Before

THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

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In re: C-80011839 - Villanova University vs. National Railroad Passenger Corporation (Amtrak), Consolidated Rail Corporation, Southeastern Pennsylvania Transportation Authority (SEPTA), Pennsylvania Department of Transportation, County of Delaware and Radnor Township. Alleging that respondents have failed to construct a safe and appropriate crossing where Route 320 (Springmill Road) crosses over and above railway tracks in Radnor Township, Delaware County.

Further hearing.

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Philadelphia, Pennsylvania

June 2, 1982

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Pages 78 to 168

HOLBERT ASSOCIATES
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Further hearing.

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Stenographic report of proceedings held in Room 1304, State Office Building, Philadelphia, Pennsylvania,

Wednesday,
June 2, 1982,
at 10:05 o'clock a.m.

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ADMINISTRATIVE LAW JUDGE MARTIN R. FOUNTAIN

APPEARANCES:

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For - AMTRAK

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JUDGE FOUNTAIN: This is the further hearing predicated on the Commission of the detailed study submitted by PennDOT as to ---

MR. ZAHN: Amtrak was to submit one, too.

JUDGE FOUNTAIN: I see no one from Amtrak present.

MR. ARMENTROUT: Right here.

JUDGE FOUNTAIN: Did you sign the appearance slip?

MR. ARMENTROUT: No, sir, I didn't. Sorry. I missed the appearance slip.

My name is Scott Armentrout. I am here on behalf of Amtrak.

JUDGE FOUNTAIN: Who is the first to submit testimony?

MR. ZAHN: The Department of Transportation.

RONALD P. FLEGEL, called as a witness on the part of PennDOT, being previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. ZAHN:

Q Will you state your full name?

A Ronald P. Flegel.

Q And by whom are you employed?

A Pennsylvania Department of Transportation.

Q In what capacity?

A District Bridge Engineer.

Q And you are a professional registered engineer?

A I am.

Q Are you familiar with the crossing in today's hearing?

A I am.

MR. ZAHN: The Department was asked to submit testimony describing in detail its report prepared in compliance with the Commission's order of April 28, 1981. If Your Honor please, all parties have now received a copy of our report. The Reporter has three copies, and I gave you one.

JUDGE FOUNTAIN: All right.

BY MR. ZAHN:

Q Would you answer that question, sir?

A Yes, we have submitted a report in response to the PUC order on this particular project.

Q Now, describe in detail your report.

A The report requires looking into four aspects. The first was the attachment of a pedestrian bridge to the existing highway bridge; second was replacing the present highway bridge with a modern structure; third, constructing a pedestrian bridge at another location and cost for such a bridge; and four, other feasible alternatives.

In the report I outlined what we had done to, first of all, examine the existing highway crossing. There is a similar bridge out in Gap which is also under the PUC jurisdiction and requires a regular inspection by my

counterpart in District 8, Harrisburg District. I understand that bridge was of similar construction, it was experiencing some problems which could be fatigue related, cracks in the structure, and on October 13th I met with Amtrak ---

Q What year?

A 1981.

--- met with Amtrak, District 8, and township people and inspected the bridge. We found numerous cracks, most of which were old, some of which appeared to be progressing. We found portions of metal which could actually be broken off.

And the reason for this inspection was to try to draw a correlation between this bridge and the Villanova Bridge. We subsequently went and carried out an inspection at the Villanova structure. We found some similar conditions on the Villanova Bridge. We found some cracks in vertical portions of the truss. We found cracks at every location where the bridge had been damaged and a weld attempt had been made. Every weld was cracked; therefore, leading credence to our assumption the bridge was either wrought iron or non-weldable mild steel.

This was important in the consideration of attaching a pedestrian bridge to the existing structure. We had to find out what condition this structure was in, the possibility of

welding the existing structure and get some idea of the life of the existing structure.

Some other physical dimensions of the bridge should be brought out in the fact the bridge is on a very poor vertical alignment. So, visibility is difficult from one side to the other. The cartway of the bridge is only eighteen and a half feet, and the original bridge was built in 1875.

In 1945 the railroad had initiated some repairs to the bridge. They replaced the floor beams, then put a new deck on the bridge, but the basic structure is the 1875 vintage.

So, our determination after limited inspection we can make of the bridge with Amtrak's assistance, the inspection made of the Gap bridge, the geometrical conditions of the bridge, our conclusion was the existing bridge, just from geometrics alone, is in need of replacement. The fact that the existing bridge should be replaced, that alone precluded adding a pedestrian walkway to this existing bridge because when the bridge is replaced, the walkway comes down with the bridge.

The next consideration --- to follow that out, our recommendation was that immediately on our findings of examining this bridge and the bridge in Gap, we felt that there should be an immediate inspection of the bridge to determine some materials that were used in the bridge after taking samples from the bridge, going to an in-depth

inspection above the tracks of Amtrak's facilities, this will require closures of the rails by inspection can be made, taking dimensions of various portions of the bridge, which is going to be difficult because at some point in time - I believe it was probably in 1945 - portions of the bridge were encased in concrete, most notably the bottom flange, which is a tension flange of the bridge. Let me correct that. I should say bottom chord of the truss, which is a tension chord and one most susceptible for fatigue failure. So, there are parts of the bridge we expect it to be difficult. So, we feel it is important to make sure the bridge can adequately support legal loads. Right now there is no posting on the bridge.

Once that is done, we feel that just from geometrics alone, the bridge should be scheduled to be replaced. An eighteen and a half foot cartway is not nearly wide enough to safely accommodate the 12,000 vehicles that use that portion of the highway.

A new bridge should make provisions for pedestrians. However, we do not recommend that we wait until a new bridge is constructed to adequately carry pedestrians across that rail facility. The reason for that is the time duration in constructing a new bridge. I worked out some times on it, and we have had to hire a consultant. It is all in my report. That consultant, the selection procedure and design

procedure and the right-of-way acquisition would take about two years. The construction of a new bridge would take about eighteen months. This is without any delays. And as you can see, as we start adding these times up, we're talking somewhere in the vicinity of three and a half years at a very optimum figure before that bridge can be replaced and a walkway can be installed.

So, our recommendation is that although we should pursue a new highway crossing at this location, we should not wait for such a facility to be built until the pedestrians can be accommodated.

We looked at the feasibility of placing a pedestrian bridge adjacent to the existing structure but not attached to the existing structure. This presented some problems because the adjacent pedestrian bridge would have to be far enough removed so that it would not interfere with any future construction of the highway crossing.

Another problem occurs with the location of the bridge. It would have to be on the east side to accommodate university students, and this would put both approaches to the bridge in a parking lot on each side of the railroad.

The federal government requires that because of handicapped people, a ramp of a maximum of eight per cent has to ascend to the crossing. If straight-back ramps were used, it would actually go out past the driveways which enter

into the station and into the university. If a switch-back system or circular ramp were used, it would take up a substantial amount of parking lots on both sides of the railroad facility.

So, for these reasons, perhaps a pedestrian crossing at this location is not the proper place to place it especially since Amtrak is actively trying to renovate the tunnel which is at approximately the same location.

We considered a pedestrian bridge at a different location. The location, we felt, with my little experience with the university and the movement of pedestrians through the university, I felt a location for the bridge would be probably more adequate by the pathway which passes through the two Mendell Hall buildings under the underpass at Mendell Hall. This would carry, I think, a better flow of university students and faculty through the campus, across the track and over to the St. Mary complex. This was kind of borne out by the fact that the university through the township is presently requesting a permit for traffic amid block crossing to get from one side of Spring Mill Road to the other, and this pedestrian bridge would line up with that proposed location.

So, our conclusion was that in fact a new pedestrian bridge is needed. A pedestrian bridge should not be attached to the existing highway rail crossing. We don't feel that

putting it adjacent to it is a proper location. We feel it should be on the university campus.

We have made some costs for different proposals. A new highway bridge for the bridge only utilizing the existing abutments would cost, for the construction cost, about a half million dollars. The design cost would be approximately $80,000, with the administration costs being about $65,000, which is a total of $145,000. Not included in this proposal is any right-of-way costs, any cost for highway work, as this is very difficult to estimate before we get into an actual study at the location. I would guess that we would be up near or surpass the million dollar mark for a new highway rail crossing, and that is with the assumption that the existing abutments are wide enough to accommodate a new bridge.

For a pedestrian bridge located at some other location, preferably, our recommendation was down near Mendell Hall, we estimate a design cost for that pedestrian bridge being $45,000 for design cost and $300,000 for the construction of the bridge.

And I feel that with the work that Amtrak has proposed in their tunnel, the tunnel will probably be a reasonable alternate until any of these proposals are initiated.

MR. ZAHN: Your Honor, Mr. Flegel answered also question number two of the questions and procedures which

asked us for our recommendation as a result of the report, and the report itself I ask be marked PennDOT Exhibit No. 3.

JUDGE FOUNTAIN: All right. It will be so marked.

(PennDOT Exhibit No. 3, being five-page document entitled "Response to the PUC C-80011839 entered June 26, 1981," was produced and marked for identification.)

BY MR. ZAHN:

Q Now, the other part of question two, Mr. Flegel, is: What portions of the work and costs would the Department agree to bear.

A I think we probably have to bear some of the cost for the highway rail crossing. I don't think the Department is in a position to offer to bear costs for a pedestrian bridge on the university campus which is solely for the use of their students and faculty.

Q And is there any other reason why we should not bear the cost of the pedestrian crossing?

A Well, it is not part of our highway system.

Q And is it because the university built up the St. Mary's area without making adequate arrangements?

MR. McDOWELL: I am going to object.

JUDGE FOUNTAIN: Objection sustained. We have been over that ground before.

MR. ZAHN: The Witness is available for cross-examination.

CROSS-EXAMINATION

BY MR. McDOWELL:

Q Mr. Flegel, your report does indicate that the bridge that goes over the tracks is in pretty poor condition; is that correct?

A The bridge that goes over the tracks is showing some fatigue failures, some of which we can explain away. It does not show any of the stress which would indicate an immediate problem. If it shows that there were signs of stress, we would have posted it or closed it immediately.

Q You are saying, then, there is no necessity to post it for a certain weight restriction at this time?

A We say there is a necessity to study it closely to see if it requires posting. That is from a structural standpoint. From a geometric standpoint, it does not meet any of our criteria.

Q And you indicated that 12,000 vehicles crossed the bridge. Is that a day?

A That is a day.

Q And the new bridge that you are proposing, you are saying that there should be a separate walkway for pedestrians; is that correct?

A The new bridge could very easily have a walkway on to accommodate pedestrians.

Q And the separate walkway, pedestrian walkway that you

are saying should be built east of the existing bridge, you indicate that you propose that it be close to where the pathway comes between Mendell Hall; is that correct?

A That is correct.

Q And if it were built there or constructed there, it could also be used for passengers getting off Amtrak trains; could it not?

A It could, yes.

Q Because it would be, more or less, directly above the tunnel?

A No. It would be east of the tunnel. Anyone could walk over. I don't know without plotting it out if in fact where the bridge was laying on the north side of the track if that in fact would be in the parking lot or on a walkway which would be constructed in conjunction with the bridge which would carry over to St. Mary's Hall.

Q But you are not here saying today that it would only be university students or university faculty that would use such a walkway; are you?

A Unless the university restricted it as such, no.

Q If it were close to this tunnel which is supposedly for university faculty or students or also rail passengers, such ---

MR. ARMENTROUT: I object to that characterization of the tunnel. I think our testimony in earlier parts of

this hearing was that that tunnel was constructed for rail passengers.

JUDGE FOUNTAIN: Mr. Armentrout, I don't believe that this is an appropriate time for you to enter an objection. This is Mr. Zahn's witness. I would suggest that you wait until you have your chance in cross-examination.

I will overrule your objection as out of order and inappropriate at this point in time.

BY MR. McDOWELL:

Q Just to go back, if the separate walkway were built where you are proposing, it could be used by rail passengers, also; could it not?

A I would think if there were no restrictions on use of that bridge, it could be used by anyone.

Q And if the tunnel were flooded or if it were late at night, as the record indicates, certain females feared to go through the tunnel, they could use such a walkway either if they're students or getting off the train; could they not?

A That is correct.

Q Your proposal to build the separate walkway is to take care of the situation as soon as possible; is that it?

A That is correct. In my report I indicated that the initial hearing was -- the hearing was initially initiated toward pedestrians. We have kind of gotten off on a sideline,

including the highway crossing, and I felt that we should try to separate the two and zero in on a pedestrian problem which was the initial intent of these hearings.

Q But to get going on a separate walkway, you are still not willing to pay for any of that cost?

A I don't know --- not being a lawyer, I don't know if the Department could legally pay for such a crossing which is entirely off our right-of-way and is not for the benefit of the highway user. It would be more for the benefit of keeping people off the railroad tracks, not off our highways.

Q But if there was a walkway on that bridge at the present time, people could walk over it safely, could they not?

A Correct.

Q To go a step further with that, PennDOT at the present time has not supplied any safe movement from one side of that bridge to the other - is that correct - by pedestrians?

A That is correct.

Q That is what Villanova has asked in this complaint to do; correct?

A Yes.

MR. McDOWELL: That is all I have. Thank you, Mr. Flegel.

JUDGE FOUNTAIN: Mr. Herskovitz?

MR. HERSKOVITZ: Yes, Your Honor.

BY MR. HERSKOVITZ:

Q Getting back to the question posed by Mr. McDowell whether or not the existing bridge can safely carry legal loads at this time, do you believe that an in-depth inspection should be conducted as soon as possible to make that determination?

A Yes. I indicated that in my report.

Q Are any repairs necessary right now, emergency repairs?

A No. As I indicated earlier that if we had found some stress or something which indicated the bridge had structural damage, whether it would be fixed or not fixed, we would take action of either post the bridge or close the bridge.

Q An in-depth inspection, of course, could lead to repairs; is that correct?

A Yes. Maybe I should indicate, when we are out there inspecting the bridge, as indicated in the report, we were only able to get under one span. We had to get track from the railroad, in the course of an entire day, go get one track. We were only able to get on the underside of a small portion of the bridge.

Q And this was just a visual inspection?

A It was a visual inspection, yes.

Q You are recommending that a pedestrian bridge be constructed prior to replacement of the existing highway bridge; is that correct?

A Only because of the time involved in replacing that highway crossing.

Q Is it really cost efficient to erect a pedestrian bridge? We're talking $345,000 today. By the time it gets constructed, if it does, it could well be a half million dollars for a pedestrian bridge.

Does the time factor involved in constructing a new bridge, does it really make a pedestrian bridge cost efficient?

A I guess --- it's very difficult to answer that if you're talking in terms of lives which may be saved, to put a dollar figure on that.

Q How long would it take to construct a pedestrian bridge?

A Well, it would depend on how it was funded and who handled the construction. If the Department did it, unfortunately, it is not programmed, it is not funded. Many of the same problems for a new bridge would face the Department for the construction of a pedestrian bridge. So, if the fact the Department by some means were going to do the pedestrian bridge, it would take a couple of years.

Q Are there any funds available for a pedestrian

bridge through the Department?

A No, sir.

Q Now, your estimate for the existing bridge, 24 months to design and 18 months for construction, is this the minimum amount of time required, or is this just an average time? Could this time be reduced somewhat?

A Well, if you look at the breakdown instead of just looking at the final figures ---

JUDGE FOUNTAIN: Are you looking at your report?

MR. ZAHN: Page 5.

JUDGE FOUNTAIN: Page 5. Thank you.

THE WITNESS: I had broken that 24 months down. It takes the Department with our consultant selection procedure, which is now our policy, about six months to bring a consultant on board to do the work. We do not have the in-house capability as far as manpower to do it ourselves. The design time we only have is 12 months; with a right-of-way acquisition, an additional six months.

So, you can see the 24 months for pure design is more than enough time, and we're not saying 24 months for pure design. We're only saying 12 months for design.

And these are optimistic. I tried to be relatively optimistic, optimistic but realistic.

JUDGE FOUNTAIN: Optimistic but what?

THE WITNESS: But realistic. There is so much depends

on the PUC for the orders, and any time someone objects to an order, that has a tendency to drag out.

BY MR. HERSKOVITZ:

Q Well, if the PUC was to order a new bridge there and you were to submit plans within one year or 18 months, are there federal funds now available to begin on that project?

A No. This is a Capitol project, and although it is on a 12-year program, it is not yet a budgeted project. So, first the Legislature would have to budget the money, and budgets don't come every year.

Q You say in your report it's presently scheduled for years nine through 12. Can you expand on that a little bit? Do you mean that is when you plan to receive the budgeting for this project?

A Yes. The 12-year program is broken down into three four-year segments, and this was put on the last -- third segment, third four years. So, that's our 1980. So, this would be around 1990, 1987, 1990.

Q Of course, this is PennDOT's program. If the Commission was to order a bridge built there within the next two years, would not the Department attempt to gain the funds now?

A It's the Department's program in conjunction with the County Planning Commission, and I would certainly recommend that it be pushed up and seek funding for it. However, the

funding does come from the Legislature, and it is beyond our control.

Q This 24-month design time, does that include time to get federal funds and any other money?

A We work on an amount of federal moneys allocated to the state, and it's a matter of how much money is allocated to the state and how much money is already committed. The tendency right now by the federal government is to cut back for the federal funding. One viable funding we have right now is the critical bridge funding which is 80/20 which I indicated earlier in my report.

Q This has not been programmed for this particular bridge? In other words, you have funds, but some internal procedure has to take place to get that directed toward this particular bridge; is that correct?

A Right now, if this project were funded by the Legislature today, we would have to transfer funds from some other project. All present federal funds are committed. There is a shortage in the state of federal funds.

MR. ZAHN: I might add under this ---

JUDGE FOUNTAIN: What are you adding? Do you want to testify?

MR. ZAHN: No, but I want to make a statement on behalf of the Department that might be helpful for Your Honor.

JUDGE FOUNTAIN: All right.

MR. ZAHN: And that is that right now the Federal Court has restricted the federal government from giving the state any funds under this emission program that is presently before the courts.

JUDGE FOUNTAIN: The Department for the State of Pennsylvania follows the federal guidelines for funding; is that right?

THE WITNESS: Yes, sir.

JUDGE FOUNTAIN: Has it stopped yet?

THE WITNESS: Yes. Some funds have stopped, yes.

MR. ZAHN: 400 million dollars has stopped right now.

MR. HERSKOVITZ: I have no further questions.

JUDGE FOUNTAIN: Anybody else? Mr. Mazor?

MR. MAZOR: Yes, Your Honor.

BY MR. MAZOR:

Q In order to qualify for the federal funding, what is the minimum size the bridge would have to be with respect to roadway width and so forth?

A I believe with the amount of traffic on that road, it would probably be 30 feet curb to curb.

Q And I assume that the approaches similarly would have to be widened - would they not - to make any sense of the whole project?

A Right.

Q Now, at present, what is the minimum clearance

of the bridge over the tracks?

A The only clearance I have is our records. I don't know how accurate they are.

Q Well, let me put it this way: Is it not a fact that the pump-back effect of the bridge and the poor sight distance is due to the fact that it had to be done that way to achieve clearance over the tracks?

A I assume so, yes.

Q So, would you not have to on a new bridge go back a considerable distance to achieve that same height and still get within federal guidelines with respect to the rate of the approaches, sight distances and all the other things that have to be considered?

A Absolutely, and that is why I was unable to estimate a right-of-way cost.

Q Was any consideration given to the possibility of reconstructing the bridge at some other location other than the present one?

A There was some consideration which was looked into very briefly. There doesn't appear to be a reasonable location other than the present location to relocate the bridge.

Q With the requirement of a minimum of 30 feet in width, is there any doubt in your mind that the present abutments would not be adequate to support it?

A It's not a matter of the adequacy for a load-carrying capacity. It's a width problem.

Q Exactly.

A I would feel that probably if the retaining walls do come straight back on a flare, it's a matter of could we put a new cap on the abutment and cantilever the cap so that we can obtain additional width that way and maintain the existing wall.

Q All of this would be dependent on what an in-depth inspection would determine with respect to the condition of the abutment in any event, or can you visually see that they're all right now?

A A cursory inspection of abutments and our experience with abutments of this type would lead us to be reasonably certain the existing abutments could be reused.

MR. MAZOR: Thank you. That is all I have, Your Honor.

BY MR. ARMENTROUT:

Q Mr. Flegel, did you in the course of your studies make any attempt to evaluate the drainage through the present pedestrian tunnel, railroad tunnel?

A No, we did not.

Q On your direct examination you were asked by Mr. McDowell about the likelihood of railroad passengers using a bridge if one were built.

Isn't it a fact that that likelihood is dependent upon the location of the bridge and the convenience of the bridge?

A Yes, sir.

Q And that is not really something that you can answer here today without knowing exactly where the bridge is likely to be built?

A We have never done a study with a relationship between the tunnel and the rail passengers and a new pedestrian bridge. So, I couldn't answer that question.

Q In fact you testified that there were several different possible locations for the stairs or ramps to a pedestrian bridge; didn't you?

A My testimony with relationship to the stairs or ramps was in conjunction with a bridge immediately adjacent to the existing structure, and it was three different ramp configurations, straight-back ramps, switch-back ramps or circular ramps. That was all for a bridge in a location.

Q And that would be adjacent to the current structure?

A Yes.

Q Did you do any studies of water drainage along Spring Mill Road?

A No, we did not.

Q You didn't study water drainage at all, then?

A No. We studied the feasibility of -- inspection of the condition of the existing structure and the feasibility of a new structure at that location.

Q Also in your report you recommended that an in-depth inspection be performed of the existing structure. Is it possible, if in your opinion the existing structure has any deficiencies or any likely deficiencies, is it possible to post that structure for restricted loadings absent an in-depth inspection?

A Yes, if so ordered by the Commission.

Q It is not absolutely necessary in order to post it to do an in-depth inspection?

A No. We have --- it is common practice with the Department to post old bridges just to increase their life span. For instance, we may post a bridge for 15 tons knowing full well that additional heavy traffic will accelerate the rate of deterioration of the bridge, and although it may be adequate to carry legal loads, the continuation of legal loads across that bridge would more quickly generate the deterioration of the bridge. So, we post it for the prolonged life of the structure.

Q If I ask, would you recommend such a restricted posting of this bridge?

A If the likelihood of an in-depth inspection was far off, I would recommend it. If an in-depth inspection

would be carried out in a relatively near future, I think the inspection should be carried out first.

Q How much does an in-depth inspection run? Do you have any idea of the cost of that?

A When you're involved with a railroad in any kind of work with a railroad facility, it's extremely difficult to estimate anything.

Q What about the cost other than the cost of shutting down the railroad segment? What about just assuming there is no railroad there?

A It would vary. One of the intangibles we have here is encasement of the bottom chord. How difficult to properly inspect the bridge, we have to remove the concrete, and we don't know how difficult it would be to remove that concrete.

If you're looking for an average cost for an in-depth inspection, we have inspected bridges recently of that size for about 15,000, $20,000.

Q It is economically prudent to spend that sort of money inspecting a bridge that you intend to remove or replace in the near future?

A I would say economics don't strictly dictate here. If you said in the near future it would be 12 months or 18 months, I would say you would probably be better to post the bridge to be on the safe side and replace it and not do an in-depth inspection. We're probably looking down the road,

I would guess, five years before that bridge could be replaced, and for that period of time, I don't think it prudent to let the bridge carry legal loads without having it inspected.

Q But it might be prudent - might it not - to post it for reduced loading?

A If no inspection could be done in the near future, yes.

Q Mr. Mazor asked you if you considered locating the highway bridge at a different location. Did you consider closing it and perhaps diverting traffic to another nearby crossing?

A Well, that is the big problem that we have with this bridge, is there no good alternate detour route, and that has been part of our reluctance to post it, and this is why I feel an in-depth inspection to be carried out without posting it because of the lack of other crossings.

MR. ARMENTROUT: That's all I have, Your Honor.

MR. HUSS: No questions.

JUDGE FOUNTAIN: Do you have any redirect, Mr. Zahn?

MR. ZAHN: Yes, sir. There is one obvious question ---

JUDGE FOUNTAIN: Excuse me. I note that the attorney representing Radnor Township is here. Do you have any questions?

MR. EVANS: No, sir, I do not.

REDIRECT EXAMINATION

BY MR. ZAHN:

Q Mr. Flegel, one obvious question that wasn't asked of you that I thought might be asked on cross-examination. If Amtrak were to fix the pedestrian tunnel to make it usable at all times, would there be a necessity for building a new pedestrian bridge over the tracks?

MR. McDOWELL: Your Honor, I'm going to object to that question because it is in the record that not only the flooding of the tunnel is a problem but also as the record will show and as your initial opinion which was adopted by the Commission pointed out, it's the fear of female students or female passengers of the rail line to use the tunnel at night. So, it is not only the flooding in the tunnel which we're concerned with.

MR. ZAHN: My question was if it were properly done, that would include lighting, whatever is necessary to make that underpass usable.

MR. McDOWELL: Well, Your Honor, as was pointed out, and I remember the girl that testified said that she doesn't want to use it at night because she could get trapped down there.

JUDGE FOUNTAIN: I remember that girl's testimony. We held the hearing in Villanova itself.

MR. ZAHN: I remember that. That is one person's opinion.

JUDGE FOUNTAIN: Well, I am going to permit the question. Go ahead.

THE WITNESS: Yes. If the tunnel was properly fixed, it would give another access to get from one side of the track to the other without crossing the tracks themselves.

MR. ZAHN: That is all I have, Your Honor.

JUDGE FOUNTAIN: Any cross on that?

RECROSS-EXAMINATION

BY MR. McDOWELL:

Q Mr. Flegel, the new pedestrian walkway that you have talked about in your report indicates that there has to be a certain grade for handicapped people; is that correct?

A That is correct.

Q How would a handicapped person get through the tunnel, say, in a wheelchair?

A They would need assistance.

Q You are saying that could be properly fixed by Amtrak in some way to get the handicapped through there whether it's at night or whether it's not flooded?

A It would be difficult to get a handicapped person or wheelchair through the tunnel by a person of their own power.

MR. McDOWELL: That is all I have. Thank you.

MR. ZAHN: I move for the admission of PennDOT's Exhibit No. 3.

MR. McDOWELL: No objection.

JUDGE FOUNTAIN: It may be admitted.

Thank you, Mr. Flegel.

MR. ARMENTROUT: Your Honor, I would like to call Norman Satterthwaite, who has not previously testified here, to the stand to testify about the drainage report.

NORMAN SATTERTHWAITE, called as a witness on the part of Amtrak, being duly sworn according to law, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. ARMENTROUT:

Q Please state your name and your occupation.

A Norman Satterthwaite, Senior Civil Engineer for Amtrak.

Q And where is your office located?

A 1617 J. F. Kennedy Boulevard, Philadelphia.

Q And, Mr. Satterthwaite, have you participated in a study of the drainage in the existing tunnel at Villanova Station which was submitted to this Commission by letter dated March 23, 1982?

A Yes, I did.

Q Would you describe for the Judge and the parties here this morning what is contained in your report concerning

the drainage and the adequacy of the present tunnel?

A Basically the report is based upon the physical evidence that we found in the field, our observations during rainfalls whenever we were able to time it well so that we could get out there when it was raining and also reports from our field personnel who periodically would go out to pump the tunnel out whenever there was flooding. And based upon these observations and this information that we acquired from our field personnel, it seemed to us that the obvious source of the flooding was from the parking lot on the south side of the tracks.

It looked like, based upon simply the areas of the parking lot, that most of the water was coming from the parking lot of the university, Mendell Hall parking lot. It was flowing off the parking lot into the curb on the north side of the parking lot and then running down the sidewalk at least to the station, flowing down the steps to the station platform and then going down the steps into the tunnel.

Our field personnel had reported when they had been out there during heavy storms that they had witnessed water cascading down the steps on the south side of the tunnel. I myself had never been lucky enough to be out there when it was really raining hard. So, I never witnessed that.

We also theorized that some of the water was coming

from the Amtrak parking lot. It's a considerably smaller parking lot, also on the same side of the tracks, and was somehow bypassing the two inlets that are there.

We speculated that from time to time there would be accumulations of debris in front of the inlets, and perhaps that was the reason the water was ponding there and bypassing the inlets.

In fact, since we speculated that it was bypassing, we did perform some work last year and built a splash wall about a foot and a half high and linking the two inlets to keep the water from bypassing the inlets.

We also theorized that perhaps some of the --- there was silting in our track ditches upgrade from our tunnel. We noticed that particularly on the north side, and we also speculated perhaps this caused the water to be diverted out of the track ditch into the railroad roadbed and perhaps it was coming down the roadbed and then seeping through the tunnel walls into the tunnel. So, this was another possibility.

There was no evidence that there was water infiltrating the tunnel from the north side. It seemed to be strictly the south side.

The gutters, there are two gutters in the tunnel, at the north end of the tunnel which would pick up the tunnel flow and discharge it by way of a 12-inch gravity drain line

along the north side of the track and paralleling the tracks to a stream - I believe I have a report here - quite some distance away, 2,000 feet east along the railroad. And whenever there was a flooding of the tunnel, we would have private contractors come out and --- well, we would pump the tunnel out, and we would have private contractors come out and jet the discharge pipe clean of any accumulation, silt or sediment that might have been in the pipes, blockages that might have occurred and clean them out by jetting to restore normal flow.

It was not until I was gratuitous enough to make a trip out to the site this last Friday and lucky enough to be out there when there was a moderately heavy storm that I would have to --- as a matter of fact, I prepared an addendum to the report along with an illustration here which illustrates what I observed on Friday. I also prepared a sketch which is attached to the addendum I wrote up which describes what I saw on Friday.

JUDGE FOUNTAIN: Are you going to make that an exhibit?

MR. ARMENTROUT: Yes. I would like to make the report which has been submitted as an exhibit, and I would like to make the addendum an exhibit as well.

JUDGE FOUNTAIN: Did you submit any previous exhibits, Mr. Armentrout?

MR. ARMENTROUT: I think we submitted a map. Frankly, I don't really recall whether we did or not.

MR. McDOWELL: Amtrak 1 was a plan.

JUDGE FOUNTAIN: Mark the report Amtrak 2; the addendum thereto Amtrak 3 and the sketch Amtrak 4.

(Amtrak's Exhibit 2, being blue-bound booklet entitled "Drainage and Lighting Study, Passenger Tunnel, Villanova Train Station, Villanova, Pennsylvania," prepared by National Railroad Passenger Corporation, Philadelphia, Pennsylvania, March 1982, was produced and marked for identification.)

(Amtrak's Exhibit 3, being two-page document entitled "Addendum to Report on Villanova Station Passenger Tunnel Flooding," was produced and marked for identification.)

(Amtrak's Exhibit 4, being sketch entitled "Villanova University Complex," was produced and marked for identification.)

BY MR. ARMENTROUT:

Q Mr. Satterthwaite, would you describe what is contained in your addendum?

A Well, this is the railroad here on the right-hand side. Spring Mill Road is horizontally along the top of the sheet. And what I observed was --- first let me describe Spring Mill Road. The profile, of course, there is a high point in the center of the bridge. The bridge approaches come down a low point in the roadway of Spring Mill Road is right at the entrance of both the parking lot of Amtrak and the Mendell Hall parking lot. Then the roadway ascends

quite steeply on a grade and the crest of the hill is opposite this university building here, I judged. And during this moderately heavy rainfall, I observed considerable water coming off of this parking area down the driveway entrance to the parking area in a very heavy flow along the east side of Spring Mill Road descending toward the railroad in a northerly direction, and that heavy flow then swung into the brick gutter along the south side of Amtrak's parking lot, down the brick gutter. It partially bypassed, for the most part, I would say, bypassed the first inlet because of the sheer volume of the flow and went to the second inlet and was ponding at the second inlet, and I estimated it was ponding at about eight inches.

The pond seemed to be in equilibrium, which would mean that the inlet itself and the pipe connecting to it was handling the considerable flow that was coming down the gutter. The pond was practically on the verge of flowing around the corner of the parking curb and flowing along --- once it overflows, it would have flowed along the sidewalk and down the steps and into the tunnel.

I noticed puddles that had formed on the steps leading to the tunnel, and since there weren't puddles on the steps on the north side of the tunnel, I surmised before I got there that there had been a heavier intensity and the water had raised a little bit in that ponding in that inlet and had

gone down the steps.

I checked the track ditches upgrade from the tunnel, and there was no water in them at all. There was no flow at all.

There was no seepage from the tunnel at all. I would say it was moist, but there was no water flowing into the tunnel.

So, I observed the flow in the Mendell Hall parking lot along this northern curb, and there was a considerably lesser volume of flow along the curb, I would say one/twentieth the amount that was flowing into the Amtrak parking lot. And the new lip curb that the university installed across the sidewalk entrance was doing the job of diverting that flow down to the next inlet. So, there was no flow from the Mendell Hall parking lot at all.

So, to me it was pretty clear where the water was coming from. It was from the Spring Mill Road and quite a heavy torrent of gutter flow.

This drawing also illustrates what I would -- the obvious solution would be to pick up the flow in the gutter at the low point in the road at an inlet or perhaps a series of inlets, two or three inlets would be needed to completely cut off the flow from entering the Amtrak parking lot and discharging it someplace. It would probably have to be discharged into our ditch the way we show there.

There was very little flow on the west side of Spring Mill Road. It was all concentrated on the east side, and it was coming off of the university property in, more or less, sheet flows, the bulk of it coming in the driveway at the top of the hill.

As I said, I would describe it as a moderately heavy rain storm, and it was easy to imagine in a very heavy rain storm flooding of the tunnel this way.

Q Can you testify about any other improvements or repairs that have been made to the tunnel recently to alleviate this flooding condition?

A Our forces, I believe they pointed the tunnel walls, and the inlets that pick up any tunnel drainage, they were originally rather small, and our B and B forces installed larger inlets that would pick up the water better and replace the sections of pipe that join the two inlets and connect to the 12-inch pipe.

As I said before, our forces constructed a splash wall in the parking lot, and they also rebuilt both inlets to better pick up the water.

I made a number of recommendations in the report, some of which have already been implemented. One was the construction of a retaining wall at the outfall of the pipes from the parking lots and also the pipes that passed under the platform, train platform, and I believe that work has

been completed.

Other improvements included the work that the university did that I already mentioned, the lip curb across the sidewalk, which is doing a job, and the inlet which connects the two inlets and the sidewalk, that was also constructed.

Q In connection with question number four, you heard the Witness from PennDOT testify about his recommendation of replacing the Spring Mill Road bridge and building either a separate pedestrian bridge and also have a pedestrian bridge on the Spring Mill Road bridge.

Will Amtrak agree to assume any of the costs of that?

A No, they won't.

Q Will Amtrak agree to assume the cost of relocating its electric facilities that might be attached to the bridge and signal facilities and bearing the cost of any flag protection?

JUDGE FOUNTAIN: You're talking about the cantenary wires, Mr. Armentrout?

MR. ARMENTROUT: Yes, cantenary wires, and bearing the cost of any flag protection in connection with the construction.

THE WITNESS: Yes, we would.

MR. ARMENTROUT: That is all I have, Your Honor.

CROSS-EXAMINATION

BY MR. McDOWELL:

Q Sir, from your report which is dated March of 1982 and has been identified as Amtrak Exhibit 2, some of that is outdated now - is it not - since you come in with this addendum?

A Yes, that is right.

Q In other words, in your report you suspected that the water was draining out of the Mendell parking lot where you have indicated that the university put up a lip curb; is that correct?

A That is right, yes.

Q And the university also put a grate across that sidewalk which you have in your photos four and five; is that correct?

A Yes, sir.

Q And the combination of the lip and the grate has taken care of any problem that you suspected was coming out of the Mendell parking lot which is more accurately depicted in your photo number three?

A I would say it probably will correct the problem.

Q Well, it has been corrected; hasn't it?

A The work has been done, yes. All I am saying is that in a very heavy storm, I can't speculate that there wouldn't be some that would somehow bypass. But those seem

to be the two measures that would probably deal with the problem, and I would guess they would be pretty effective.

Q Well, last Friday it was taken care of.

A Yes, it was. The lip curb alone was taking care of the flow.

Q And prior to today's hearing when you brought in this addendum, that is what you thought the problem was coming out of the Mendell parking lot; is that not correct?

A That is what I thought was the bulk of the problem, yes.

Q Now, you come in with another problem, and that is what is in your Amtrak Exhibit 3?

A Yes, sir.

Q What do you propose be done to correct this particular problem that is in Amtrak Exhibit 3 and 4?

JUDGE FOUNTAIN: You mean specifically alleged causes of water on the highway itself?

MR. McDOWELL: Right. Your Honor, he has given us the problem but he doesn't say what should be done.

THE WITNESS: Well, on the illustration I show a proposed PennDOT inlet or inlets. In the report I mentioned ---

JUDGE FOUNTAIN: He did mention a series of inlets.

THE WITNESS: I think the addendum mentions, the last line, the recommendation at the end of the report ---

JUDGE FOUNTAIN: You mentioned a series of inlets on the highway when you were testifying.

BY MR. McDOWELL:

Q Just to be clear, then, you are saying that PennDOT should put in some inlets along Spring Mill Road to correct what you perceive is the problem now that is causing the flooding in the tunnel?

A Yes. The suggested correction is mentioned in the addendum on the last paragraph.

Q By the way, in your Amtrak Exhibit 4 when it gets into your Amtrak parking and where you saw the ponding, where does that inlet empty?

A The inlet empties to the ditch at the east end of the passenger platform, east end of the inbound platform.

Q Past the tunnel, east of the tunnel?

A Yes. These inlets interconnect, and then there is a pipe that --- we don't know the exact alignment, but it runs, more or less, on a straight line to the east end of the east-bound passenger platform and empties into the track ditch there.

Our personnel have cleaned out these pipes a number of times. So, that is how we have been able to find it.

Q So, you are convinced that the pipes going to the east end of the platform are clear?

A Yes, sir.

Q You didn't talk at all about your opinion as to the lighting in the tunnel. That's in your report. It's your opinion that the lighting is satisfactory; is that correct?

A Yes. I observed that when I was there Friday, and the lights were working and seemed to be perfectly adequate to me. I am not a lighting engineer, but it seemed to be quite adequately illuminated.

Q Okay. When you were there Friday, did you see any water coming in from the sides of the tunnel, seeping through the sides?

A No, there was no water seeping in through the sides at all. Dampness, but that was all there was. There was no water to speak of in the tunnel gutters except for some small puddling where there were accumulations of debris.

Q When was the work done by Amtrak that you talked about in connection with the tunnel, the repairs that you have done so far?

A The splash wall and the inlets were rebuilt in late 1981, I believe September or October 1981. The retaining wall at the east end of the east-bound platform was done, I would say, in the last few months.

Q Prior to April of 1982?

A I would say right around that time.

Q Are you aware or have you been advised by any of your subordinates that the tunnel flooded in April of 1982

which caused ankle-deep water?

A April?

Q Of 1982.

A Let's see. I heard about that --- it would have been about the right time, I guess, yes.

Q So, you are aware of it?

A Yes.

Q If you would please turn to your Exhibit B-1, which is attached to your report, do you have that in front of you?

A Yes, sir.

Q On that exhibit and by your testimony you have indicated that there is two inlets in the tunnel, at the north side of the tunnel?

A Yes, sir.

Q Do you know where they empty? Where does the water go from these two inlets?

A The water flows in a pipe, it flows north, and then the pipe bends and then flows east as it shows on Exhibit B in the 12-inch vitrified clay pipe to a stream about 2,000 feet north of the tunnel.

Q Again looking at the exhibit, does it flow down towards where Manhole No. 1 pump chamber is indicated on this diagram?

A Yes.

Q How large is the pump that is in that manhole?

A It's a two-inch diameter discharge pump.

Q And do you know how much water that would discharge in an hour, say?

A No, I don't.

Q Has any movement been made by Amtrak to place a larger pump in there?

A I am not sure of the situation as far as the pump goes. They may have installed a larger pump through the years. I know they did work on the manhole and improved the condition of the manhole, but I don't know, I am not sure about the pump.

Q Why is there a need for a pump in Manhole No. 1?

A The pump is to take care of any water that accumulates in the manhole and pump it into the stream, the nearby stream.

Q Or that comes from the tunnel and the tunnel inlets?

A Yes, sir.

Q Are there any sort of one-way valves or back-water valves that would keep the water from going back into the tunnel once it heads down toward Manhole No. 1?

A None that I know of.

Q Are you aware of such type of valves? Are you familiar with what I am talking about?

A Yes, I am familiar with the type of valves.

Q If they were placed in that pipe, could that help

the situation, help the tunnel from flooding? In other words, once water gets in there and you start pumping it, instead of it flowing back into the tunnel, wouldn't they help the situation?

A I am not sure they would exert enough force to close. Normally in instances that I have heard where they're used, they're activated by more pressure than would be exerted by the back-up of water in the pipe, but I really don't know. I can't answer definitively your question.

Q How often does Amtrak inspect the tunnel?

A I don't know how frequently.

Q And if there is a heavy rain, do you have any employees go out and see if it is flooding?

A Yes, they do.

Q So, on page four of your report you indicate that the university should alert Amtrak immediately at the first sign of flooding. You would also have somebody going out there if there was a heavy rain; correct?

A Yes.

Q Or a moderately heavy rain as you talked about last Friday?

A Well, the reason we suggested that university people participate is just that they're right on the site, and they could get the report to us that much quicker, and we could take action quicker.

Q The last three paragraphs at the bottom of page five of your report which starts, "There is additional work required of Villanova University," is that still a valid argument on your behalf since you come up with your addendum?

A On page five ---

Q You're referring to your photo number eight.

A I would say the ditches should be cleaned out just from a standpoint of good maintenance procedure, that they should function properly so that if there is any water in the ditch, it would be carried to the pipes through the passenger platforms, that should be done.

Q But since you have now come up with the new source of the problem which you set forth in your Exhibits 3 and 4, you are not really saying that Villanova should do what you have set forth in the last three paragraphs on page five; are you?

A Well, we would like to have Villanova send us any plans that they have or give us any information about pipes at outlets at that location that I mentioned in the report so we can stop the erosion of the banks that is occurring there so that we don't have the problem recurring of filling up the ditches.

Q You want plans that they might have ---

A Any information, plans or someone who knows where the pipes are. We haven't seen pipes there, but from the

way the erosion is occurring, it seemed like there was. We did notice inlets in the vicinity of the tennis court. So, we assumed there were pipes discharging from those and that is perhaps out the railroad embankment and slopes.

Q And then you are proposing to take further action as set forth on pages four and five of your report?

A Yes, we are.

Q And that estimated cost is $15,000, and is that cost that you are going to bear, you being Amtrak?

A Well, some of the work has already been completed. Like I said, the headwall has been built.

Q Well, whatever has not been completed and that you propose to do on pages four and five, that will be an estimated cost of $15,000, Amtrak is going to bear that?

A We propose to bear that cost, yes.

Q And what if that doesn't take care of the situation? Then what are you going to do?

A Well, as I said before, based upon what I saw Friday, I would be extremely optimistic that the inlets I'm proposing along Spring Mill Road would correct the problem. It just seemed pretty obvious to me as an engineer that that was the source of the problem.

Q Your plan on page four that you said would be approximately 250,000, what would that involve?

A That was the total rebuilding of that outfall line.

Q What is the outfall line?

A The 12-inch vitrified clay pipe that takes the tunnel drainage to the stream 2,000 feet away.

Q Now, if the proposal in your addendum, Exhibits 3 and 4, does not work and your other proposals on pages four and five that are going to cost 15,000 do not work, are you going to undertake this more expensive task?

A No.

Q You're going to let the tunnel continue to flood?

A It is much too expensive. I would say that once the proposal we are making in addendum three and four is --- once that work is completed, then we should see if the tunnel floods again. When the tunnel floods again, we are going to do what we have done in the past, namely have a contractor coms in and jet clean any obstructions, and we're going to ask that contractor to measure precisely how far in from the tunnel those obstructions are, and we can pinpoint the blockages. We suspect there is only a few blockages within the line. Some of them we feel are caused by tree roots because they got tree roots out in the past, and identifying those locations, and if necessary, excavate and replace sections of pipe.

It really doesn't make any sense to replace the entire line when the entire line is not at fault. Plus, once the improvements as I am suggesting in addendum three and four are

implemented, the load that is being put on that discharge pipe will decrease immensely.

Q Sir, going back to your Exhibit B-1 which is attached to your report, the Manhole No. 1 pump chamber, does the 12-inch pipe continue east also where you have pointed out there is a point of root damage?

A Yes. The 12-inch pipe continues east, yes, past that point.

Q So, if the water is coming out of the tunnel and comes east toward Manhole No. 1, it can either go towards the stream or continue on east; is that correct?

A I don't understand the question.

Q Well, you show on your drawing or your diagram that at the junction of where the Manhole No. 1 is that there is a two-inch diameter pipe going to the stream, which is in a northerly direction; correct?

A Yes.

Q And you also show at that junction that it continues east in a 12-inch clay pipe?

A Yes.

Q So, it can go one of two ways, to the stream or continue east?

A Well, of course, the original design, there was no pump. All the water was taken by the 12-inch vitrified clay pipe and discharged in the stream. The pump is a later

addition to pump out any accumulations of water in Manhole 1 as a result of some blockages that may occur downgrade from that point.

Q So, you need the pump, then?

A Right now we do, yes.

Q If you know, sir, will a two-inch pump get rid of the water that is going through a 12-inch pipe?

A It won't roplace a 12-inch pipe, no, it wouldn't take care of a 12-inch pipe discharge.

Q So, if there is a blockage at that manhole, it will back up towards the tunnel and into the tunnel?

A Well, it depends on how much blockage there is in the 12-inch pipe. The 12-inch pipe I don't believe is completely blocked off. There is some limitation of the flow.

Q It is possible, though - isn't it - for it to back up toward the tunnel?

A Yes.

Q It will not take care of all of that?

A Yes.

Q You are an engineer, and I would assume that you go to quite a few of these rail crossing type of hearings; do you not?

A Not really, no. Occasionally.

Q Have you gone and visited rail stations in the past?

A Yes, sir.

Q Where there is either a tunnel or an overhead pedestrian walkway, have you seen either one of those?

A Yes.

Q And passengers from your own knowledge, Amtrak passengers do use a pedestrian walkway; do they not?

A They do use a pedestrian walkway?

Q To get from one side of the tracks to the other.

MR. ARMENTROUT: I object to the form of that question, Your Honor.

JUDGE FOUNTAIN: What is objectionable about that?

MR. ARMENTROUT: Well, it is overly broad, for one thing. He is not giving the Witness any parameters. They use an overhead crossing compared to what?

JUDGE FOUNTAIN: First of all, Mr. McDowell, there is something on the record to the effect that both Amtrak passengers and university students do use that tunnel. If I am not mistaken, I think that came out at the initial hearing.

MR. McDOWELL: Okay.

JUDGE FOUNTAIN: I will sustain the objection.

BY MR. McDOWELL:

Q That being the case that it is of record that passengers do use the tunnel, wouldn't it also be the case that such passengers could use a walkway?

A Yes.

JUDGE FOUNTAIN: A what?

MR. McDOWELL: A pedestrian walkway that would go over the track from one side of the track to the other.

THE WITNESS: Yes. I would think --- if you wanted an opinion of the likelihood that they would use one or the other, the existing underpass versus a new overpass, I would say they would be much more likely to use the underpass because there would be much fewer steps to navigate.

BY MR. McDOWELL:

Q If it was flooded, if the tunnel was flooded, an overhead pedestrian walkway would be an alternative for such passengers; would it not?

A Yes. Definitely.

Q And for a handicapped person that had to get from one side to the other and was in a wheelchair, that would be a means to get from one side of the track to the other, a pedestrian walkway; correct?

A Yes, assuming it is designed for handicaps.

Q And if it was late at night and there was a female passenger that got off an Amtrak train and feared to use the tunnel, an overhead pedestrian walkway would be an alternative; would it not?

MR. ARMENTROUT: I object. We would stipulate that ---

JUDGE FOUNTAIN: Objection sustained.

Is that within the Witness' field of expertise to, more or less, speculate on that? I don't think so. I don't think the Witness is competent to answer. If he answers, I don't know how much value the answer will be to me because it will involve speculation.

MR. McDOWELL: I would submit, Your Honor, that since Amtrak passengers would use such a walkway, that Amtrak should bear part of the cost for such a walkway.

MR. ARMENTROUT: I will state for the record right now that there are no Amtrak passengers that ever use the Villanova Station.

JUDGE FOUNTAIN: Villanova students that come to Villanova are passengers on Amtrak trains; aren't there?

MR. ARMENTROUT: No, sir.

JUDGE FOUNTAIN: Are you saying that no Villanova students use Amtrak to Villanova?

MR. ARMENTROUT: The only trains that stop at Villanova are SEPTA commuter trains operated by Conrail. Amtrak does not have any trains that stop at Villanova.

JUDGE FOUNTAIN: I see.

MR. ARMENTROUT: That was the distinction I was drawing.

JUDGE FOUNTAIN: That was a good distinction. I assumed that Amtrak operated passenger trains.

MR. ARMENTROUT: No, sir. I think the first stop we

have outside of Philadelphia is Ardmore.

JUDGE FOUNTAIN: All right. Thank you.

MR. HUSS: What they do, Your Honor, is take the Amtrak train to Ardmore and then take the SEPTA Cenrail facility from Ardmore to Villanova.

JUDGE FOUNTAIN: Thank you, Mr. Huss.

MR. McDOWELL: That is all I have, sir. Thank you very much.

JUDGE FOUNTAIN: Who has any cross ---

MR. HERSKOVITZ: Just a couple of questions, Your Honor.

BY MR. HERSKOVITZ:

Q Just for clarification purposes, you are still recommending these items listed on page four and five of your first report; is that correct? You are still recommending that there are problems besides what were raised in your addenda today, that it still be corrected and the seven items listed on pages four and five of your report should still be performed; is that correct?

A I would say, yes, they should still be carried out.

Q And your addendum is not the new source, the new original source; it is an additional source of water; is that correct?

A I would say that the recommendations I have on page four and five are more cosmetic at this time after what I

observed on Friday just from the standpoint of good maintenance. They don't really focus, in my opinion, on the problem of the tunnel flooding. Based upon what I saw Friday, I would say -- I would even speculate that the sole source of water is from the ---

Q So, you are saying, then ---

JUDGE FOUNTAIN: He didn't finish.

THE WITNESS: From the roadway.

BY MR. HERSKOVITZ:

Q You are saying if you correct the roadway run-off, these seven items listed in your report, you can do without? Is that what you are saying, it won't make any difference to the flooding of the tunnel?

A Well, maybe we ought to take the items one by one.

The first item, monitoring of the drainage line, that should certainly continue because the drain line drains the tunnel. Whatever water collects in the tunnel, you still have to monitor the drain line flow.

The dye testing of the 12-inch pipe, we have already performed that work, and we were unable to find out where the pipe goes. The dye showed up nowhere. So, we're just going to have to leave that one lie. We guess it passes through the passenger platform and discharges somewhere because there hasn't been any backup of water in the pipe. So, the outlet must be clear. That is the only thing we can conclude.

Q What about number three?

A Number three, we still will do that. As a matter of fact, there is already instructions to our division to clean out the ditches for a distance of 400 feet upgrade of the, or, west of the passenger platforms. That work will be performed.

As I said, number four, the headwall ---

Q Excuse me. If number three is not performed, that will create a problem; is that correct?

A No. As I said, I didn't see any water in the drainage ditch at all when I was out there. So, I don't think it would present any problem.

Q The ditch does need cleaned out, though. If water gets in there, it could create problems; couldn't it?

A It should be cleaned out, I think, yes, just from the standpoint that it should be cleaned. It's as simple as that.

Number four should be done already. I didn't get a chance to look at the headwall when I was out there on Friday. They were working on it about a month, month and a half ago. So, I assume it is finished by now.

The field survey, I am not sure that should necessarily be done.

The trees I think should be taken down. There are a number of large trees that could possibly be causing root

damage to the outfall pipe, the tunnel outfall pipe, and they should be removed. The one reason we did not remove them was because our field people advised me that the university claimed that they were on their property, and based upon my measurements in the field, I'm pretty certain that they are on Amtrak property. So, I hesitated to have them removed until such time as perhaps after the hearing we could get some agreement on whose property they are on before we take them down.

Q Number seven?

A Well, as I said, if there are any more blockages in the tunnel pipe, we would try to identify where the exact point of blockage is so that we can decide what the next course of action will be.

Q And in 7-B you refer to a new pump manhole. You're talking about west of Manhole No. 1 depicted on your Exhibit B-1?

A Yes, west of Manhole 1. I would not do that until --- that would be fairly expensive, and I wouldn't do that until after the results of the work addressed in addendum three and four were done to see if there is any more flooding after these inlets on Spring Mill Road are done. I don't think it would be necessary.

MR. HERSKOVITZ: Thank you.

BY MR. ZAHN:

Q You state that your addendum shows that there is additional water flow from the roadway. Is that what you stated?

A It shows the flow from the roadway, yes, sir.

Q But that water comes from that parking lot at Barry Hall; does it not?

A Is Barry Hall the ---

Q That is the parking lot. It's not Mendell Hall parking lot, which is the one closer to the station. But the one that is marked "parking" where you said you saw additional water coming out of there, that is Barry Hall parking lot.

A I observed quite a lot of flow coming down that driveway from that hall that you mentioned.

Q And that is the water that is running onto the highway?

A Well, I would say that that contributes quite a bit. There is sheet flow across all of that ground onto the highway.

Q Are there any drainage facilities on that Barry Hall parking lot?

A Once I saw the water flowing down the driveway, I was getting wet. So, I didn't go up and look around the parking lot to any great extent. So, I can't say whether there

was any drainage facilities.

Q But if there were drainage facilities there, would that take some of that flow away from the highway?

A If there were and they didn't discharge onto the highway, yes, they would.

Q And that is not the facilities that you have, your photographs three and four, the drainage area there?

A Three and four are in the ---

Q That's the Mendell Hall ---

A The Mendell Hall parking lot drains in the opposite direction, drains towards the east. So, there is no water coming from the Mendell Hall parking lot onto the roadway, at least no substantial amount of water.

Q If that type of drainage were placed in the Barry Hall area, would that decrease the flow of water?

A I don't know what type you are talking about.

Q Well, you have your photographs three and four.

A You mean the lip curb type of approach?

Q No. Yes. The drain that is in the roadway and photograph --- I guess it's four and five.

A Well, the photograph four and five, it's just a matter of diverting the flow from getting across the sidewalk and keep it from getting into the sidewalk. This other situation is quite a bit different because a lip curb certainly wouldn't do the job. It would just stop the water

and make it go --- it wouldn't change the direction of flow at all.

Q I am not talking about the lip curb. I am talking about the drain that is placed in the area there.

A Well, if you put drains near the roadway to pick up flow from the parking lot, the next question would be: Where do the drains discharge to. And I have some highway experience, and the drains would have to follow the line of Spring Mill Road down to the bottom of the road. It would be the only way to design the project, I would say. You still end up at the same point at the bottom of the road, at the low point in the profile of the road.

Q And that would be the only way, in your opinion, that that drainage could go?

A To me it seemed to be, based upon my observations Friday, that would be the logical way to go, yes. I didn't see any other solution.

Q Now, if that parking area were not paved in Barry Hall and that was earth and ground, would that absorb any of the water?

A Can I extend my answer to the previous question?

To make a full study would require much more of an examination and survey work of the ground there. I suppose it's possible that the drainage at the upper part of the hill, at the hall that you mentioned --- what was the name

of that?

Q Barry.

A Barry Hall, I suppose it could be drained somehow down through the university property, but the ground seemed to fall to the roadway as well as down toward the railroad. So, it would really require a greater study.

Q But it's a fact, the fact it is concreted over that prevents the water from being absorbed in the ground? Is that not so?

A Well, I can't answer.

JUDGE FOUNTAIN: I don't know what kind of question that is. You mean the university shouldn't pave the parking lot to help with the drainage situation?

MR. ZAHN: I didn't quite get it.

JUDGE FOUNTAIN: Are you inferring or implying that the university shouldn't have paved Barry Hall parking lot in order to facilitate the drainage problem?

MR. ZAHN: No. What I am inferring is that the parking paving creates an additional flow of water onto the highway and the university should have put drains in the parking lot to take care of it, and that is a known fact.

JUDGE FOUNTAIN: This is one of the few times I have found you weren't persuasive, Mr. Zahn.

BY MR. ZAHN:

Q In your opinion, could the facilities, drainage

facilities in the Amtrak parking lot be increased to handle that additional flow of water from Spring Mill Road?

A Well, I don't know why, it seems illogical to me to increase the capacity of the Amtrak parking lot drainage when the water is coming off from the state highway. I have been led to believe that the water that accumulates on the state highway is taken care of by inlets and drains on the highway itself. It doesn't make sense to improve private drainage facilities to take care of water off of state roads.

Q That wasn't my question.

A Yes.

Q My question was: Could the increased facilities there take care of it?

JUDGE FOUNTAIN: Where?

MR. ZAHN: In the Amtrak parking lot.

JUDGE FOUNTAIN: In the Amtrak parking lot?

MR. ZAHN: Yes, sir.

THE WITNESS: I suppose it would be conceivable it could be done, yes. You have to put in, I would guess, a good-sized wall around the parking lot and quite large inlets.

BY MR. ZAHN:

Q According to your exhibit on your addendum, the flow of water, you seem to show it coming down that brick gutter. You got it marked "heavy gutter flow."

A Yes. It comes down the brick gutter, off the Spring Mill Road and down the brick gutter into the parking lot.

MR. ZAHN: Thank you, sir.

JUDGE FOUNTAIN: Is that it?

MR. ZAHN: Yes.

JUDGE FOUNTAIN: Anybody else have any questions?

(No audible response.)

JUDGE FOUNTAIN: Any redirect?

MR. ARMENTROUT: No, sir.

JUDGE FOUNTAIN: One thing I would like to get straight in my mind on the Barry Hall parking area. Say the university did install some sort of drainage there, would that help the situation vis-a-vis the water flowing onto the state highway? In your testimony, did you indicate that regardless of whether any drainage facilities were installed at Barry Hall, because of the natural flow of water it would have no effect whatsoever? What are you telling me?

THE WITNESS: If inlets were constructed at Barry Hall and the discharge was not directed to Spring Mill Road, it would help quite a bit. There would still be water coming off the other areas, the grassed areas and the other areas that would still get on to Spring Mill Road, but it would help.

JUDGE FOUNTAIN: I seem to get the indication when you

testified previously on that point, regardless of the fact that any drainage facilities were installed at Barry Hall parking lot, there would still be that problem water going through or forming on the state highway, which in turn causes the flooding in the tunnel.

THE WITNESS: Well, the slope of the ground ---

JUDGE FOUNTAIN: Contours, yes.

THE WITNESS: The contours go toward the road. So, I assume that if you installed inlets, let's say, you probably have to install them out to the road. Then when I thought about it the second time, it would be possible to install inlets in this area here and bring them down through the ---

JUDGE FOUNTAIN: What are you pointing to?

THE WITNESS: I am pointing to Barry Hall. And I am saying that if inlets were installed in the Barry Hall parking lot area, it's conceivable, depending on the contour of the ground and all, conceivable that they could be brought due north through the university property and somehow connected to the track ditches. But just based upon my observations and the fact that the water was going out to the roadway, if I was looking at the most economical solution, it would be the water up at the bottom of the -- the base of the grade at Spring Mill Road.

JUDGE FOUNTAIN: That is the more economical feasible

approach - is that what you are telling me - rather than that involved subterranean plummet? Is that what you are telling me?

THE WITNESS: I would say so. The other consideration, too, is the fact that you would have quite a lot of gutter flow in the Spring Mill Road itself, and I suppose that would have to be taken care of by a series of inlets along Spring Mill Road to keep the level from getting too high in the gutter. But it is hard to speculate on something like that when you're not that familiar with the entire terrain.

JUDGE FOUNTAIN: Where would that swell be diverted assuming inlets on Spring Mill Road? Would that be diverted away from the tunnel with drainage on the state highway itself?

THE WITNESS: It would be picked up in the gutter, and the most direct discharge point is due north to the Amtrak drainage ditch, west of the east-bound platform. It's the shortest distance from the low point in the road. So, that is the most logical point.

We would prefer that somehow it would be discharged to the east end of the passenger platform so that we wouldn't have to carry that water through the pipes to our passenger platform, but that requires a much longer run of pipes. I just showed the most direct route.

JUDGE FOUNTAIN: What I am asking you, assuming

installation of the drainage grates on the state highway, would the flow, therefore, be directed away from the tunnel?

THE WITNESS: Yes. It could be completely picked up right on the roadway.

JUDGE FOUNTAIN: That is all I wanted to know.

MR. HUSS: One question.

BY MR. HUSS:

Q On the -- I guess this is Exhibit 3 and it's the plan that is attached, ---

A Yes.

Q --- you indicated on the plan a proposed PennDOT inlet, and what I seem to hear in your testimony now was perhaps a series of inlets. Are you talking about more than one?

A Well, that is getting into detailed design. Due to the grade of the highway and the volume of the flow, normally PennDOT puts two or three inlets in series at low points in profile, so that if one is plugged up, there is always one that works, and it would also be helpful to put two in series to make sure you completely pick up the flow. If one is bypassed, there is always another one.

MR. McDOWELL: Your Honor, could I ask one question based upon the questions you had of the Witness?

BY MR. McDOWELL:

Q Sir, on your diagram, which is Amtrak Exhibit 4, you

have indicated - have you not - that water comes down Spring Mill Road from a high point which is beyond the Villanova parking area that you have been talking about?

A Yes.

MR. McDOWELL: That is all I have. Thank you.

JUDGE FOUNTAIN: Mr. Mazor?

MR. MAZOR: We have not been asked to testify at all, Your Honor. There are no questions or procedures directed to us at all. Villanova is next on the list, Your Honor.

JUDGE FOUNTAIN: I understand. All right.

MR. McDOWELL: Your Honor, I will first call Doctor Richard Neville. He has not been previously sworn in.

RICHARD NEVILLE, called as a witness on the part of Villanova University, being duly sworn according to law, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. McDOWELL:

Q Sir, would you state your name and your position with Villanova University for the record, please?

A My name is Richard Neville. I am the Vice President for Student Life at Villanova University.

Q And was your predecessor Father Degan(sic) who testified in this proceeding?

A Yes, it was.

Q Are you aware of what has transpired up to this point

involving this complaint?

A Yes, I am.

Q And have you been in the hearing room this morning when reports were given by PennDOT and Amtrak?

A Yes.

Q And first turning to the PennDOT report, what is your position or what is Villanova's position regarding the building of a new bridge with a separate pedestrian walkway attached thereto?

A We feel that that is a very needed and necessary and over-due solution to the problem, a new bridge with a pedestrian walkway on the bridge, part of the bridge.

Q And why the separate pedestrian walkway on the bridge?

A It seems to me that PennDOT is responsible for supplying safe crossing of the tracks for pedestrians in the area, and not only for vehicles but pedestrians, and that bridge is not safe for pedestrians as it now exists.

Q What is your opinion as to PennDOT's present way of getting pedestrians from one side of the bridge to the other?

A It seems to me that PennDOT has supplied no way other than walking in the road itself to go from one side of the tracks to the other.

Q And does Villanova wish to share in any of the

costs of a new bridge and attached walkway thereto?

A We feel that is not appropriate for Villanova.

Q And why not?

A Because it is a PennDOT service. It's part of the state highway system. And, consequently, the state should supply the roadway as well as pedestrian crossing independent of the university being there.

Q Also were you in the hearing room when the representative of PennDOT talked about a separate pedestrian walkway and the location of such a walkway?

A Yes, I was.

Q And what is Villanova's position on that separate walkway?

A It seems to me the separate walkway is a solution to getting pedestrians from one side of the bridge to the other. Moving that pedestrian walkway further from the bridge does not really meet the needs of many of the pedestrians who might be walking down the road. If that pedestrian walkway is put back further into the university property, it seems to me that would not be meeting PennDOT's responsibility to get pedestrians from one side to the other. Attaching that to your bridge would, but I am sympathetic to the idea that if PennDOT is going to build a new bridge which is in its plans and especially if those plans can be moved up to a reasonable time and a pedestrian

crossing put on that bridge, that would be a much better solution to the problem.

Q Is Villanova in favor of having a separate pedestrian walkway built in the very near future to alleviate the problems while a new bridge is built?

A It's certainly a possibility to do. That would be something that you could put in.

Q And is the location that PennDOT has proposed, does that meet with your approval?

A Certainly I would be in favor of putting it at a place that would meet the needs that we can identify. It seems to me that is not a university need but that is a pedestrian need independent of the university's pedestrians.

JUDGE FOUNTAIN: Even if it encroached on university property?

THE WITNESS: If there is going to be a condemnation of properties and so on, we would be glad to look at the possibilities of that. I am not sure what all of that would mean or if that is the way to go necessarily. But we are very much in favor of the safety of not only local Radnor residents but also the university students. We are quite concerned about getting them across those tracks in a safe way. It seems to me PennDOT has a responsibility in that way as well as Amtrak has a responsibility differently.

BY MR. McDOWELL:

Q Does Villanova at this time wish to share in any of the costs of a separate pedestrian walkway over the tracks?

A I don't think we would be willing --- we would be willing perhaps to look at grounds or how that would infringe on our own property, but we would not be willing to contribute to that bridge at this time.

Q And you were also, as you indicated, in the hearing room when the report of Amtrak was presented and also its addendum which was Amtrak's Exhibits 3 and 4.

What is your position on the proposed future action of Amtrak as set forth on pages four and five of its report?

A I think I am in favor of Amtrak continuing to do the work that they are doing to try to solve this problem. And if more work can be done - the addendum is, of course, new as of this morning - but that is another possibility.

And lacking that, it seems to me that Amtrak then has to look at long-term improvements in that tunnel. It seems to me that really the problem is in the 12-inch pipe, where that goes and how much water it can handle.

Q And as indicated by the representative of Amtrak, it's assuming to bear the initial costs of approximately $15,000 for its proposed action. So, you don't care to share in that cost?

A I don't think so.

Q And also attached to Amtrak's report was the lighting condition within the tunnel. What is your position on that?

A The lighting has been improved, obviously. There is more lighting down there. It makes the tunnel much more bright.

JUDGE FOUNTAIN: Do you think under those circumstances, Doctor, that the tunnel is illuminated to provide passage without any problems?

THE WITNESS: You can certainly see your way through that tunnel and you know you can get through it.

JUDGE FOUNTAIN: You can see from one end to the other ---

THE WITNESS: Yes, you certainly can.

JUDGE FOUNTAIN: --- with the illumination that is presently there?

MR. McDowell. Okay. That is all I have of this Witness. I do have one other witness I would like to call after cross-examination.

JUDGE FOUNTAIN: Any cross-examination of Doctor Neville?

MR. ZAHN: Yes.

CROSS-EXAMINATION

BY MR. ZAHN:

Q Sir, if I understood your testimony, you are saying

that the university, their preference would be to build a new bridge as soon as possible and forget about this pedestrian over-pass?

A If you could guarantee a bridge there with a pedestrian walkway within two years, some reasonable amount of time, and Amtrak would keep their tunnel from being flooded in the bad weather, that would be the university's position.

Our position is that PennDOT has the responsibility and Amtrak has and those two groups going together to give the pedestrians some options which we now do not have.

Q Then you would be satisfied, I take it, if it could be moved up in a two-year period, that your students would walk along the gutter of that state highway? You don't have any sidewalks; do you?

A That is right.

Q You didn't provide any sidewalks for your students in that area?

A Along the highway?

Q Yes.

A No.

Q Not along the highway; on your property.

A On our property along the highway, no, we didn't.

Q No pavements.

So that for a two-year period, your students would have

to walk as they are now?

A On part of the property, the law school, there is a walkway. The other part where we're talking about the flow, there is no paved walkway there.

Q If the new bridge did provide for a pedestrian walkway, would the university build sidewalks on their property?

MR. McDOWELL: I object to that. It has already been testified by Mr. Flegel that there can't be a separate walkway on the existing structure.

MR. ZAHN: I didn't say that.

JUDGE FOUNTAIN: That is not his question. He is not talking about the cantilever bridge on the present structure.

MR. ZAHN: I am talking about a new structure.

MR. McDOWELL: Okay. Excuse me. I misunderstood.

THE WITNESS: I am not sure because I am not sure how much need there is for sidewalks up on that part of the property. It seems to me the students would walk down through the property, through the parking lot and up over the bridge. They don't need to walk down 320 from coming off John Barry or the other buildings there. The flow would be down through Mendell and then up over the bridge.

BY MR. ZAHN:

Q What about the St. Mary's side of the road?

A They could cross over to, unless you put pedestrian

things on both sides of your bridge, they would cross 320 and come across the bridge.

Q Then I assume that the university has no idea of building any sidewalks at all approaching that bridge?

A The university would build them where we feel they're needed and helpful. I'm not saying we won't build them. If we feel students are walking there and we need sidewalks, we will certainly build sidewalks.

Q You heard Mr. Flegel testify that it's impossible to build a new bridge within the two-year time span that you spoke of because of the five years. What is your feeling if it were five years to replace that bridge starting now?

A Then a walkway certainly would be an answer to that problem. You can't put a price tag on a life. We have already had one experience like that, probably more.

JUDGE FOUNTAIN: Would you mind reading that question and answer back to me?

MR. ZAHN: Thank you, sir.

JUDGE FOUNTAIN: I want to hear that question and answer read back.

(Whereupon, the following was read by the Reporter as requested:

"Q You heard Mr. Flegel testify that it's impossible to build a new bridge within the two-year time span that you spoke of because of the five years. What is your feeling

if it were five years to replace that bridge starting now?

A Then a walkway certainly would be an answer to that problem. You can't put a price tag on a life. We have already had one experience like that, probably more.")

JUDGE FOUNTAIN: When you say walkway ---

THE WITNESS: A pedestrian walkway, a bridge.

JUDGE FOUNTAIN: You mean an overhead pedestrian bridge?

THE WITNESS: Sure.

MR. ZAHN: Thank you, sir.

REDIRECT EXAMINATION

BY MR. McDOWELL:

Q Doctor Neville, you mean a separate pedestrian walkway?

A Yes.

MR. McDOWELL: I don't have any other redirect.

JUDGE FOUNTAIN: Does anybody else have any cross of Doctor Neville?

(No audible response.)

MR. McDOWELL: I would call my next witness and ask that he be sworn in.

THOMAS N. TRUCKS, called as a witness on the part of Villanova University, being duly sworn according to law, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. McDOWELL:

Q Sir, would you state your name and position at Villanova University for the record, please?

A Thomas N. Trucks, Director of Maintenance at Villanova University.

Q Did you want to spell your last name?

A T-R-U-C-K-S.

Q And as Director of Maintenance, what are your duties?

A I am in charge of maintaining all of the buildings, all of the grounds, utilities at Villanova University.

Q How long have you been in that position?

A At Villanova, about four and a half years.

Q Are you familiar with the bridge on Spring Mill Road that goes over the rail tracks and also the tunnel at that location?

A Yes, I am.

Q And have you been in the hearing room this morning when a representative from Amtrak put in Amtrak Exhibit 2, which is their report?

A Yes.

Q And were you also in the hearing room when testimony was given concerning Manhole No. 1, this pump chamber?

A Yes, sir.

Q Do you have any recommendations regarding that particular pump chamber?

A Well, it's hard for me to understand - and I am an engineer - why you need a discharge pump in a manhole that has a 12-inch inlet and a 12-inch outlet. Why is the pump necessary? And then in your statement here, one of your recommendations is to enlarge that pump. Now, you should not need it, number one, unless the flow is restricted in your discharge pipe. Then you are depending upon that pipe to get rid of whatever water is in that manhole in a storm. If that pump is not of sufficient size to do that job, then the water will back up into the tunnel.

Q Mr. Trucks, what are you saying should be done?

A I am saying that the pipe from Manhole No. 1, the 12-inch pipe, must be cleared to the stream to prevent flooding of that tunnel, and there is no other way that it can be done.

Q Have you visited the tunnel within the last week?

A Yes.

Q And in that period, did you notice any water within the tunnel?

A Yes. I was in the tunnel this morning at approximately 8:20. There was a flow of water through the wall on the east side of the tunnel, I would estimate at least two gallons per minute. On the north end of the tunnel

where your two drains, catch basins, drains, whatever you want to call them, are, one was completely covered with grass. The other one was about 50 per cent covered with grass. And all of the water came into that tunnel recently, brought this grass in, came from the north side, not the south side.

Q The north side being the St. Mary's or law school side?

A Yes. That is where all of the grass that Amtrak or someone apparently cut yesterday came into that tunnel down those stairs this morning.

Q And has there been a recent rain in the Villanova area?

A It apparently rained during the night last night. I wasn't there. There were signs of it, yes.

MR. McDOWELL: That is all I have. Thank you, sir.

JUDGE FOUNTAIN: Any questions, any cross on this Witness?

MR. ARMENTROUT: Yes.

CROSS-EXAMINATION

BY MR. ARMENTROUT:

Q Mr. Trucks, you said you saw grass on the stairs?

A Stairs and in the bottom of the tunnel where your drains, catch basin or whatever you wish to call them, are located.

Q And you determined that that grass came from the

St. Mary's side. How did you determine that?

A There was none on the Mendell Hall side. All the grass down the steps was on the westbound side, which is the side I'm talking about, train going westbound.

Q Grass you say you saw was on the stairs.

A Photograph two here, this one was completely covered; this one was half covered; and there was grass on these steps here. There was no grass this side of the tunnel at all.

MR. McDOWELL: Where are you referring to? Photo two, Amtrak Exhibit 2.

THE WITNESS: Yes, sir.

MR. ARMENTROUT: I have no other questions.

JUDGE FOUNTAIN: Your solution to the problem with the tunnel flooding is, you say, clearing out a drain, Mr. Trucks?

THE WITNESS: Yes, Your Honor. On the maps that Amtrak supplied here and Exhibit B-1 here, what they show is the tunnel has two drains in it that go into a 12-inch clay pipe that runs down to Manhole No. 1 pump chamber. From that manhole there is a 12-inch, also, discharge line that goes on down to the stream. Now, normally, anything that would come in this 12-inch line should be drained by that 12-inch provided it is clear. And if that were clear, I don't believe you would have any trouble in the tunnel. What I think one of the problems is, the mainproblem is that this

discharge line, this 12-inch pipe from Manhole No. 1 is partially blocked. Otherwise there would have been no need for them at any time to put a sump pump in that manhole except to get rid of water that would not go down the 12-inch pipe.

Now, if it rained and if this pipe here cannot take the water away fast enough, nor can that two-inch diameter pump, it fills up, it comes back into that tunnel, and I have actually seen water coming out of those inlets rather than into them in the past.

JUDGE FOUNTAIN: Are you finished with your cross?

MR. ARMENTROUT: Yes.

JUDGE FOUNTAIN: Anybody else have any cross?

MR. ZAHN: Yes.

BY MR. ZAHN:

Q Sir, according to your testimony, would there be any need for the suggested inlet drain that Amtrak proposed in their Exhibit No. 3?

JUDGE FOUNTAIN: You mean on Spring Mill Road?

MR. ZAHN: On Spring Mill Road.

THE WITNESS: I don't think I am qualified to answer that question right now. I have never actually seen the conditions described by Amtrak personally. I don't know.

BY MR. ZAHN:

Q Are you on the premises every day?

A Yes.

Q You travel the area every day?

A Yes, sir.

Q In your opinion, the flow is coming from the west and, from the north side or west portion of the track?

A What I saw today, yes.

MR. ZAHN: Thank you.

JUDGE FOUNTAIN: Anybody else with any cross-examination? Do you have any redirect?

MR. McDOWELL: Nothing, Your Honor.

JUDGE FOUNTAIN: Do you mind if I put a question to your flood engineer?

MR. ARMENTROUT: Mr. Satterthwaite.

JUDGE FOUNTAIN: Did you hear the comments of Mr. Trucks on the subject? I would like to have your comments.

WITNESS SATTERTHWAITE: The tunnel slopes from the eastbound side to the westbound side. So, I can understand why there would be straw around the inlets. Any straw that would come in from either side would end up being washed to the low point in the tunnel, which is on the west-bound side. So, that doesn't refute my theory of Appendix 3 and 4.

The straw on the steps I can't explain unless it was tracked up there. I would think if water came down the steps on the north side, it would have washed that straw down to the bottom of the tunnel.

JUDGE FOUNTAIN: What about his conclusion that the

tunnel flooding would be alleviated or possibly taken care of altogether by a cleaning of the drains? Wasn't that his overall solution?

WITNESS SATTERTHWAITE: As I understood his answer, he said that was the sole solution to the problem, was cleaning that 12-inch line out.

JUDGE FOUNTAIN: What do you think about that?

WITNESS SATTERTHWAITE: My feeling is, keep the water from getting into the tunnel first and surface water from outside in quite a large volume that is getting in there, that is the number one step, to keep it out of the tunnel, and then whatever accumulates in there, then go to the 12-inch line.

JUDGE FOUNTAIN: His suggestion would compliment your suggestion as far as the overall solution?

WITNESS SATTERTHWAITE: I would say so, yes. But I think the primary thing to accomplish is to keep the surface water out first. The 12-inch line was not designed to handle water from outside, surface run-off.

JUDGE FOUNTAIN: All right.

MR. HUSS: George Stanley. He has not been previously sworn.

GEORGE STANLEY, called as a witness on the part of SEPTA, being duly sworn according to law, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HUSS:

Q Mr. Stanley, would you give your name and address to the Court Reporter?

A George J. Stanley, 200 West Wyoming Avenue, Philadelphia, Pennsylvania.

Q What is your title?

A Senior Civil Engineer.

Q And are you authorized to testify on behalf of SEPTA?

A Yes, I am.

Q SEPTA has been directed to answer a question seven, which is to submit testimony commenting on PennDOT's report and Amtrak's report.

What is SEPTA's ---

A I have read both reports, sir, and SEPTA takes no exceptions.

Q SEPTA has also been asked to respond, if the improvement is ordered by the Commission, what portion of the cost thereof it would agree to bear.

A SEPTA is of the opinion that the cost of any improvements ought to be absorbed by the highway users or other parties.

MR. HUSS: That is all I have, Your Honor.

JUDGE FOUNTAIN: Any cross on that?

MR. ZAHN: No questions.

MR. McDOWELL: I have some.

CROSS-EXAMINATION

BY MR. McDOWELL:

Q Mr. Stanley, are any SEPTA passengers using the Villanova train station that you know of?

A I would believe so.

Q And such passengers, it would be a convenience if there were an overhead pedestrian walkway if the tunnel were flooded or if they feared to go through the tunnel; would they not?

A Yes, that would be a fair assumption.

Q SEPTA won't pay any of the costs for such a convenience to its passengers?

A That is right, sir.

MR. McDOWELL: That is all I have.

JUDGE FOUNTAIN: Mr. Evans?

MR. EVANS: Mr. Guernsey hasn't been sworn yet.

CHARLES B. GUERNSEY, called as a witness on the part of Radnor Township, being duly sworn according to law, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. EVANS:

Q May I have your full name and address for the record?

A Charles B. Guernsey, Township Manager, Radnor Township. My address is 22 Oakford Road.

Q How long have you been Township Manager of Radnor?

A Since 1975.

Q Have you reviewed both Amtrak's report as well as PennDOT's report?

A I have.

Q Did you find any exceptions to those reports?

A No, I did not.

Q And we have been asked by the Commission to state whether or not Radnor Township would agree to bear any of the cost should the improvement be ordered. What is Radnor's position on that?

A Radnor's position is that they would not be willing to bear any of the costs.

Q Why is that?

A Because we feel that the problem is one of PennDOT, Amtrak and Villanova.

MR. EVANS: That is all of the questions I have.

CROSS-EXAMINATION

BY MR. McDOWELL:

Q Mr. Guernsey, are you aware of some recently constructed pedestrian walkways over the P & W tracks on Latches(sic) Lane and Garrett Avenue?

A Laurie's Lane.

Q Okay. Are you aware of such a pedestrian walkway?

A I am aware the township replaced two bridge

structures there and have made them accessible for pedestrians.

Q And that goes over SEPTA tracks; correct?

A Correct.

Q And the township you say did bear the cost for such construction?

A One of them was done under the urban system grant, and the other one was completely borne by the township.

Q And why did the township bear the cost in one instance?

A Because in both cases we would have liked to have had them urban system grants. However, we found that that was a more expensive way even for the township to do it with the federal red tape, so that we did the other one on our own. They are both local streets, they're both wholly within the township, and also we had a safety problem with fire trucks and school buses.

Q Villanova is within your township; correct?

A That is correct.

Q And local people use the Villanova facility; do they not?

A Yes, and we consider the Villanova student population as part of the township.

Q And for safety reasons, wouldn't you consider bearing some of the cost of a separate pedestrian walkway

over the tracks?

A No, I don't think we could at this particular time. I do know that we have agreed to make other expenditures in that area for the safety of the students in regard to an application we have in front of PennDOT for a walk signal to cross the students on North Spring Mill Road.

Q Wouldn't you agree with me, sir, that a separate pedestrian walkway over those tracks would be a safety feature to Villanova students, faculty and other residents of your township?

A No, I cannot agree to that.

Q It wouldn't be a safety feature for such people?

A If it were connected with the roadway it would be helpful. However, they do have a way of getting across the tracks now, and if the flooding condition and the lighting condition were improved, I personally cannot see the need at this time of an additional pedestrian overpass. If it were going to be a reconstruction of the bridge, I could see it.

Q And you would bear some of that cost, then?

A That is a whole other ball game. I feel that is a PennDOT responsibility.

Q But that was in a report of PennDOT today?

A Correct.

Q And will you bear any of that cost of a new bridge?

A No, we would not be willing to bear any of that

cost.

MR. McDOWELL: That is all I have. Thank you, sir.

MR. ZAHN: Just one question.

BY MR. ZAHN:

Q Radnor Township receives liquid fuels tax funds from the Commonwealth?

A I think you know the answer is yes.

MR. ZAHN: Thank you.

JUDGE FOUNTAIN: Anything else?

MR. HERSKOVITZ: Your Honor, I would like the record to indicate that there is no representative from the County of Delaware at today's hearing, and they were duly notified.

MR. ARMENTROUT: Your Honor, I have one matter. I neglected to move the admission of Amtrak's Exhibits 2, 3 and 4. I would like to do that at this time.

JUDGE FOUNTAIN: Any objection?

MR. McDOWELL: No objection.

JUDGE FOUNTAIN: They will be admitted.

I don't know if I got a communication from a representative of Delaware County.

MR. McDowell: We didn't, Your Honor.

MR. HERSKOVITZ: I don't think they were present at any of the hearings.

MR. MAZOR: I don't think they showed up at the original hearing.

(Off-record discussion.)

JUDGE FOUNTAIN: The hearing is concluded. We will close the record. No further hearings unless informed to the contrary. Thank you.

(Whereupon, at 12:35 o'clock p.m., the proceeding ended.)

--oOo--

I hereby certify that the evidence and proceedings are contained fully and accurately in the notes taken by me during the hearing of the within cause, and that this is a true and correct transcript of the same.

RAY E. SWEIGART, R.P.R.

HOLBERT ASSOCIATES
1001 North 2nd Street
Harrisburg, Pa. 17102

Response to the PUC C-80011839 Entered June 26, 1981

In an order entered on June 26, 1981, the PUC, in Docket #C-80011839, has charged the Penna. Department of Transportation to study the feasibility of constructing a pedestrian crossing over the tracks of Amtrak at or near the crossing of the Spring Mill Road Bridge, LR 225 Sta. 784+21. The study is to include the following considerations:

1. Attachment of a pedestrian bridge to the existing highway bridge.
2. Replacing the present highway bridge with a modern structure.
3. Constructing a pedestrian bridge at another location and cost for such a bridge.
4. Other feasible alternatives.

The existing highway bridge on Spring Mill Road was built in 1875. In 1945 new floor beams along with a filled grid deck was placed on the bridge; some of the tie rods were replaced; the bottom chord was encased in concrete (which now leaves the tension chord uninspectable); the ends of the arch was cut off at the first bay of the truss; new concrete end posts were installed; work was performed at the bearing areas.

The first item for consideration is the condition of the existing bridge. Toward this end we found another bridge of almost identical construction over Amtrak's tracks in the town of Gap in Lancaster County. The bridge is located on TR 741 near the intersection with TR 41. A periodic inspection of the bridge has been ordered by the PUC in Docket # C-78080300.

On September 30, 1981 the District Bridge Unit participated in the inspection of this bridge along with the Department's District 8 Bridge Unit, the Township and Amtrak. Numerous cracks had already been isolated on this bridge and we are trying to draw a correlation between the two bridges. The bridge in Gap is posted for 3 tons while the bridge on Spring Mill Road is not posted. From the age of the bridges and from the

visual inspection of a piece of steel taken from the Gap bridge we made the assumption that the steel in both bridges is either wrought iron or non-weldable mild steel.

On October 13, 1981 arrangements were made with Amtrak to inspect the Spring Mill Road Bridge. We could only get clearance over one track at the far end of the bridge enabling the inspection team to examine the bottom chord and the underside of the deck close up in one area only.

A limited inspection was able to be performed at other parts of the bridge. This revealed the following.

a. A large crack was found in the web of a vertical truss member. The crack is old, but we cannot determine the reason for a crack in this area.

b. The top chord at the near right end of the bridge contains a crack. This apparently was a brittle fracture resulting from an accident in this area of the bridge.

c. The bridge has been struck and damaged on several occasions at the near right end post. Numerous repairs utilizing welded splice plates along with other attempted welds have been made at this location. Virtually all the welds to the original steel have cracked. This further supports the assumption that the existing structure is made from non-weldable metal.

d. The truss consists of vertical beam posts with steel diagonal counter rods. An arch is carried between the top and bottom chords with the verticles notched to receive and bear on the arch. In 1945 along with the repairs the arch was cut and discontinued at the first interior vertical from the bearing. We can see no reason for the removal of the arch and how this affects the operation of the truss.

The type of design and construction for this bridge appears to be standard for the

railroad in this era. We are unsure how the combination arch-truss was supposed to work and what effect cutting the end of the arch had.

The Department feels that first and foremost the bridge should have an indepth inspection to determine its load carrying capabilities. Because of the heavy involvement with railroad traffic, the presence of the catenary wires and the design which is peculiar to railroad bridges, the bridge should be inspected by the railroad engineers. The Department will be willing to provide the services of our laboratory for any materials testing it may be able to do, and provide traffic control.

1. In view of the foregoing information and the fact that the existing roadway is only 18.5 feet wide and cannot be widened we can't find any justification for attaching a pedestrian walkway to the existing bridge.
2. While the structural condition of the bridge is questioned, the geometry of the structure alone is grossly inadequate. This section of LR 225 carries over 12,000 vehicles each day, this alone is justification for a new bridge. We recommend the construction of a new highway bridge at same location with provisions for pedestrians.
3. This PUC complaint was initiated because of a need to safely get pedestrians across the railroad tracks. The time involved with programming, financing, designing and constructing a new highway bridge will take years while there is an immediate need for the safe passage of pedestrians. We therefore recommend the construction of separate pedestrian bridge.

Serious consideration must be given to the location of such a structure.

The pedestrian bridge cannot be located adjacent to the existing highway bridge because this would interfere with any future construction of a highway bridge at this location.

If the pedestrian bridge is laterally shifted east away from the existing highway bridge it will interfere with the parking lots on each end of the bridge. The Federal Government requires a maximum approach grade of 8% for the handicapped. This grade is

less than that of the approach highway roadway. So a straight approach ramp, circular approaches or switch back approaches would interfere with the existing parking facilities.

We realize that the existing bridge is used by people other than those associated with Villanova University. However, it is probably safe to assume that a large majority of these crossings are not destination oriented but rather joggers or cyclists who could travel in other directions.

The necessity for crossing the tracks with the exception of the users of the rail facility was generated by the University's development of the complex at and around St. Mary's Hall.

Apparently there were no provisions made by the University in the expansion of their facilities to provide for the safe movement of their staff, faculty, and students.

It is our opinion that all consideration and evaluation for a pedestrian bridge should be separated from the vehicular crossing because of needs and time frames.

Our recommendation is to build a separate pedestrian bridge at the walkway which passes between Mendall Hall Buildings.

Estimates

(1) Construction of a new highway bridge.

The structure over Amtrak is on a Federal Aid Route and would qualify for Federal funds on a 75% - 25% basis for a normal replacement or 80% - 20% basis for critical bridge funding. There are not sufficient federal monies to fund projects that are presently programmed.

Before any design could be begun on new highway structure the project would have to receive capital budget approval and be moved up on the 12 Year Program. It is presently scheduled for years 9 thru 12. It would then have to be approved by the Program Management Committee.

The next step would be to hire a consultant utilizing the selection procedure which would take about 6 months. The design would take at least 12 months with the final right-of-way acquisition would probably require an additional 6 months.

- Design time approximately 24 months
- Construction will take about 18 months
- Design cost approximately $80,000
- Administration & inspection costs $65,000
- Construction of bridge only - $500,000
- Roadway approaches and right of way must be added to the above costs.

(2) Construction of a separate pedestrian bridge.

The estimated cost of constructing a separate pedestrian bridge at the location suggested earlier is as follows:

Design	$ 45,000
Construction	$300,000

In Summary

It is not feasible nor prudent to try to attach a pedestrian bridge to the existing highway bridge. A separate pedestrian bridge should be built at another location. The existing highway structure should be immediately evaluated and the planning process for a new structure should be begun as soon as funds become available.

DRAINAGE AND LIGHTING STUDY

PASSENGER TUNNEL
VILLANOVA TRAIN STATION
VILLANOVA, PENNSYLVANIA

Prepared by:

National Railroad Passenger Corp.
Philadelphia, Pennsylvania
March 1982

DRAINAGE STUDY
VILLANOVA STATION PASSENGER TUNNEL
VILLANOVA, PA

Introduction

Pursuant to the PUC order entered June 26, 1981, regarding the complaint filed by Villanova University to the flooding problem in the passenger tunnel at Villanova Station and to the safety of the University students crossing the railroad at this location, the commission has ordered Amtrak to prepare and submit a detailed study of drainage and lighting within the tunnel.

This portion of the report deals with the tunnel drainage problem. In it we describe the drainage system as it originally functioned, our analysis of the reasons for the periodic flooding that has occurred since Amtrak acquired the property in 1976, work undertaken to date by both Amtrak and Villanova University to correct the problem and our recommendations for further drainage improvements.

Flooding has occurred at a number of the station tunnels along the Harrisburg line in the last six years. In all cases, Amtrak has been handicapped in dealing with it due to lack of information on how each drainage system functioned. Plans showing underground drains (with the exception of those for cross culverts) are nonexistent.

Through field surveys and data obtained while correcting instances of flooding, we now understand, for the most part, how the Villanova Station drainage system functions so that we can now address the problem. Unfortunately, there is not one cause but a number of contributing factors which we will describe.

Existing Drainage Conditions and Causes of Flooding

Exhibit A, taken from U. S. Geological Survey mapping, shows the drainage area contributing to the station tunnel problems - for the most part water shed from the University properties on each side of the railroad. The station tunnel is at the worst possible location - near the bottom of the "bowl" of the drainage basin and at the source of the stream where gravity outlet of tunnel drainage is not easily achieved.

In general, the drainage design that was developed provided for efficient handling of runoff by track ditches, pipes and inlets emptying into the existing stream. In the station area, the subsurface (tunnel) and surface drainage systems were separated. The tunnel flooding is the result of certain breakdowns in both systems - due to deferred maintenance and aging of the system - which have resulted in leakage of surface runoff into the tunnel system and impaired the free flow of tunnel drainage.

Exhibit B-1 shows the system of inlets, pipes and ditches within the station area. Arrows indicate direction of flow.

The passenger tunnel (Photo #1*) is of brick arch construction. Two rows of weep holes are provided, one row near the floor and one at the spring line, 4'-6" above the floor. They consist of unmortored spaces left between adjacent bricks. Weep holes allow ground water to percolate through the tunnel walls to prevent hydrostatic pressure build-up. Water penetrating the walls drops to open gutters on each side of the tunnel walkway. These drain to new 6" x 2'-6" grate inlets at the north end of the tunnel (Photo #2). The inlets are connected to a covered junction box in the floor of the tunnel on centerline by new 6" pipes. From here a 12" vitrified clay pipe carries the flow north then east parallel to the tracks to a stream near Ithan Avenue, about 2,000 feet from the station. Since flow is by gravity and the tunnel deep, the long run of pipe was needed to meet the grade of the stream. The pipe is about 15 feet deep in the first half of its run (to manhole #2), then the depth diminishes to just a few feet at Ithan Avenue.

In addition to seepage through the tunnel walls during storms, the 12" outlet pipe also handles constant spring flow. A channel is constructed under the tunnel floor centerline carrying this flow to the junction box, thence to the 12" pipe. The 12" tunnel outfall pipe was, therefore, intended to handle subsurface flow only, while a separate system was to handle surface flow.

Flooding problem began because of three factors:

1. Development of adjacent properties within the drainage basin

2. Deterioration of surface drainage system which dumped some of its load onto the tunnel system

3. Deterioration of the 12" vitrified clay tunnel outfall pipe.

Surface runoff west of the station sheet flows from properties on both sides of the right-of-way to the track ditches. Development of the properties has increased the volume of rainfall runoff, which has put additional load on the drainage system. This is because of reduced time of concentration due to piping and increased runoff rate due to the paved surfaces. The track ditches flow east to pipes through the station platforms. The through-platform pipes pass over the tunnel and outlet to streams or ditches. If blockages within the pipe back water up or if water is not entering the pipes due to clogging of the inlet ends of the pipe or the ditch itself, water will flow down the trackbed and surcharge the tunnel.

*Refer to photo index, Exhibit B-3.

Blockages in these pipes have occurred and continue to re-occur. The eastbound platform pipe (two 18" V.C. pipes) outlets to the ditch frequently clog due to instrusion of ballast and silt (Photo #11). During heavy rains, we have observed water seeping in through the mortared tunnel joints as well as the weep holes which in all likelihood indicates intrusion of surface water. The outlet of the westbound platform pipe (12" C.M. pipe) has yet to be found, meaning that in all likelihood it may be clogged or sealed. The inlet ends of the platform pipes are provided with reinforcing bar screens to keep debris out. If not periodically cleaned, these accumulations of debris will restrict flow. As the ditches fill up, water is directed more and more into the track bed. In addition to this, on the westbound side, the bank has collapsed in several places due to runoff from the University tennis court area completely silting up 400 feet of the ditch west of the westbound platform.

Another source of water in the tunnel was, at one time, surface flow from the parking areas on the south side of the railroad. Flow from both the Amtrak and University parking lots would periodically cascade down the tunnel steps at the south end. Water from the 0.3 acre Amtrak parking lot was bypassing its two inlets because of clogging with leaves and debris, overflowing the shallow brick gutter and flowing down the steps. Of more serious consequence, the 1.0 acre University lot next to Mendel Hall was designed so that its entire runoff was directed to the sidewalk leading to the station platform and tunnel (Photos # 3, 4 & 5). Two inlets were installed recessed on each side of the sidewalk. Unfortunately, the sidewalk was not adequately crowned and the abrupt recessing of the inlets allowed much of the flow to bypass the inlets. Additionally, the 18" outlet from these inlets flows to the east end of the eastbound where it joins the two platform pipes in silting up (Photo #11).

The 2,000 foot long vitrified clay tunnel outfall pipe, is apparently collapsing due to age, loading and penetration by tree roots through its joints. Blockages have occurred at various locations between the tunnel and a point 50 feet east of manhole #2 - the length where it is most deeply buried. Tree roots have been removed near large trees.

Improvements Since Amtrak's Acquisition (Exhibit B-2)

Amtrak has responded each time to flooding of the tunnel by pumping the water out and hiring private contractors to clean the 12" outlet pipe by water jetting. Jetting has reopened the pipes sufficiently to at least handle the spring flow but probably not much more.

In the course of one cleanout from the tunnel end, the tunnel inlets were rebuilt and the covers replaced with commercial open grates. Originally the only inlet was a single 6" diameter pipe with steel cover pierced by small holes. This was replaced by two new 6" x 2'-6" inlets and new 6" pipe connections were installed. The tunnel floor was repaved and 2" x 6" gutters were formed on each side of the walkway. The wall joints were pointed.

Manholes #1 and #2 have also been improved and more substantially covered. A 2" pump was installed in manhole #1 outletting to the stream to lower the water level should water backup in this manhole.

Late in 1981, both Amtrak and the University took steps to stop intrusion of surface water on the south side. In September, Amtrak B&B forces cleaned the brick gutters surrounding its parking lot, rebuilt the two inlets to provide greater capacity, and built a 1'-3" high splash wall around the eastern end of the lot to contain any overflow (Photo #6 & #7). Track gangs cleaned out the outlet ends of pipes under the eastbound platform and cleaned the ditch. Later the University constructed a grate inlet across the sidewalk between the existing inlets to intercept sidewalk flow. They also formed an asphalt lip across the upper end of the sidewalk to cut off flow down the sidewalk.

All of the above has reduced the problem but has not cured it. A complete cure could be achieved by reconstructing the outfall pipe for its entire 2,000 foot length to handle the present discharge. This would be quite expensive - on the order of $250,000.00. The most cost effective solution is to correct the deficiencies that are emptying surface runoff into the tunnel system and attempt to locate precisely the points of blockage in the 12" outfall, then eliminate them by clearing the line or replacing pipe sections.

Proposed Future Action

Amtrak's plans for further action include the following:

1. Keep the 12" tunnel gravity drain line functioning by continuous monitoring and maintenance. Since 99% of the foot traffic through the tunnel is University students going to and from classes and University maintenance people are "on the ground" at all times, it would seem appropriate and expedient that University employees handle periodic inspections and debris removal of the tunnel and parking lot inlets.

   The University should alert Amtrak immediately at the first sign of flooding due to stoppage within the pipes. Amtrak should then respond immediately to reopen the lines.

2. Dye tests to determine location of outlet of 12" pipe under westbound platform and clean the pipe.

3. Clean out and reshape track ditch west of westbound platform leading to this pipe. There are a number of accumulations of spoils and eroded material from the banks that deflect ditch flow into the track areas. In the most recent flooding, infiltration through the tunnel walls occurred mainly at the westbound end of the tunnel. Also, clean out accumulations of debris in ditch west of eastbound platform (photo #9).

4. Construct an L-shaped headwall for the three pipes outletting at the east end of the eastbound platform. This will keep ballast out of the pipes. Clean out ditch to the east.

5. Make a field survey to obtain elevations of pipe inverts. This will permit us to: (1) evaluate the capacity of the existing pipes and (2) determine feasibility of outletting tunnel outfall pipe to the stream at some intermediate location to reduce the length of run.

6. Remove trees suspected of causing root damage to outfall pipe (photo #10).

7. Evaluate need for further corrective action which could include:

   (a) Locating exact point of blockages in tunnel pipe and excavate and replace pipe.

   (b) Constructing new pump manhole as near to tunnel as possible and installing larger pump.

Estimated cost for the first stage work - items 1 through 6 - is $15,000.00.

There is additional work required of Villanova University. In item 3 above, we mentioned eroded material accumulations in the ditch west of the westbound platform (photo #8). The ditch is filled for a length of 400 feet west from the Spring Mill Road bridge with material that has eroded out of the cut side slope. Erosion seems to be concentrated at two specific locations where pipe storm drain systems in the Villanova tennis court area apparently outlet to the railroad.

It appears that these pipes (the pipes are not visible, the erosion being so deep) are too short, outletting above the slope and causing the slope to erode. The solution would be the extension of the pipes down to the ditch line.

Villanova University should verify the existence of these pipe outlets, uncover the outlet ends of the pipe, and extend the pipes to the ditch line.

LIGHTING

LIGHTING

VILLANOVA STATION PASSENGER TUNNEL
VILLANOVA, PA

The lighting within the tunnel was renewed in early 1980 at a cost of about $3,000.00. The new lighting, Photo #1, is comprised of flourescent type fixtures mounted on the ceiling in the center of the tunnel.

It is our opinion, the lighting is satisfactory and provided there is no vandalism, it does not need replacement with a different type of system.

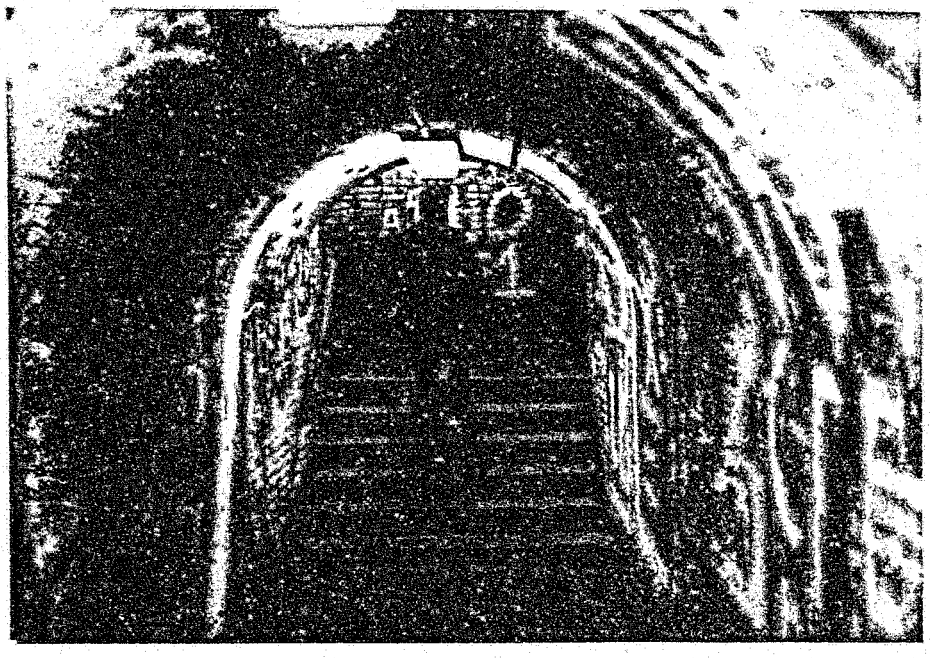


PHOTO #1

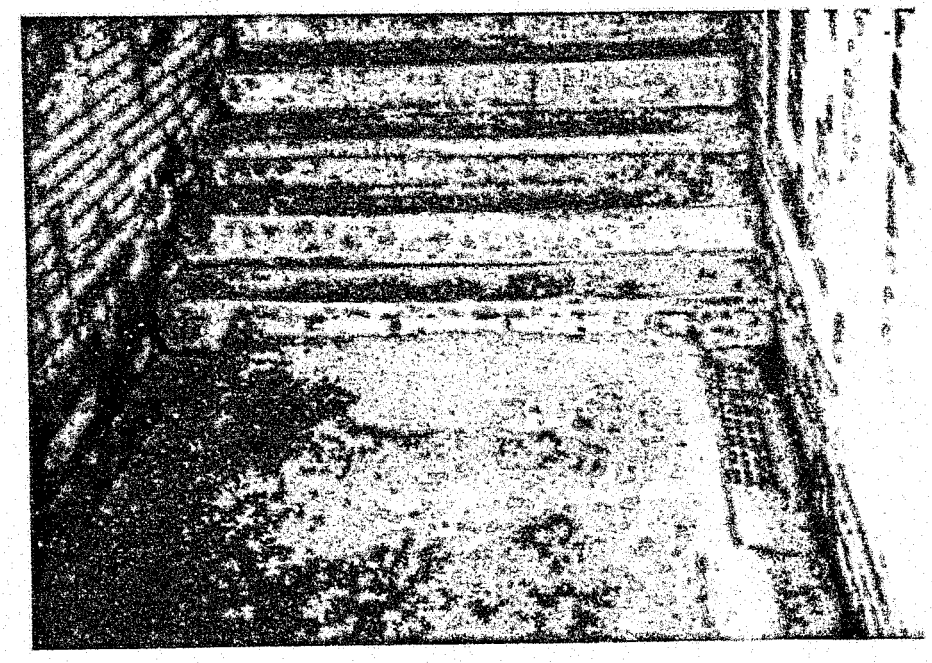
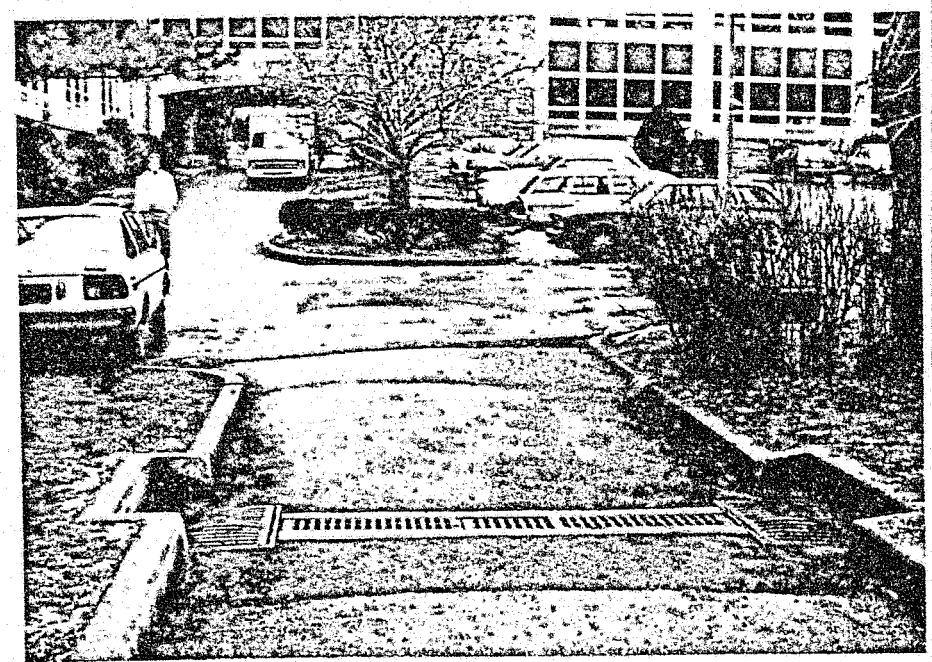


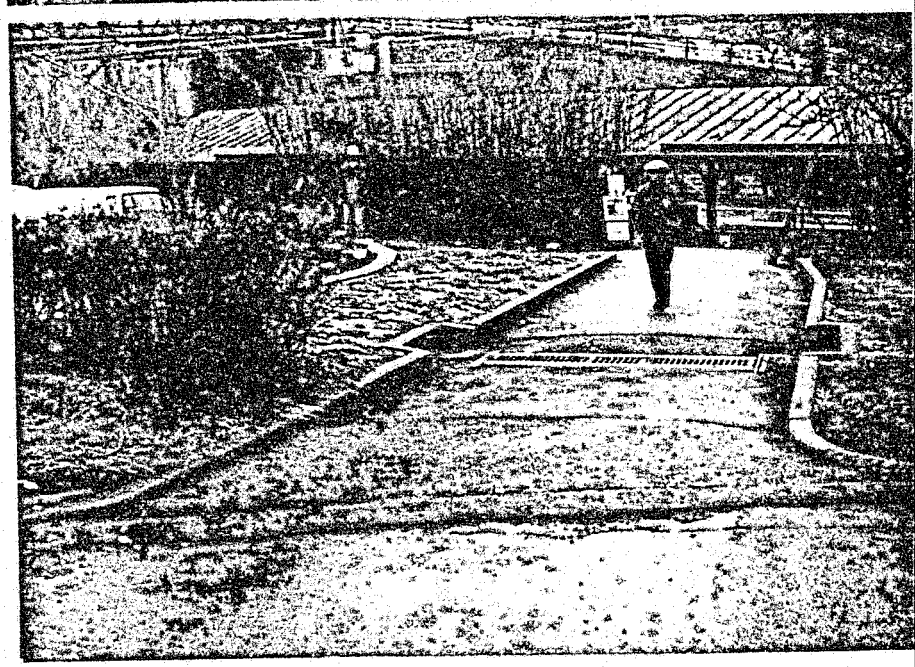
PHOTO #2

PEDESTRIAN TUNNEL & DRAINS

PHOTO #3
SIDEWALK TO EAST-BOUND STATION PLATFORM BEFORE UNIVERSITY WORK

PHOTO #4 & 5
AFTER UNIVERSITY WORK





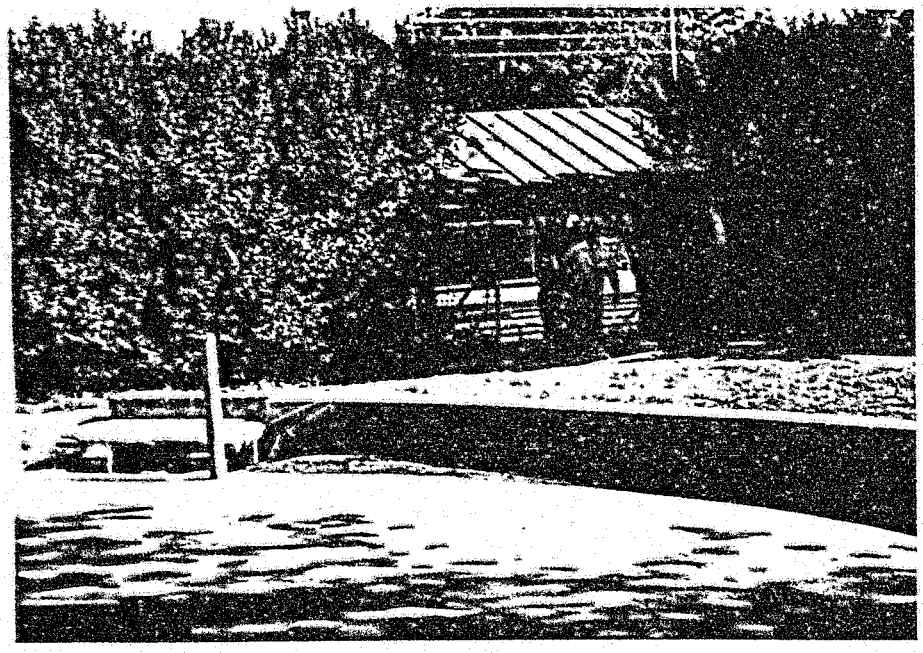


PHOTO #6

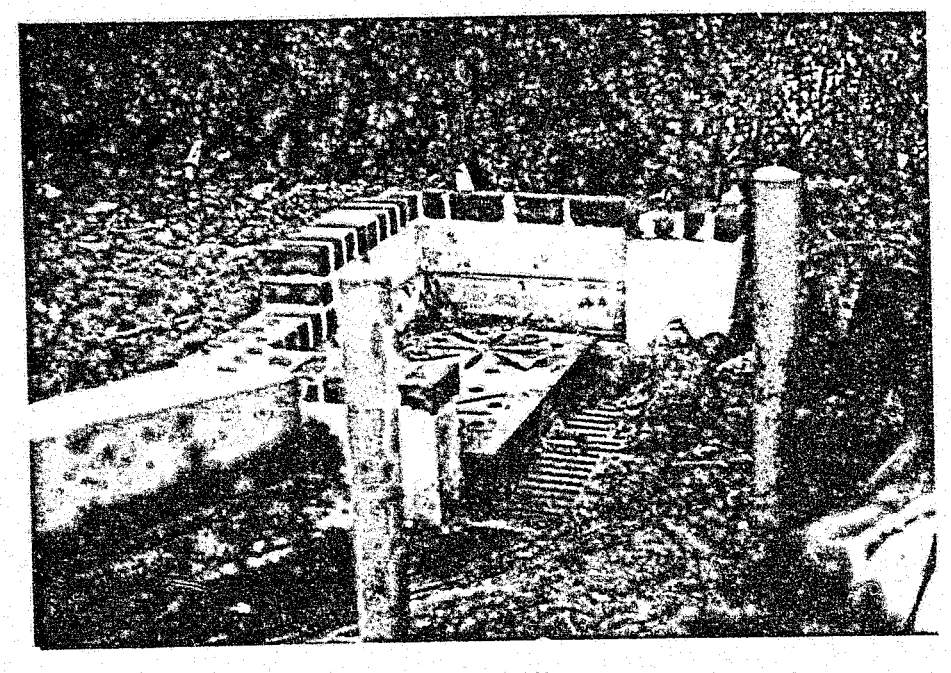


PHOTO #7

STATION PARKING SHOWING REBUILT
INLETS AND NEW SPLASH WALL

PHOTO #8
TRACK DITCH WEST
OF WESTBOUND PLATFORM
(LOOKING EAST)

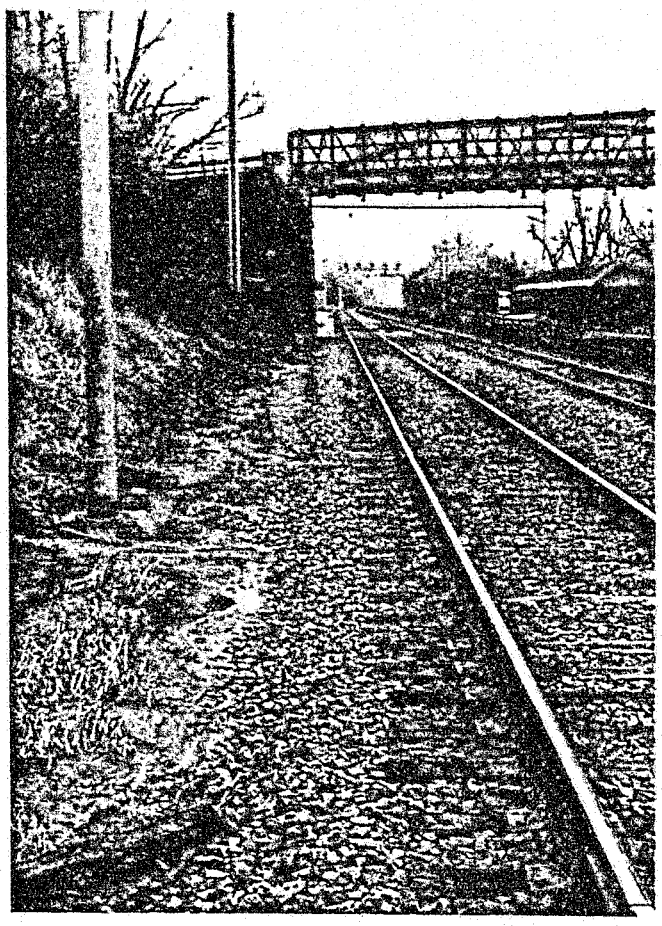


PHOTO #9
TRACK DITCH WEST
OF EASTBOUND PLATFORM
(LOOKING EAST)

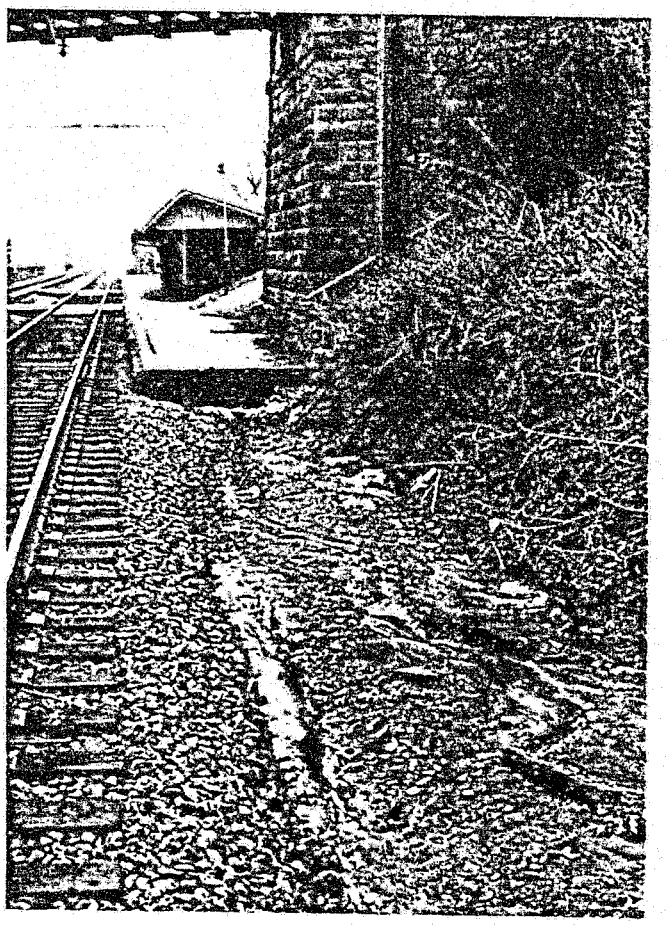
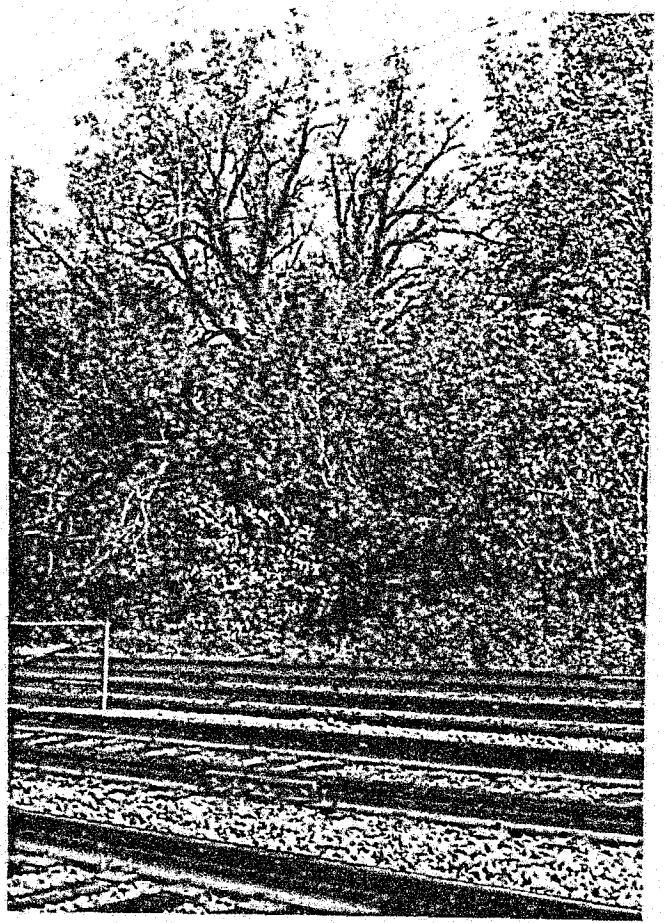


PHOTO #10
TREE EAST OF
MANHOLE #1



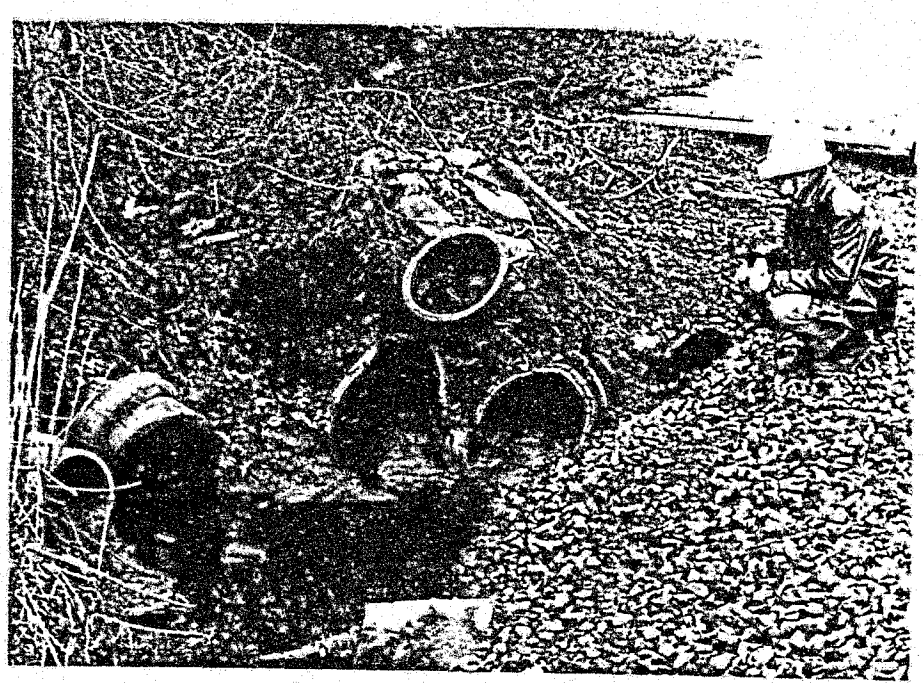


PHOTO #11
PIPES OUTLETTING EAST OF
EASTBOUND PLATFORM

PHOTO #12

INLET END OF 12" C.M.
PIPE THROUGH WESTBOUND
PLATFORM

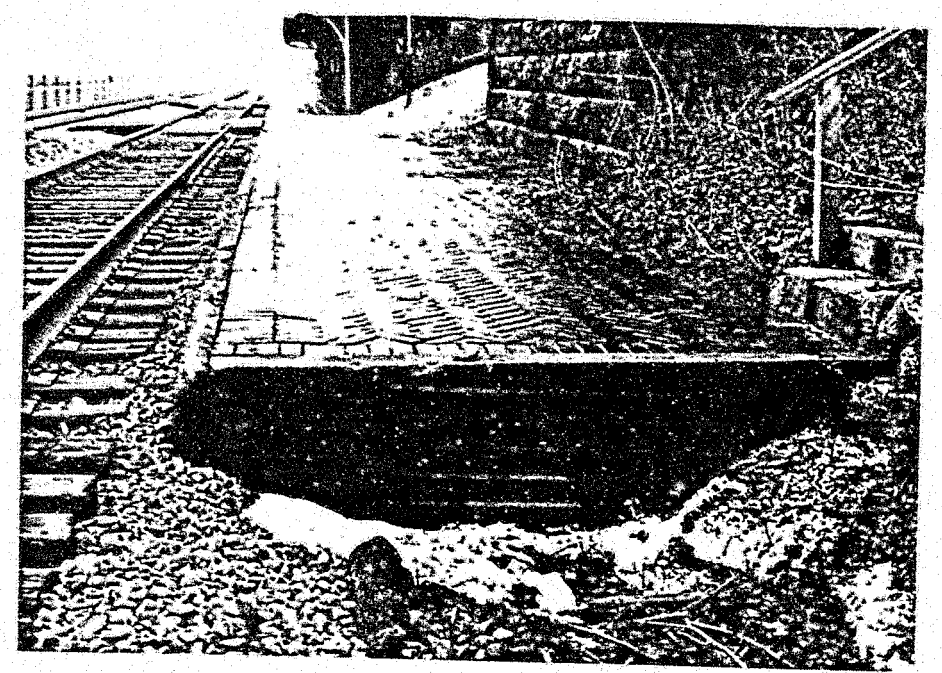


PHOTO #13
INLET END OF TWO 18" V.C. PIPES
THROUGH EASTBOUND PLATFORM

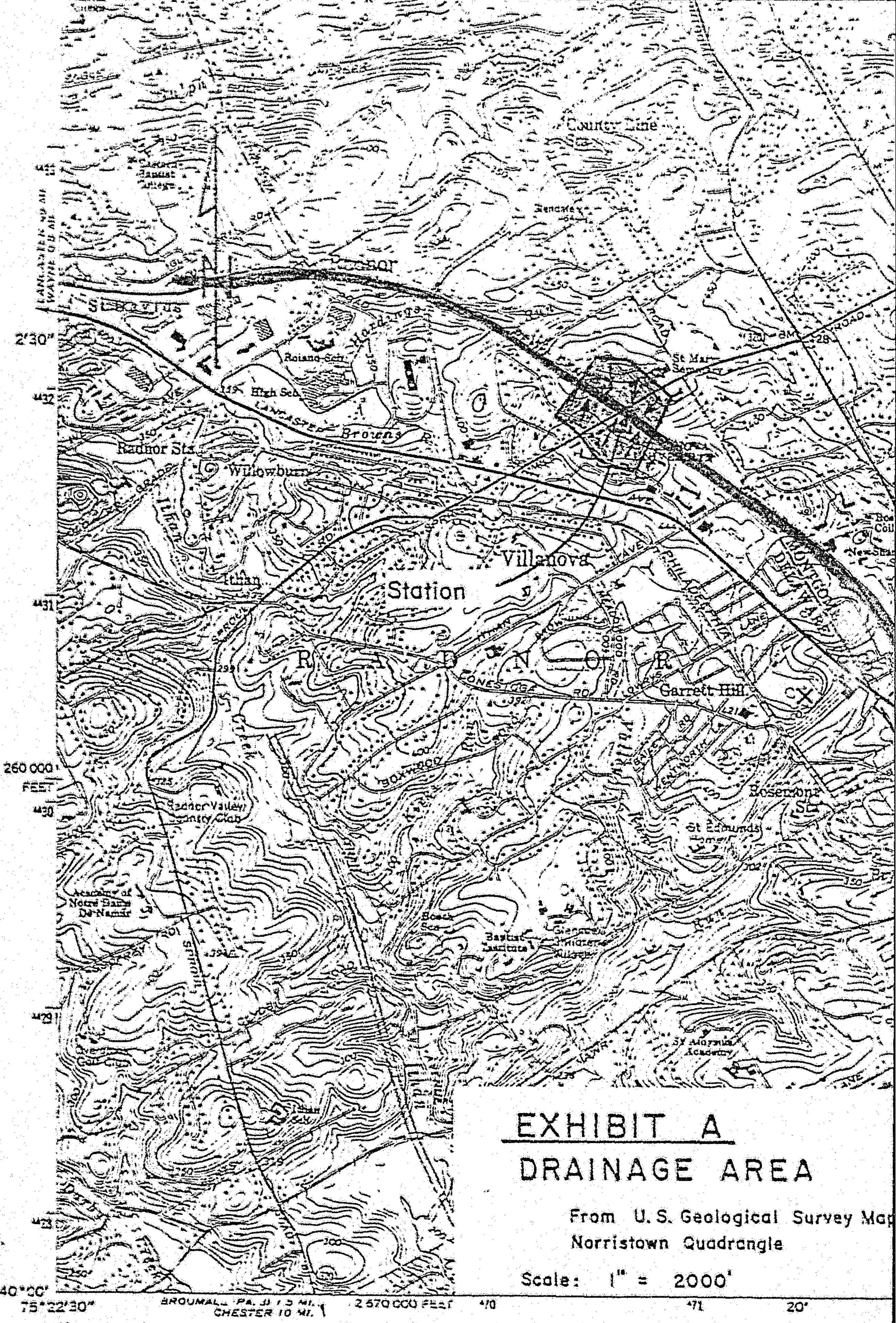


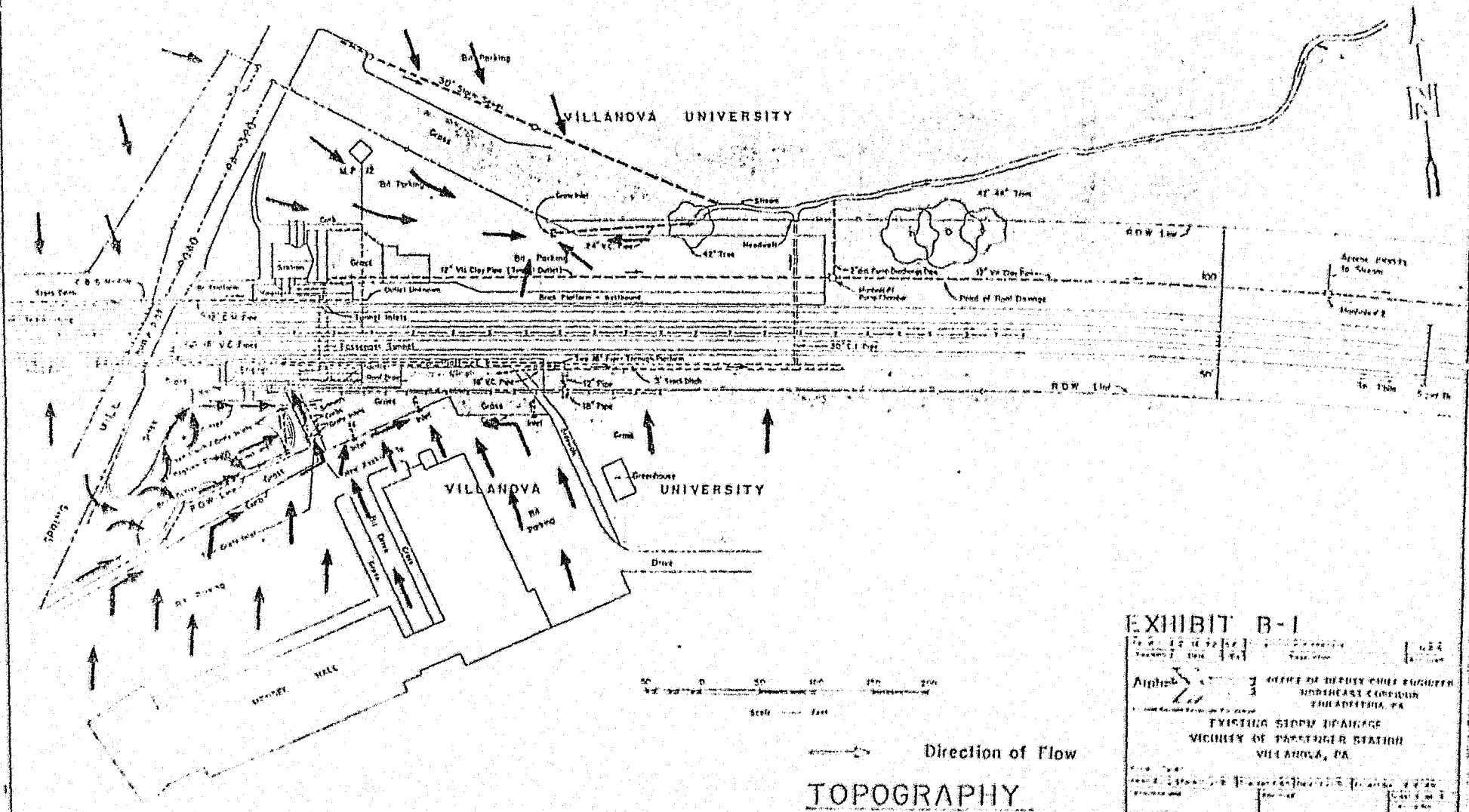
EXHIBIT A

DRAINAGE AREA

From U.S. Geological Survey Map
Norristown Quadrangle

Scale: 1" = 2000'

Mapped, edited, and published by the Geological Survey

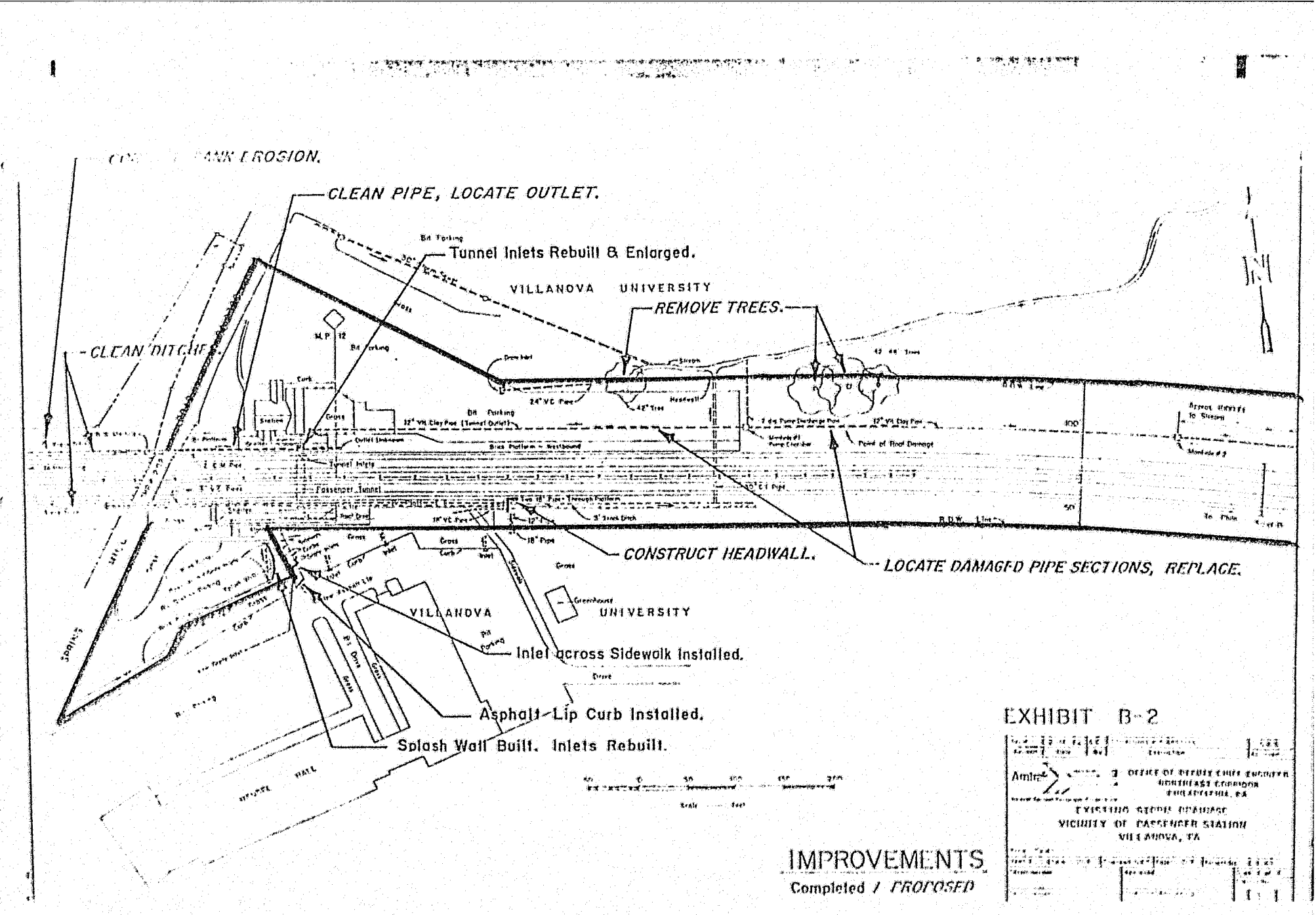


TOPOGRAPHY

EXHIBIT B-1

OFFICE OF DEPUTY CHIEF ENGINEER
NORTHEAST CORRIDOR
PHILADELPHIA, PA

EXISTING STORM DRAINAGE
VICINITY OF PASSENGER STATION
VILLANOVA, PA


CLEAN PIPE, LOCATE OUTLET.
Tunnel Inlets Rebuilt & Enlarged.
VILLANOVA UNIVERSITY
REMOVE TREES.
CLEAN DITCHES
CONSTRUCT HEADWALL.
LOCATE DAMAGED PIPE SECTIONS, REPLACE.
VILLANOVA UNIVERSITY
Inlet across Sidewalk Installed.
Asphalt Lip Curb Installed.
Splash Wall Built. Inlets Rebuilt.
IMPROVEMENTS
Completed / PROPOSED
EXHIBIT B-2
EXISTING STORM DRAINAGE
VICINITY OF PASSENGER STATION
VILLANOVA, PA

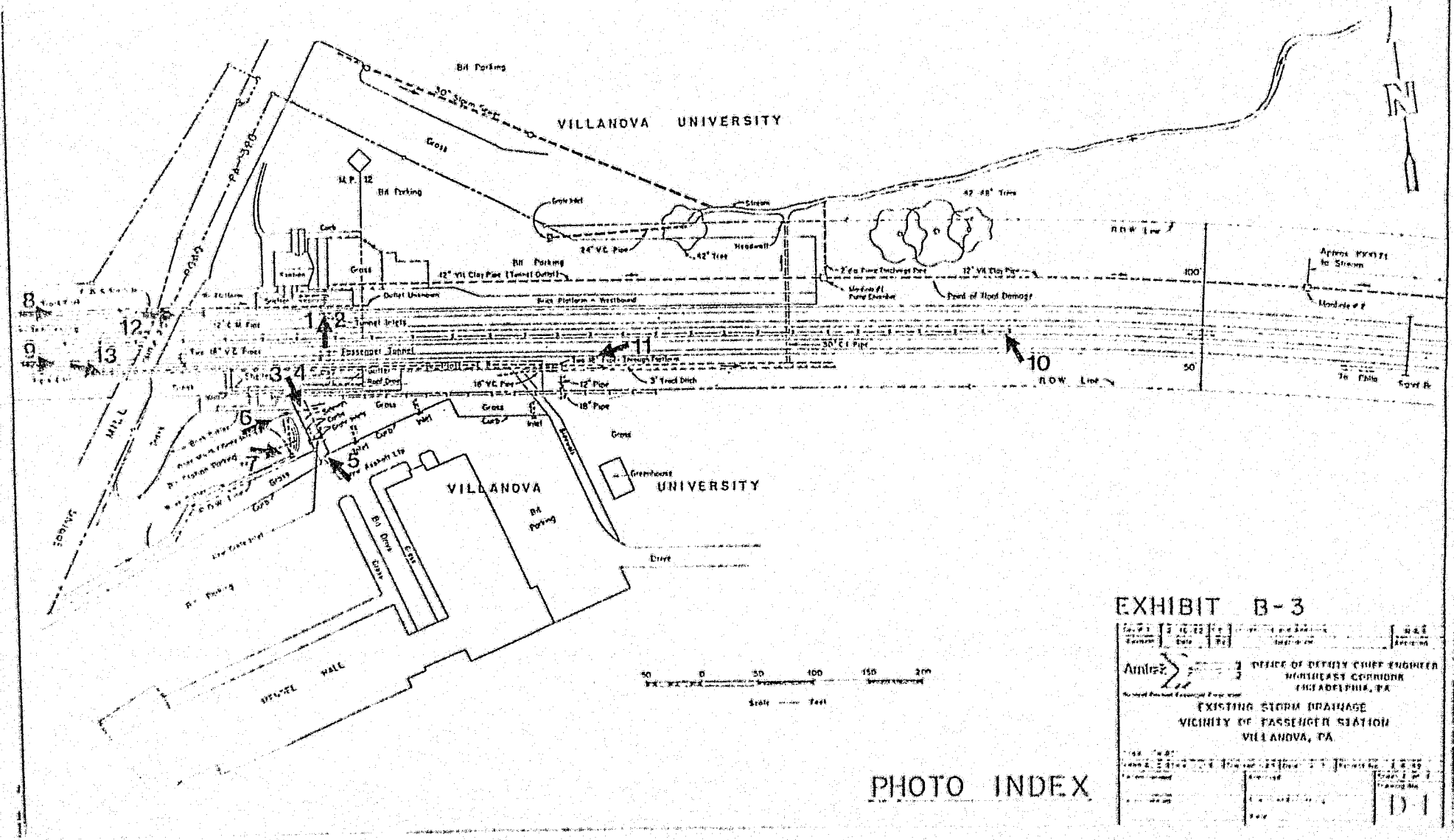


PHOTO INDEX

EXHIBIT B-3

Amtrak

OFFICE OF DEPUTY CHIEF ENGINEER
NORTHEAST CORRIDOR
PHILADELPHIA, PA

EXISTING STORM DRAINAGE
VICINITY OF PASSENGER STATION
VILLANOVA, PA

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Addendum to Report on Villanova Station Passenger Tunnel Flooding

N. Satterthwaite - June 1, 1982

In our report, we theorized, based upon observations and reports of our field personnel and physical evidence, that the majority of the water flooding the passenger tunnel was coming from the University's Mendel Hall parking lot via the sidewalk. On May 28, 1982, I visited the site during a moderately heavy rain and observed firsthand the actual source of the water.

As shown on the attached sketch, storm runoff is flowing off Villanova University property along the east side of Spring Mill Road south of the railroad into the roadway gutter. Very heavy gutter flow was observed along the 800 foot long grade down the hill to the low point in the roadway profile at the start of the bridge approach - at the entrance to the Amtrak parking lot.

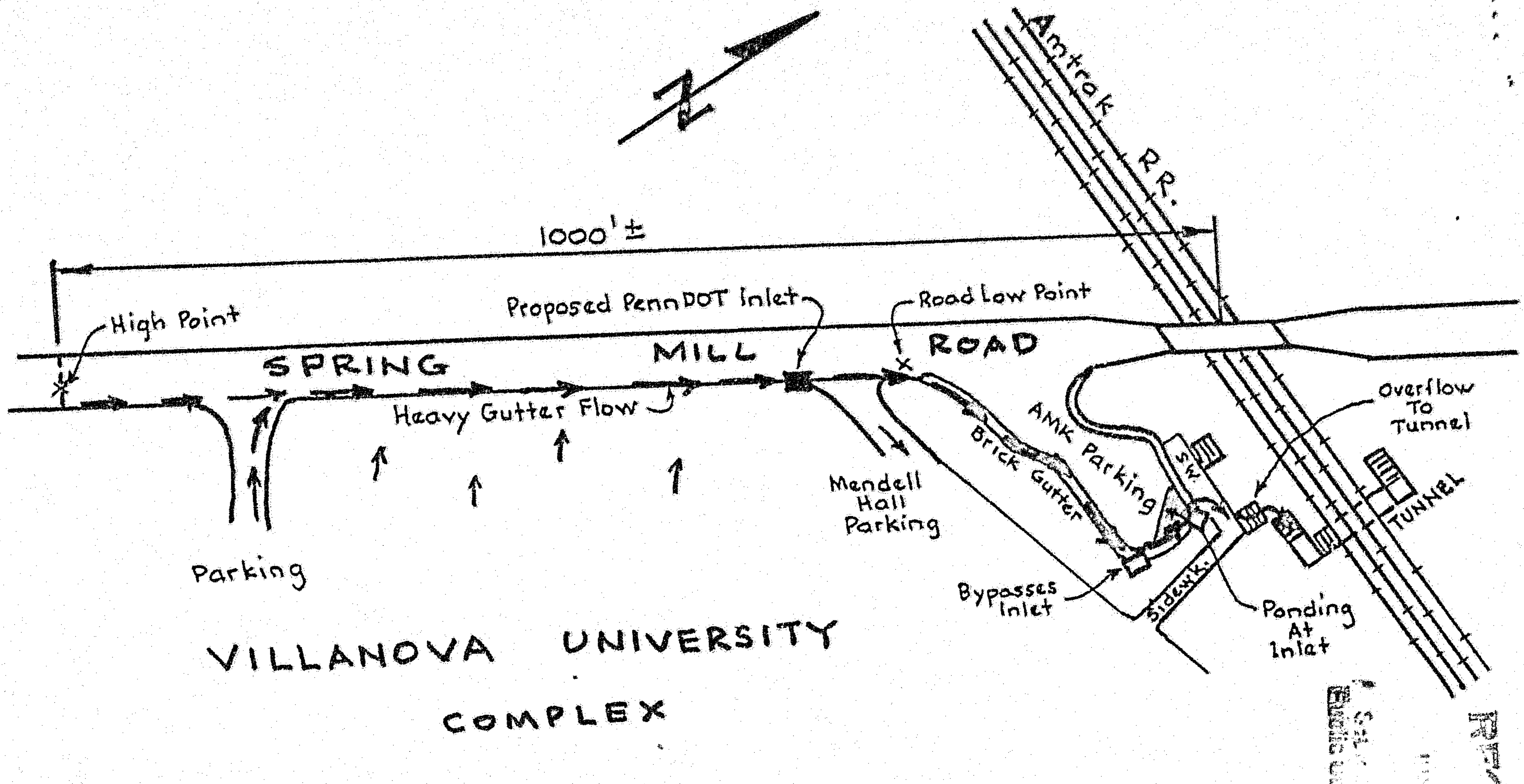
This heavy flow swept into the parking lot in the brick gutter on the south side of the lot. Most of the water bypassed the first inlet and flowed to the second inlet. Here it ponded to a depth of about 8 inches and was on the verge of flowing around the end of the 6 inch curb on the north side of the lot, along the sidewalk, down the steps and into the tunnel. Since the level of the ponding water was in equilibrium, the second inlet was handling, but just barely, the heavy gutter flow.

Earlier, during a somewhat greater intensity of rainfall, the water had overflowed and cascaded down the steps as I noted puddles on each step descending to the tunnel. (There was only a small amount of standing water in the tunnel gutter as a result of damming by small accumulations of sediment). It was easy to imagine a rainfall of heavy intensity flooding the tunnel.

A considerably lesser gutter flow was observed along the north curb of the University Mendel Hall parking lot and this was being effectively blocked from entering the station sidewalk by the newly installed asphalt lip curb. There was no flow at all in the track ditches upgrade from the tunnel. There was no seepage through the tunnel walls. Spring Mill Road and the Mendel Hall parking lot appeared to have been the only two sources of flood water. Estimated ratios are 95% from the road and 5% from the parking lot.

Now, with the Mendel Hall parking lot flow diverted, the tunnel floodwater's sole source is the Spring Mill Road gutter flow which enters Amtrak's parking lot. The recommended solution is that a short curbed section be developed in the gutter and a combination open mouth and grate 6 foot inlet (or inlets) be

installed to intercept the water before it enters railroad property. This would be emptied into the track ditch. Due to the considerable flow, Amtrak will require adequate and effective erosion control at the outlet to the ditch.



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