excellent chances of success.





In 16 of the 22 claims, tree management proved totally effective. An example is shown in Appendix I. The policyholder reported his concerns in October 2003 when he noticed that a 25 mm gap (Category 4) had opened up between his house and extension. A visual inspection readily identified the cause of the problem as being a large Eucalyptus growing in the policyholder's garden. The initial monitoring recorded significant upward movement and closure of the crack. The decision to remove the tree was made in the spring of 2004 and the subsequent monitoring confirmed that there was little further movement. Repairs could have

been carried out as early as June 2004, but were deferred because of the severity of the original damage. The option existed to continue the monitoring post-repair to assuage any remaining concerns the policyholder might have regarding longterm stability.

The Geo-Serv claims experience for 2003 is that (in an event year) underpinning should be considered in only 11 % of valid tree-related claims and implementation of underpinning should be around 3 %. Realistically, this is not an achievable target for most service providers without specialist geotechnical expertise. However, with the backup provided by SURGE and precise level monitoring it should be possible to limit underpinning to say 1 in 20 valid claims.

Benefits

The principal benefit of SURGE is its cost effectiveness. It reduces unnecessary and often inconclusive Geotechnical Investigations and eliminates unnecessary underpinning. It also reduces claim duration, makes the process less labour intensive and reduces the overall cost of the claim which tends to increase progressively with time.

Properly applied, SURGE should reduce underpinning to about 5 % of valid claims, even in an event year. Assuming underpinning is currently carried out on 15% of valid claims with average underpinning costs of £ 20,000, this represents a saving of £ 2M per thousand claims.

Other benefits include the following:

- greater control of the claims,
- implicated trees are readily identified, avoiding unnecessary negotiations with third parties
- by identifying which parts of the property are moving, subsidence damage can be fairly differentiated from wear & tear and other causes
- recovery prospects are improved,
- customer care is improved (because the p/hs can understand what is happening to their home and can see they are receiving the best possible level of service),
- investigation costs are reduced, and
- SURGE can be used as the basis of a technical audit

Technial Audit

The level monitoring results provide the perfect vehicle for a technical audit of each claim. In particular, the monitoring will confirm or deny the accuracy of the Engineer's initial assessment and will identify those claims where further remedial measures are needed.

In conjunction with Mangement Information, it will be possible to flag any claims where the Reserve appears inappropriate - for example, claims reserved for underpinning where there is little movement or claims reserved for minor repairs where the movement is ongoing. Further details can then be requested from the service provider without taking the claim out of Delegated Authority.

Cost and capability

The cost of SURGE is dependent on claims numbers and geographical location. Currently the cost of a typical level monitoring exercise for a property in the London area, inclusive of all set up and processing costs, is around £ 750. However, with economy of scale, it will be possible to reduce costs to a point where SURGE could be operated for little more than the current cost of the monitoring – say about £ 850 - £ 900 per claim (plus VAT). This would be the total cost to insurers inclusive of all monitoring costs. Although there would be some cost implications to extending the service beyond the London area due to the additional travelling time between surveys, in principle the system could be operated nationally.

Geo-Serv currently have the capability of undertaking 5,000 surveys per annum with present staffing levels. This equates to 1,000 claims, although up to 50 new claims a week could be handled in busy periods. In a non-event year, it is anticipated that SURGE would be of benefit on about 80 % of valid claims, but could be run on a pilot basis with a particular service provider or restricted to certain postcodes.

In an event year, additional capacity could be developed at short notice by contracting in land surveyors (who are unaffected by event years) or the selection criteria could be altered to focus on the claims where SURGE is likely to have the greatest benefit.

T J Freeman MA CEng MICE
for Geo-Serv Ltd
May 2006

APPENDIX I

Example of Monitoring Report

Geo-Serv Limited
17 Hoveden Road
London NW2 3XE

Consulting Civil and Geotechnical Engineers

Your ref: 20556062

Our ref: *j275dl/TJF*

monitoring 020 8208 2545 ⇦

general enquiries 020 8208 4476

e-mail: *mon@geo-serv.com*

date: 12 November, 2004

GEO-SERV

[policyholder]
[risk address]

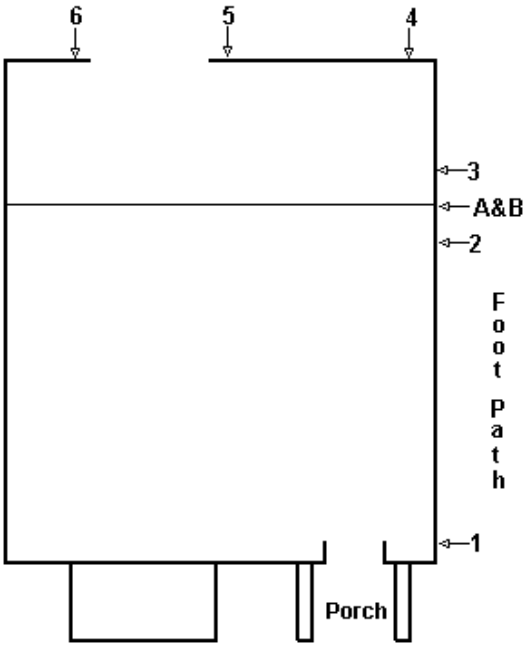
Monitoring Report

Owners name	[policyholder]	Suspected cause	root induced clay shrinkage	Monitoring type	Levels & cracks
Address	[risk address]	Prinicpal area of damage	The junction of rear extension & house	Installed	07/11/03
		Damage Category	moderate	Frequency	3 mnths
		Surface geology	London Clay	Status	open
Home telephone		Feedback from last visit	P/h pleased to note that cracks have closed up		
Work telephone					
Correspondence address					

Comment

Further level monitoring has confirmed the stability of the foundations following the removal of the large Eucalyptus in May. The swelling process in the surface soil is now complete and there is no reason to suspect further movement. It is recommended that permanent repairs and decorations are now scheduled.

Sketch showing approximate location of monitoring points



Results of: precise levelling . crack monitoring . distortion survey . verticality monitoring

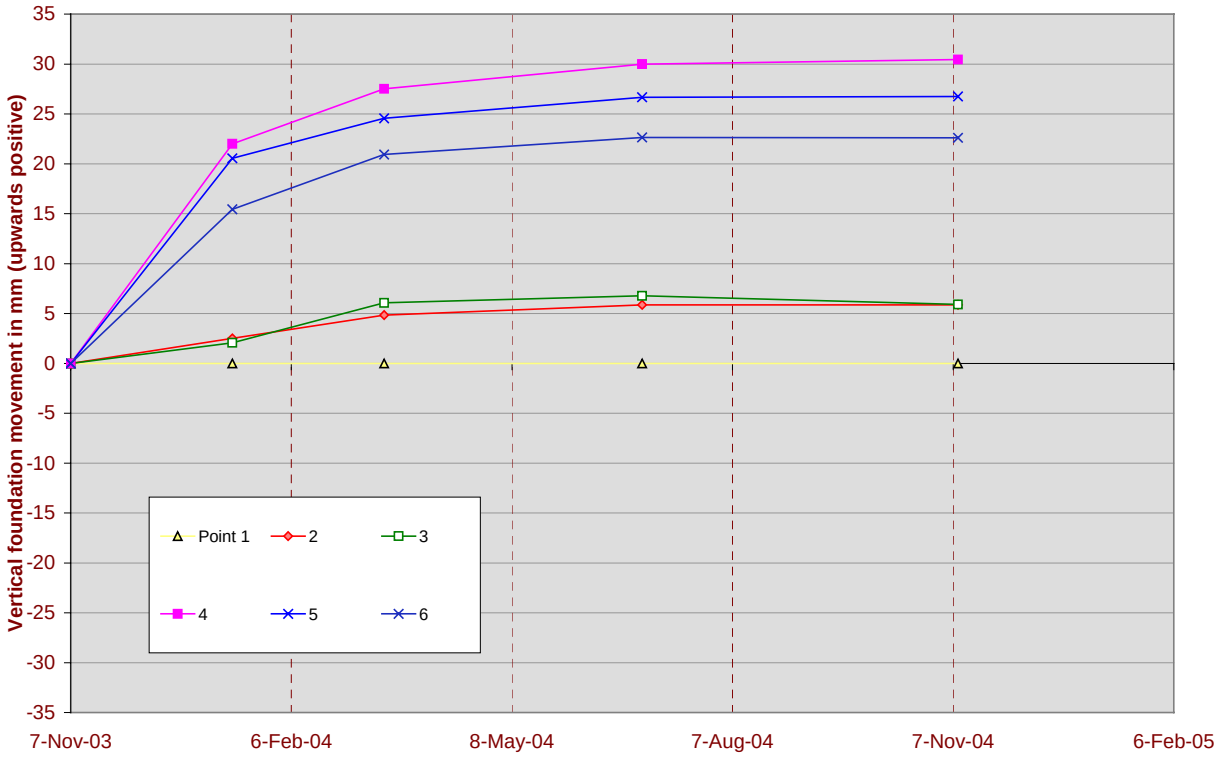
Survey:	2003/1	2004/2		2004/2		2004/3		2004/4	
Date:	07-Nov	13-Jan		16-Mar		01-Jul		09-Nov	
	levels	levels	*chngs*	levels	*chngs*	levels	*chngs*	levels	*chngs*
Point ID	mm	mm	*mm*	mm	*mm*	mm	*mm*	mm	*mm*
Point 1	**1000.00**	**1000.00**	***0.0***	**1000.00**	***0.0***	**1000.00**	***0.0***	**1000.00**	***0.0***
2	1033.84	1036.35	*2.5*	1038.68	*4.8*	1039.71	*5.9*	1039.70	*5.9*
3	1031.53	1033.60	*2.1*	1037.60	*6.1*	1038.31	*6.8*	1037.43	*5.9*
4	971.62	993.63	*22.0*	999.13	*27.5*	1001.62	*30.0*	1002.07	*30.4*
5	954.33	974.89	*20.6*	978.89	*24.6*	980.99	*26.7*	981.09	*26.8*
6	942.41	957.85	*15.4*	963.35	*20.9*	965.05	*22.6*	965.02	*22.6*
Point 1	999.77	999.82		999.82		999.82		1000.00	

Results are changes in level relative to baseline survey performed and assume that point marked with an asterisk remains static

Closing errors (mm)

Sum	-0.23	-0.18	-0.18	-0.18	0.00
Datum	-0.23	-0.18	-0.18	-0.18	0.00

Precise level monitoring



Results of: precise levelling crack monitoring distortion survey . verticality monitoring

Survey:	2003/1	2004/2		2004/2		2004/3		2004/4	
Date:	07-Nov	13-Jan		16-Mar		01-Jul		09-Nov	
	sprtn	sprtn	*chngs*	sprtn	*chngs*	sprtn	*chngs*	sprtn	*chngs*
Crack ID	mm	mm	*mm*	mm	*mm*	mm	*mm*	mm	*mm*
A	159.18	139.40	*-19.8*	134.90	*-24.3*	133.65	*-25.5*	133.17	*-26.0*
B	117.73	111.17	*-6.6*	109.17	*-8.6*	108.65	*-9.1*	108.44	*-9.3*

NOTE: All measurements made with inside jaws except those marked with an asterisk.

The description 'vertical' and 'horizontal' refer to the positions of the demecs and not the direction of the cracks themselves.

A: Demec pair, junction, H/L
B: Demec pair, junction, L/L